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Raven SR Bioenergy Project
Updated Initial Study / Mitigated Negative Declaration

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Appendix

1. General Project Information

1.1 Project Title

Raven SR Bioenergy Project

1.2 Lead Agency Name and Address

City of Richmond (City)
Community Development Department
450 Civic Center Plaza
PO Box 4046
Richmond, CA 94804-1630

1.3 Project Case File Number

City Project Case Number: PLN21-282

1.4 Contact Person and Phone Number

Lina Velasco, Director of Community Development
Community Development Department
Lina_Velasco@ci.richmond.ca.us
(510) 620-6841

1.5 Project Location

1 Parr Boulevard, Richmond, California (generally).

The proposed Raven SR Project location is within the West Contra Costa Sanitary Landfill (WCCSL) facility located in the northwest area of the City of Richmond, in Contra Costa County, California. For purpose of this environmental document, the project would occur within approximately 2.5 acres of the existing Republic Services Bulk Materials Processing Center (BMPC) within "Area A" of the WCCSL.[1,2] The property is located approximately 0.25 miles west of Parr Boulevard (approximately 0.25 miles west from Richmond Parkway) via an unpaved access road. The northern boundary of the project site is the City of Richmond / Contra Costa County jurisdiction line; the project site is located wholly within the City of Richmond, except for use of an existing access/egress road located within the County. The project site is located within Assessor's Parcel Number (APN) 408-140-009.

[1] Actual project operations will occur on a subset area of approximately 1.3 acres that Raven SR will lease from BMPC.

[2] "Area A" of the WCCSL is approximately 12 acres in the upland portion of the property that encompasses pollution control facilities and stockpile areas (separate from the closed Class I and active Class II landfill areas, the runoff ponds or lagoons delineated as "Area B", and tidal waters delineated as "Area C"). Shown in Figure 3-1, Vicinity Map, of the *Environmental Impact Report on the West Contra County Sanitary Landfill Bulk Materials Processing Center and Related Actions,* June 2004. SCH. 2002102057.

See **Figure 1-1, Regional Context**; **Figure 1-2, Local Context – North Richmond**; and **Figure 1-3, Project Site and Surrounding Landfill Setting**, on the following pages.

1.6 Project Applicant's Name and Address

Raven SR S1, LLC [3]
Matt W. Murdock CEO
PO Box 1360
Pinedale, WY 82941

1.7 Existing General Plan and Zoning Designations

The project site and surrounding area is located within ~~the~~ Richmond's "Open Space" General Plan land use designation and Richmond's "Open Space" zoning district.

1.8 Purpose and Intended Use of this Document

The purpose of this Draft Initial Study/Mitigated Negative Declaration (IS/MND) is to identify any potential environmental impacts that would result from implementation of the proposed project pursuant to California Environmental Quality Act (CEQA) Guidelines. As the project site is wholly located within the City limits, the City of Richmond has discretionary authority over the proposed project and is the lead agency in the preparation of this Draft IS/MND. The intended use of this document is to disclose the potential environmental impacts and mitigation measures, if any, and to provide the basis for input from public agencies, organizations, and interested members of the public.

Extensive prior CEQA analyses have been conducted for the WCCSL site over the last three decades. Solid waste disposal operations at the WCCSL began in 1952, prior to implementation of CEQA. Over the years, operational changes have occurred as new regulations, permits, and recycling operations have been implemented. Currently, solid waste management facilities at the WCCSL include a closed Class II municipal solid waste landfill, a Waste Shuttle Facility, and the BMPC. The BMPC was originally analyzed under CEQA in the early 1990's. The City of Richmond issued a conditional use permit (CUP), and Contra Costa County issued a Land Use Permit (LUP) for the facility. In the early 2000s, in response to Republic Services' request, the City and County approved amendments to the use permits to allow expanded and additional waste streams for the BMPC. An EIR was prepared and certified by Contra Costa County in 2004 to address the additional and expanded waste streams.[4]

This CEQA document is a stand-alone analysis for the proposed Raven SR project. Where appropriate and suitable, setting and context information from prior CEQA documents certified for the WCCSL/BMPC facility and operations is used in parts of this Draft IS/MND to describe

[3] The P~~p~~roject A~~a~~pplicant is referred to throughout as "Raven SR". "Raven SR" also refers to the multi-patented process/system. "Raven" refers to the proposed facility.

[4] *Environmental Impact Report for the WCCSL Bulk Materials Processing Center and Related Actions*, State Clearinghouse No. 2002102057, June 2004.

the existing setting and baseline conditions, given that the project site is located within the WCCSL/BMPC facility.[5] However, no part of the proposed project affects existing WCCSL/BMPC operations; the proposed development and Raven SR system is a wholly independent utility, except that it would use feedstock available from the current onsite composting facility referred to as the West Contra Costa Sanitary Landfill Organic Materials Processing Facility (OMPF)~~BMPC operation~~. Mitigation measures identified in this document will apply solely to the proposed project and do not conflict with any applicable mitigation measures identified in the previously certified WCCSL/BMPC CEQA documents. Similarly, and addressed separately from this CEQA document, the proposed project requires approval of a City of Richmond Conditional Use Permit (see Section 1.11, below), which is wholly independent from the existing City Conditional Use Permit (CU 1101132 as amended) and Contra Costa County Land Use Permit (LUP 2054-92 as amended) for the WCCSL/BMPC, as well as any existing permits, control

[5] *Environmental Impact Report on the West Contra County Sanitary Landfill Bulk Materials Processing Center and Related Actions,* June 2004; and *Addendum to the Final EIR for the WCCSL BMPC and Related Actions*, 2009. SCH. 2002102057.

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SOURCE: Raven LLC, 2022

Raven SR Bioenergy Project Initial Study

Figure 1-1
Regional Context

ESA

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SOURCE: Raven LLC, 2022

Raven SR Bioenergy Project Initial Study

Figure 1-2
Local Context - North Richmond

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SOURCE: Raven LLC, 2022; ESA, 2022

Raven SR Bioenergy Project Initial Study

Figure 1-3
Project Site and Surrounding Landfill Context

ESA

measures or cooperative agreements executed by various regulatory agencies that have permitting authority for the WCCSL/BMPC.

On October 7, 2022, the City as lead agency released for public review the draft IS/MND pursuant to requirements of CEQA. The original public review and comment period on the IS/MND was October 7, 2022, through November 7, 2022. However, the City extended the comment period to November 22, 2022, to allow for additional opportunity for public review. Approximately 19 written comments were received during this period. Although not required by CEQA, the City the responded in writing to all written comments received on the IS/MND during the public review period. The City's Response to Comments memorandum is included as **Appendix D** to this document. The project was then presented to the City's Planning Commission, which held a public hearing on December 15, 2022, to consider approval of the project by approval of the IS/MND and Mitigation Monitoring and Reporting Program (MMRP) and Design Review and Conditional Use Permit, which would allow the project to construct and operate a bioenergy facility that converts food and green waste into transportation-grade hydrogen for various renewable energy products (PLN21-282). After consideration of all evidence before it, including public comment, both written and oral, the Planning Commission then approved the project. The approval was then appealed.

Given the comments provided during the hearing and in the written appeal, it appeared that there were still questions and concerns from the public and the appellants regarding aspects of the proposed project. It became evident that the public would benefit from additional information added to the IS/MND that would clarify, amplify, or otherwise more fully explain the information in the original IS/MND. For example, additional description of a greater number of proposed operational details was requested. Additionally, although not required as the initial significance thresholds had not been met, the City required a preparation of a health risk assessment (HRA) and further assessment of the project impacts on air quality and greenhouse gas (see Appendix A to this document). This information, including clarification of operations and that the project would result in better health outcomes and reduced impacts to air quality, etc., as compared to current operations and landfill flare emissions at the site, has been incorporated into this updated IS/MND. This updated IS/MND has highlighted these refinements by noting them in either as deletions in "~~strike through~~" and additions in "double underline" (such as this sentence) to facilitate review.

Given that the new information added to the updated IS/MND merely clarifies, amplifies, or otherwise makes insignificant modifications to the original IS/MND, recirculation of the document is not required by CEQA. Regardless, to ensure greater transparency and to make additional clarifying information available to the public, the City has again recirculated this (now updated) IS/MND for public comment. It is anticipated that this updated IS/MND and the comments received during review, will be considered by the City Council during its consideration of the appeal from the decision of the Planning Commission.

The remainder of this **Section 1** provides an overview of the project's primary characteristics and its environmental setting and required discretionary approvals. **Section 2** describes the project in more detail, **Section 3** is the draft environmental declaration, and **Section 4** is the environmental

checklist that evaluates the potential environmental impacts that may result from construction or operation of the proposed project. **Section 5** contains the List of Preparers.

1.9 Project Overview

The Raven SR Bioenergy Project (project) proposes to construct and operate a bioenergy system composed of the Raven SR multi-patented Steam/CO_2 Reformation process at the project site.[6] The non-combustion Raven SR process would convert blended green waste and food waste, obtained from the existing onsite OMPF composting ~~BMPC~~ operation ~~adjacent to~~located approximately 1,100 feet west of the project site, into renewable, low-carbon, transportation grade hydrogen. The low-carbon hydrogen produced from renewable feedstock would be for off-site use in trucks and other heavy-duty applications in lieu of petroleum-based diesel. to the project will reduce emissions of criteria pollutants and produce low-carbon hydrogen to reduce greenhouse gas (GHG) emissions from transportation and other hard-to-abate sources. The produced hydrogen ~~that~~ would be exported offsite for various renewable energy products. No long-term hydrogen storage would occur onsite.

The Raven SR process would reduce existing flaring of landfill gas (LFG, gas produced from the decomposition of organic solid wastes in the landfill to generate power. Raven intends to produce the hydrogen through a process that uses less power consumption per kilogram of hydrogen produced than conventional electrolysis technologies.[7] The project would involve the erection of a modular structure and industrial canopy.

1.10 Environmental Setting

As shown in Figure 1-2, industrial use and natural waterways create the environment setting of the project site located within the boundary of the WCCSL facility. The WCCSL facility spans approximately 340 acres generally between Parr Boulevard and San Pablo Bay, south of San Pablo Creek. This area is composed of expansive planted disposal areas/landfill mounds, runoff control ponds and lagoons, the organic material processing facility and composting areas, and the location of the proposed project (within part of the BMPC area), is situated in the southeast area of the WCCSL facility. San Pablo Creek and the San Pablo and Wildcat Creek tidal marshlands exist north and south of the WCCSL facility. Open water of San Pablo Bay is approximately 0.25 miles west from the project site.

Figure 1-3 shows the closest structure and development is the Golden Bear Waste Recycling Facility (part of the BMPC) approximately 300 feet southwest of the proposed project location, and the West County Wastewater District Treatment Plant and the Wildcat Marsh Trail and trail head parking exist approximately 1,000 feet east of the project location. The surrounding uses are industrial, commercial and open space; the nearest sensitive receptors to the project site are

[6] CO_2 is carbon dioxide.

[7] Electrolysis is a process that uses an electric current to split water molecules into their constituent elements of hydrogen and oxygen. Hydrogen that is produced through electrolysis using renewable energy sources is known as "green hydrogen".

residential uses, an elementary school, and a health clinic, all within approximately 0.75 to 1.2 miles southeast in the North Richmond area.

1.11 Required Discretionary Approvals

- **City of Richmond (Lead Agency)**: Adoption of the CEQA Documentation, Mitigated Negative Declaration; Conditional Use Permit for a new activity and facility to convert organic waste to hydrogen[8]; and various development permits, including but not limited to site preparation, construction and building activities.

1.12 Other Agencies Whose Review or Approval Is Required

- **Bay Area Air Quality Management District (BAAQMD)**: Issuance of an Authority to Construct (ATC) for the associated air pollutant emissions. Raven SR has applied for an ATC air permit to be issued by BAAQMD. This permit application is currently undergoing review.

- **East Bay Municipal Utilities District:** Issuance of water supply service and approval of needed water main extensions and/or any off-site pipeline improvements.

- **West County Wastewater District:** Issuance of wastewater discharge permit for the proposed project. This permitting from the District is pending.

- **State Water Resources Control Board:** Raven SR would submit Notices of Intent (NOI) to the State Water Board. Raven SR would submit the Construction NOI prior to any grading on the project site obtain coverage under both the statewide General Permit for Discharges of Storm Water Associated with Construction Activity and General Permit for Storm Water Discharges Associated with Industrial Activities. The Industrial NOI would be submitted prior to operation of the waste conversion system.

- **State Department of Resource Recovery and Recycling (CalRecycle) and Local Enforcement Agency (LEA):** Issuance of Solid Waste Facility Permit (SWFP).

1.13 California Native American Tribes Consultation

Pursuant to Public Resources Code section 21080.3.1, on May 4, 2022, the City received a response for consultation from a representative of the Confederated Villages of Lisjan. Consultation occurred on May 18, 2022, during which the tribe posed no concerns with the proposed project or potential mitigation measures as it relates to impacts to tribal cultural resources and cultural resources. See Section 4.16, *Tribal Cultural Resources*, of this checklist for more detail.

[8] The existing WCCSL facility operates under an existing City of Richmond Conditional Use Permit (CUP) and other resources agency permits.

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2. Project Description

2.1 Project Purpose

The purpose of Raven SR's proposed project and its non-combustion Raven SR process is to reduce pollution, help reduce greenhouse gas emissions, and produce renewable and green hydrogen using a low-carbon process. This section introduces each of these goals and relevant characteristics of the proposed project.

Reduce Pollution and GHG Emissions

The project proposes to convert blended green waste and food waste obtained from the existing onsite OMPF west of the project site into renewable, low-carbon, transportation grade hydrogen. Use of the low-carbon hydrogen as a substitute for petroleum-based fuels in heavy-duty vehicles and many other applications, would reduce the criteria pollutant emissions and GHG emissions from those vehicles and other applications.

The project would use WCCSL landfill gas that would otherwise be combusted in a flare - or in older, inefficient generators - in new generators. Existing 1980's-vintage Waukesha (3 x model 7042 gl) landfill gas generators exist on the Republic Services site. These obsolete, aging, high-emission generators would be removed from the site and replaced by new, low-emission Jenbacher engines (3 x jgs 420 gs-l.lc), equipped with Best Available Control Technology (BACT). Installation of the new generators for the project would significantly reduce existing emissions that would otherwise occur from continued flaring or the existing, poorly-controlled generators.

Produce Low-Carbon, Renewable Hydrogen

Hydrogen is a key mitigation strategy identified for several sectors by the California Air Resources Board (CARB) in its *2022 Scoping Plan for Achieving Carbon Neutrality* (CARB, 2022a). The 2022 Scoping Plan is the state's identified scenario for achieving carbon neutrality statewide no later than 2045. The Scoping Plan "calls for accelerating the transition from combustion of fossil fuels," including by increasing the use of renewable and green hydrogen in zero-emissions vehicles, heavy-duty vehicles, aviation, ocean-going vessels, freight and passenger rail, and industrial applications. The Scoping Plan calls for increasing the current amount of hydrogen supply about 1,700 times and notes that hydrogen production from gasification of forest or agricultural waste is a possible technology to produce low-carbon hydrogen. In support of the Scoping Plan, Senate Bill (SB) 1075 (Skinner, 2022) directs CARB to make recommendations that accelerate progress in green hydrogen production, scaling and use.

To advance the Scoping Plan, Raven SR's purpose is the conversion of organic feedstock input to produce renewable and green hydrogen with a lower carbon intensity than could be produced using electricity from the grid, that would consume less electricity per kilogram of hydrogen produced, and do so without using freshwater resources. Aligned with SB 1075, the project's

purpose is also to contribute to the expansion of renewable hydrogen supply needed to keep pace with the expanding fuel-cell vehicle population and fueling capacity.[9]

2.22.1 Existing Site Conditions and Ownership

Existing conditions ~~of~~at the project site are shown in **Figure 2-0, Birdseye View of Project Site and Surrounding**. The proposed Raven SR ~~operation~~ project would be developed on approximately 1.3 acres that Raven SR would lease within part of the existing Republic Services BMPC property shown in Figure 2-0, however it would operate separately from the existing BMPC operation, which extends west of the project site. **Figure 2-1, Project Site and Raven SR Facility Areas**, delineates the proposed 2.5-acres that is referred to as the "project site" and highlights the 1.3 acres where the Raven facilities and operations would occur. The project site is relatively flat and partially paved, with the remainder consisting of compacted soil and ruderal groundcover along the north edge. No trees or landscaping exist.

The existing landfill power plant and maintenance building are primary structures near the project site, and both would remain. Existing trailers housing ancillary uses on the site would be removed, and remnant concrete foundations from previous uses exist on the north portion of the site. (See Figure 2-0).

The project site is currently served by utility infrastructure and services by East Bay Municipal Utilities District (EBMUD), West County Wastewater District, PG&E, and City of Richmond police, fire and emergency services departments.

The existing owner of the property is West County Sanitary Landfill, Inc., a subsidiary of Republic Services, Inc. The property ownership is not proposed to change with the construction of the proposed project.

2.32.2 Surrounding Uses and Conditions

As highlighted in Figure 2-1, the project site is bound by existing fencing on the north, east and south, and connects to the surrounding WCCSL areas and operations via existing service road. Not part of the proposed project, but ~~within part of the BMPC property~~ shown in Figure 2-0, the

[9] To be clear, the proposed project is a separate and independent project from other possible hydrogen-related projects within the City that may be proposed in the near future. The Raven project has a separate and independent owner, located on a separate and independent site, has a separate and completely independent source stream to make hydrogen, is proposing "green" hydrogen, and is seeking separate entitlements. Additionally, baseline for the Raven project was established at the time that the completed application was filed by the applicant on July 30, 2021. At that time, other hydrogen-related projects were not in the entitlement process with the City. Months later Chevron submitted and application on November 15, 2021, for an alternatives fueling station that would include fueling equipment for hydrogen (H2) and compressed natural gas (CNG). That application did not propose the manufacturing of hydrogen. Additionally, after Raven's project was received no other application has been received by the City for a hydrogen production project. As a result, the Raven project is not required to analyze the potential cumulative impacts for subsequent/potentially future projects as i) the fueling station application was submitted after the Raven project's baseline; and/or ii) CEQA does not require analysis of speculative projects that have yet to be received. Finally, any hydrogen-related projects submitted after the Raven project or at some future date would be required to comply with CEQA. As part of that process, those projects would also need to include the Raven project in either the baseline or a reasonably foreseeable project for that project's initial study – assuming that the type of project impacts overlap for the purposes of a cumulative analysis.

existing WCCSL maintenance building, power plant, and a leachate treatment facility sit within 50 to 100 feet of the site, and leachate tanks operate just west of the north driveway into the property from the main WCCSL access road.

Figure 1-3 shows the nearby Golden Bear Waste Recycling Facility (part of the BMPC), located approximately 300 feet southwest of the property. Also, the West County Wastewater District Treatment Plant and the Wildcat Marsh Trail and trail head parking exist approximately 1,000 feet southeast of the property. Figure 1-2 and Figure 1-3 show the surrounding expanse consists of components of the 340-acre WCCSL facility, which consists of several distinct operations that function as a whole. Notably, these areas and uses include grass-covered disposal areas that are landfill mounds, runoff control ponds and lagoons, and composting areas, in addition to the tidal marshlands of San Pablo and Wildcat Creek tidal marshlands. Open water of San Pablo Bay is approximately 0.25 miles westward from the project site. (WCCSL BMPC Draft EIR, 2003)

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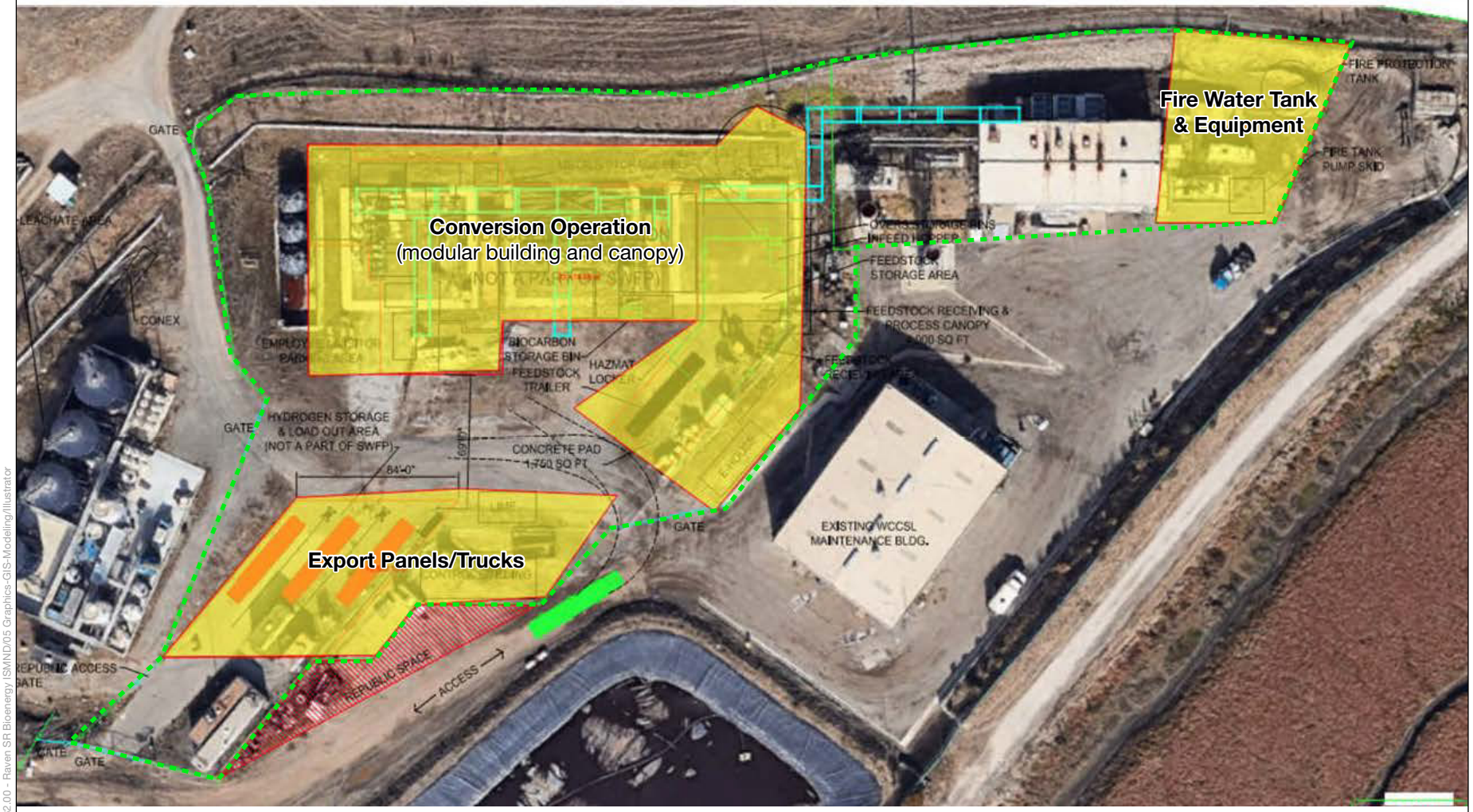
SOURCE: ESA, 2022; Google Earth, 2022

Raven SR Bioenergy Project Initial Study

Figure 2-0
Birdseye View of Project Site and Surrounding (from SE)

ESA



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SOURCE: Raven LLC, 2022; ESA, 2022

Raven SR Bioenergy Project Initial Study

Figure 2-1
Project Site and Raven SR Facility Areas

ESA

2.42.3 Site Plan and Structures

Figure 2-2, Simulated 3D Site Development, illustrates the proposed facility and key operation components simulated in a birds-eye view. All Raven SR's materials handling systems would be located inside a proposed modular structure. The proposed project would erect a new stand-alone modular structure where storage uses and remnant foundations currently exist at the north edge of the property. The proposed modular structure and industrial metal canopy for the feed (or input) area would contain three primary areas for the three-stage process of the operation described below.

Figures 2-3a and 2-3b, South Elevations, illustrate the proposed facility and key operations in elevation, and **Figure 2-4, Detailed Site Layout and Raven SR Facility Plan**, identifies each component in detail. The total new building area would be approximately 40,000 square feet. The industrial feed material handler would be up to 31 feet tall and the tallest facility element. Other elements of height and size include the nitrogen tank (30 feet tall); the cooling tower and the fire water tank (both 25.5 feet tall); and the industrial metal canopy over the feed/unload storage area, the adjacent steam reformer structure, and the nitrogen tank (each 26 feet tall).

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SOURCE: Raven LLC, 2022

Raven SR Bioenergy Project Initial Study

Figure 2-2
Simulated 3D Site Development

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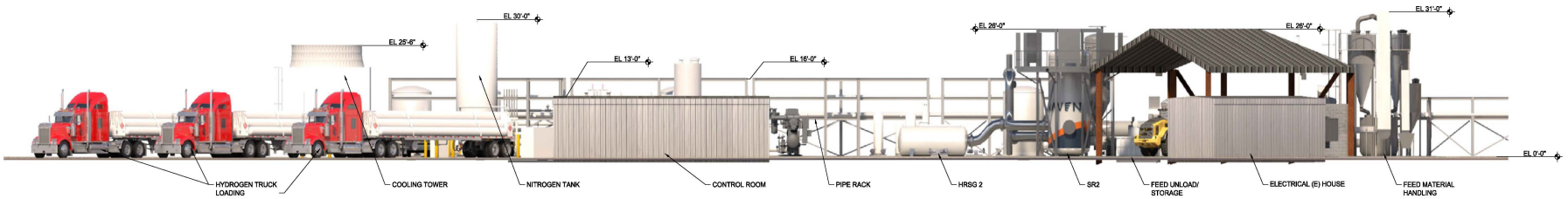

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SOURCE: Raven LLC, 2022

Raven SR Bioenergy Project Initial Study

Figure 2-3a
South Elevation (West End)

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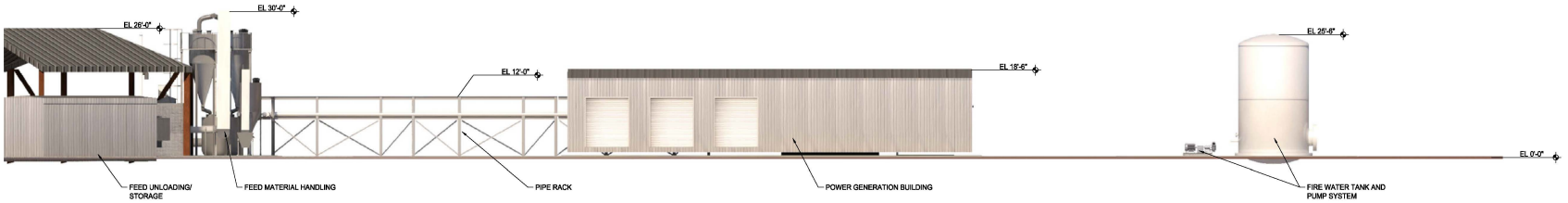

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SOURCE: Raven LLC, 2022

Raven SR Bioenergy Project Initial Study

Figure 2-3b
South Elevation (East End)

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SOURCE: Raven LLC, 2022

Raven SR Bioenergy Project Initial Study

Figure 2-4
Detailed Site Layout and Raven SR Facility Plan

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2.5~~2.4~~ Technology

Raven SR's multi-patented Steam/CO_2 Reformation technology can convert a variety of organic waste feedstocks into a hydrogen-rich synthesis gas (syngas) through a three-step process shown in **Figure 2-5, Raven SR Process Diagram**.[10] ~~Organic feedstocks include biomass, municipal solid waste, bio-solids, industrial waste, sewage, medical waste, or a combination of these, obtained from the existing WCCSL. The first stage of the process to turn feedstock into a raw syngas begins with an externally-heated "biomass steam reformer" and a "syngas steam reformer". The raw syngas is then polished, and then processed through purification of hydrogen to make the hydrogen product: transportation-grade hydrogen-rich syngas.~~ In 1993, the California Environmental Protection Agency's Department of Toxic Substances Control (DTSC) determined that the Raven SR process to produce syngas from biomass and other carbonaceous solids was not categorized as either incineration or combustion and was therefore a suitable technology for use in California.

While ~~T~~the Raven SR t~~T~~echnology can use a variety of potential feedstocks, the selected feedstock for this Project is a blend of urban greenwaste and organic food waste supplied by WCCSL. The first stage of the process to turn feedstock into a raw syngas begins with an externally heated "biomass steam reformer" and a "syngas steam reformer." The raw syngas is then conditioned, compressed and processed through purification systems to produce hydrogen product: transportation-grade (compliant with SAE J2719) hydrogen. [11]

The technology is strictly non-combustion (i.e., anoxic, indirect heating), low pressure, and a catalyst-free process. As indicated in Figure 2-5, early in the process, the system sequesters solid carbon in a byproduct, biocarbon (also referred to as "biochar"), which is a salable product that can be used for fertilizer or filler for concrete, for example. The biocarbon mixture also includes ~~elements~~non-reactive components within the organic waste feedstock (dirt, glass, grit, rocks, inorganic salts, etc.) that are inert to the process, not gasified, and drop out in the first stage, avoiding slag and tars.[12] ~~The amount of biocarbon mixture is a~~Approximately 15 to 20 percent of the volume of dry feedstock input. (Also see Section 2.5, *Safety and Controls, Non-Combustion*, below.)

Feedstock is supplied by the Republic WCCSL and based on a blend of urban green waste (grass, tree branches, etc.) and organic food waste that has already been subject to visual inspection for contaminants by Republic before delivery to the Project's receiving floor. Any incidental, non greenwaste/organic food waste s~~S~~olid material that ~~goes~~ may inadvertently make it through ~~the feed handling~~ earlier inspection and removal by the Republic WCCSL process before the Raven system, including any inorganic~~volatile~~ material (such as bits of plastic~~s~~, cardboard, wrappers,

[10] Hydrogen-rich, 55 to 63 percent H_2.

[11] "Conditioned" or "conditioning" refers to steps in the process to convert residual impurities, primarily sulfur compounds, into a form that can easily be removed from the syngas. If the sulfur is not removed, it will contaminate downstream catalyst/media, deactivating it, significantly reducing performance in downstream processing.

[12] The biocarbon is considered sterile following thermal treatment by the first stage of the process, when biological pathogens (if any) are destroyed by elevated temperature and residence time of approximately 45 minutes.

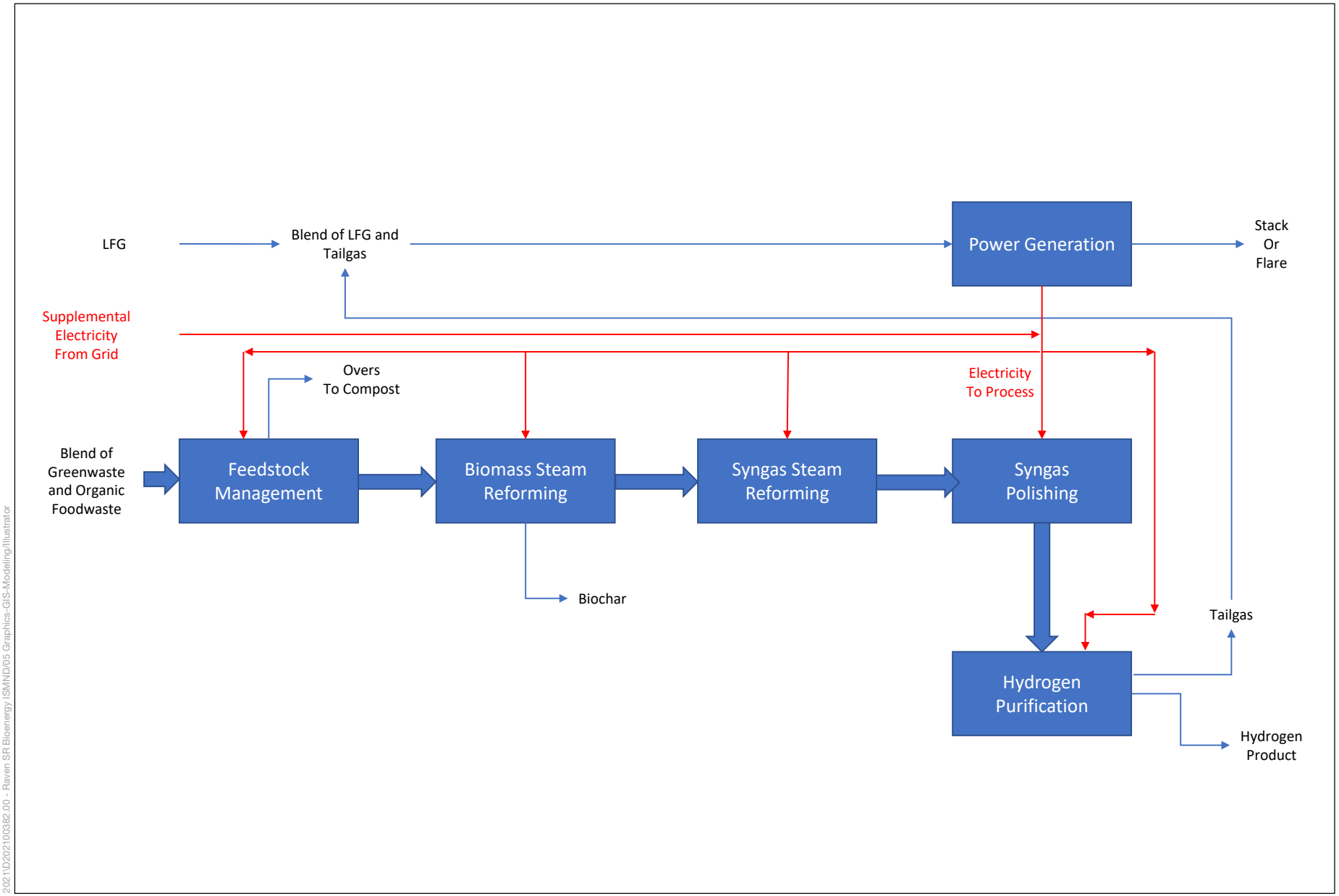
etc.~~refrigerants, batteries~~) that may incidentally flow through to the rotary reformer would ~~be converted~~undergo conversion to syngas as ~~they~~ it thermally decomposes by exposure to temperatures in the range of 1,400 degrees F. Any volatile material would become part of the syngas, while~~and~~ non-volatile, inert material would report to the biocarbon solid phase. ~~No emissions would be generated by any volatile materials that may inadvertently enter the process~~. As stated earlier, the solid components of the feedstock that do not thermally decompose at 1400 degrees F+ would report to the solid phase and become biocarbon, while the volatile components would become part of the raw syngas and go to the secondary steam reformer (SR2) operating at 1900 degrees F+. (Also see *Feedstock Processing*, below.) Processing other potential feedstocks within the confines of this project is not consistent with Raven SR's intent or Project Business Plan as shown by its agreement with allowed conditional uses of the site.

As also shown in Figure 2-5, the ~~waste heat or~~ "tail gas" (i.e., other gaseous components of the syngas that have been separated from the hydrogen product with residual, otherwise unrecoverable energy content) from the conversion process can be blended with existing LFG to generate power ~~and increase the efficiency of the process~~. ~~At some point in the cycle,~~ This occurs in new state-of-the-art, higher efficiency, low emission Jenbacher engines, which will provide approximately half the electrical demand needed for the biomass conversion process. Emissions estimates for these engines were made using the blended fuel composition of LFG and Raven process tailgas. These engines will incorporate exhaust emissions control systems for low emissions. The hot engine exhaust is used to dewater the incoming biomass feed stream before it enters the rotary reformer. Using this available heat increases overall process energy efficiency, and eliminates fuel combustion or costly electricity to supply heat at the dryer for dewatering feedstock. Use of the LFG and the tail gas ~~would no longer recycle into the process and instead go to the stack or~~ in the Jenbacher engines will result in a reduction in emissions of criteria pollutants from combustion of the landfill gas in the existing flare or existing engines~~, described below~~.

Flare System

Raven SR anticipates use of its flare system as a safety backup for the evacuation or venting ~~of~~ syngas ~~and, on rare occasion, vent hydrogen product~~. The new Raven SR flare is in addition to the existing LFG flares operated by Republic that serve to destroy LFG in the event the LFG engines are not available.

The Raven SR flare system, for syngas vented in the event of an unexpected or emergency shutdown, would be in the constant state of readiness through a hooded, continuous propane pilot system. Use of the flare ~~would be~~is expected to be infrequent ~~no more than 100 hours per year~~ and only for emergency situations, expected to occur in few~~on three~~ typical ~~instances~~occasions:



2021\D202100382.00 - Raven SR Bioenergy ISMND/05 Graphics-GIS-Modeling/Illustrator

SOURCE: Raven LLC, 2022

Raven SR Bioenergy Project Initial Study

Figure 2-5
Raven SR Process Diagram

ESA

1. System start-up: During start-up of the system, off-spec syngas would be generated and evacuated from the system to the flare for destruction of volatiles.

2. System shut-down: Whether for emergency shut-down or planned shutdown, the system would require its inventory of syngas to be vented to the flare for destruction of volatiles.

~~3. No off-take available: On the rare occasion when a product load-out truck is not available (e.g., traffic, breakdown, etc.) or an unplanned outage on the export equipment is experienced, and arrangements are in process for replacement and/or repair, Raven SR must vent valuable hydrogen product to the flare as it would have no provision for emergency storage.~~

These instances have been quantified in Raven SR's air permit application to BAAQMD, and are included in the air emissions evaluated in this document. Note that item #3 has been clarified in this updated IS/MND. The reason is that hydrogen is not a criterial pollutant. In the unlikely case that no off-take is immediately available, the design plans call for the product gas (which is greater than 99.99 percent hydrogen) to be safely vented to the atmosphere rather than flared. The purified, high-pressure hydrogen is not proposed to be flared as the pressure could create potential noise emissions. The design plan also contemplates that if no off-taker is available for a significant period of time, the plant will determine the proper response such as reducing the rate of production, pausing production, and/or shutting down production. Even in the worst-case scenario it is anticipated that not more than an hour's worth of production of hydrogen would be in the system even if venting were necessary. As the produced hydrogen is valuable, venting is not a preferred option from an operator perspective. Instead, the expectation is that the plant would not continue to operate by consuming feedstock and power, and that any venting of hydrogen product would only occur in rare circumstances for brief durations of time.

These instances have been quantified in Raven SR's air permit application to BAAQMD, and are included in the air emissions evaluated in this document.

In 1993, the California Environmental Protection Agency's Department of Toxic Substances Control (DTSC) determined that the Raven SR process for the production of syngas from biomass and other carbonaceous solids was not categorized as either incineration or combustion and was therefore a suitable technology for use in California.[13]

2.62.5 Operations

Pre-Processing and Load Checks

~~The origin of the feedstock and the pre-processing and screening redundancies built into the s~~System processes would ~~to~~ ensure that little or no material ~~contamination~~ that is incompatible with the Raven SR process would be introduced to the conversion system. These processes

[13] According to the definitions listed in Section 260.10, Title 40, Code of Federal Regulations (40 CFR) and Section 66260.10, Title 22, California Code of Regulations (22 CCR). Also, since 2017, a Raven pilot engineering unit, sized at 100 wet pounds per day of feedstock, has been operating at the UC Berkeley's Richmond Field Station and is permitted for operation by the Bay Area Air Quality Management District (BAAQMD) under permit Nos. 23993 and 23320.

include documenting the feedstock origin, as well as pre-processing and screening redundancies. First, Republic Services would ~~grind and~~ visually screen, load check and grind the incoming mix of green waste and organic food waste before delivering the feedstock to Raven. Any ~~non-compostable~~incompatible material and other prohibited wastes would be minimized through Republic's screening and load checking programs that occur at its compost facility. In addition, all incoming pre-processed feedstock received at the Raven SR facility will also be subject to the Raven SR's own screening and load checking program as required by State solid waste facility regulations. [14]

After screening and load checking, the organic material is pre-processed by grinding to reduce volume, provide for a uniform mixture of material and particle size, and further screen out any remaining contaminants. The pre-processed organic material would then be delivered approximately 2,500 feet from the compost area to the Raven SR facility by Republic personnel and vehicles. The trucks would consist of self-unloading transfer trucks or other suitable vehicles that would discharge loads as directed by a spotter onto the floor of Raven SR's material receiving area. There the material would be visually inspected and subject to Raven's load checking program, then pushed by a loader into storage bunkers or other designated material storage areas. The pre-processed feedstock material would be fed into a metering hopper to cross a screen to remove any oversized material, and then a magnetic separator to remove any unexpected metal. Any oversized material would be returned to Republic's composting facility, and any recovered metal would be sent for recycling.

As discussed above in ~~2.4~~2.5, *Technology*, if any materials are missed by the screening processes and enters the rotary reformer, those materials become part of process feed and would eventually become syngas or biocarbon.

Daily Quantities and Operations

The Raven facility would receive up to 99.9 wet tons per day of blended green waste and food waste feedstock to produce approximately 14 tons per day of biocarbon and up to 4,800 kilograms (kg) (5.3 tons) of hydrogen per day.[15] Feedstock would be weighed on Republic scales before arriving at the Raven SR site, and the commodities that come out of the process would be weighed on Republic scales outside of the Raven SR site. The WCCSL material that would be diverted to the Raven SR facility by Republic represents a portion of their permitted 250 tons per day of compost processing capacity.

The Raven SR process and facility is designed for continuous operation ~~without many~~and would minimize start-ups or shut-downs. Accordingly, the Raven SR system would operate ~~run~~ up to 24

[14] A load checking program are developed in compliance with Title 14, Code of California Regulations (CCR), §17409.5, and generally address the number of load checks to be performed; the location for the storage of prohibited wastes removed during the load checking process that is separately secured or isolated; records of load checks and the personnel training.

[15] While Raven SR can produce synthetic liquid fuels, the proposed Richmond location proposes to only produce transportation grade hydrogen due to the interest of the local and regional markets for non-fossil fuel based hydrogen.

hours per day, seven days per week, although an average of 1.5 days per month are planned down times with a single, extended outage for annual maintenance. This totals approximately 8,300 hours of operation per year.

Energy and Fuel Use

The plant would consume approximately 6.0~~+~~ MW of electricity (MWe) to operate and produce the 4,800 kg of hydrogen per day (200 kg of hydrogen per hour). The majority of ~~the~~this power would come from onsite power generation using newly installed LFG engines, ~~that would replace~~ existing, featuring higher efficiency and lower emissions than the inefficient WCCSL engines with relatively higher emissions. The ~~fuel to~~new engines will be ~~used for~~ equipped with state-of-art air pollution controls that represent BACT. For comparison, the new engines will achieve a NOx emission rate that is 81 percent lower than the existing WCCSL engines. Using the blended LFG/tail gas fuel, the new engines will also achieve CO emissions that are 53 percent to 62 percent lower than the WCCSL engines being replaced.

~~t~~The proposed fuel for power generation is the existing LFG from the ~~Republic Services BMPC, combined~~ WCCSL, blended with the tail gas from the pressure swing absorber (PSA) unit that serves to purify the hydrogen product~~. Republic Services would receive approximately 0.5 MW from the power generation for its onsite operation needs and the rest would be used to power the proposed project~~. Any additional electrical power required beyond that generated onsite would come from an existing PG&E power drop to the site, as also indicated in Figure 2-5.

Safety and Controls

No Combustion Technology. The Raven SR's facility's controls would be distributed through the various process islands, taking their direction from a central Human-Machine Interface in the control room with centralized data collection. Process setpoints would be bounded by high/low alarm limitations to draw the operator's attention to the specific problem. The control system would represent state-of-the-art digital technology with redundant instrumentation where necessary to ensure safe operation.

Raven would initiate inspection, monitoring maintenance procedures to ensure safe facility operations. Because the Raven SR process ~~itself~~ is closed and oxygen-free, there would be no opportunity within the process for explosion. Piping and vessels would be periodically scanned with infrared equipment to identify hot spots or gas leaks that may threaten safety. If hot spots or leaks were identified, immediate steps would be taken to correct or mediate the condition. Also, remote monitoring of the facility by Raven SR corporate provides oversight of the operation and early identification of problems as they development.

The facility would maintain a "Plant Safety Handbook" and establish industry-accepted procedures to be followed if events threaten the safety of employees, the facility or surrounding areas. The facility would maintain and evolve Standard Operating Procedures for aspects of the plant that require frequent intervention~~, for example~~. One example of such activity is the daily acceptance of trucks for loading with hydrogen product, wherein accepted procedures to accept a truck for loading of hydrogen product, to fill to regulated maximum allowable pressures, to

ensure a cool-down period to allow the pressurized gas to dissipate the heat of compression prior to departure from the site. These procedures are informed and well-defined from industry experience and with oversight for the entire fueling process from federal agencies that handoff responsibility during their respective stage of the fueling process. For example, arriving for fueling (USDOT), Fueling (USEPA, OSHA), Departing from fueling (USDOT)~~shed the heat of compression, etc~~.

Safety Standards and Maintenance. ~~Raven SR units are equipped~~The project is being designed in accordance with ~~continuous monitoring~~ California Fire Code for all systems and ~~can automatically shut down~~ equipment installation containing flammable, combustible, or hazardous materials, and an equipment maintenance program agreed upon by the City and the Fire Marshall will be implemented.

As part of the Project design process, Raven SR will conduct a Process Hazard Analysis (PHA) in which a detailed risk evaluation will be conducted of the proposed plant design and plans for operations ~~without human intervention~~. ~~The project would comply~~ The PHA will identify all potential hazards associated with the proposed process operations, including potential hazards associated with the properties of hydrogen; evaluate the controls and safeguards planned in the design to ensure safe operation of the process; and identify recommendations for additional risk mitigation that will be addressed during the final design phase.

The PHA is one element of the process safety and risk management programs (PSM/RMP) that will be implemented in accordance with applicable Environmental Protection Agency (EPA) risk management plan (RMP) and Occupational Safety and Health Administration (OSHA) process safety management (PSM) guidelines, ~~as~~ and Richmond Industrial Safety Ordinance (RISO) regulations to ensure the plant is designed to mitigate potential risks and operate safely. Raven SR has chosen to implement these programs even though a preliminary determination has indicated that these requirements may not be ~~applied~~applicable to the facility. ~~to ensure the safety of its operations staff and the surrounding community~~. The proposed design would have less than 10,000 pounds of flammable substances within the process, which is the threshold quantity that triggers applicability. Though Raven SR's flammable inventory would be below this threshold, Raven SR would voluntarily adhere to the requirements of PSM as a process to facilitate safe, reliable operation of the facility.

PSM policies and programs, and the pertinent agencies that minister and provide oversight to qualifying projects, fall under the umbrella of the California Certified Unified Program Agencies (CUPA) Forum. CUPA is a statewide alliance of Certified Unified Program Agencies and Participating Agencies (collectively known as Unified Program Agencies-UPAs) that implement the Unified Program under California Health and Safety Code Division 20, Chapter 6.11. The organization works to update and continuously improve the Unified Program for the agencies, businesses and communities served.

The OSHA PSM and EPA RMP programs contain many elements to promote safety and are well known in industry. Information is available to the public on-line. For the Raven facility, these elements are under development and include, but are not limited to:

- **Comprehensive Process Safety Information (PSI),** which will be utilized in the **Process Hazards Analysis** and for developing safe work practices and operating procedures;
- **Employee Participation** to ensure employee involvement in the PSM/RMP process;
- **Operating Procedures** to develop safe work practices and protocols;
- **Training** of all employees and contractors on the potential hazards and safe operations;
- **Management of Change** process to verify any new systems, components, parts, etc. are evaluated before being placed into service;
- **Pre-Start Safety Review (PSSR)** to verify the process/equipment is ready for service before starting. This includes all safety and control items are functioning and operators are aware/trained on any changes;
- **Incident Investigation** to identify and understand the root cause of equipment or system failures and develop/implement corrective actions to keep from happening again;
- **Management of Contractors** in a manner that ensures they are aware the safety aspects of the facility as well as the requirement while working on site;
- **Mechanical Integrity** including routine maintenance, to verify the mechanical reliability of equipment; and
- **Emergency Planning and Response** to have a process/procedure in place in the event of an issue, so a standard protocol can be followed. This requires understanding of the process and determining potential issues that could occur, and developing protocols to manage the situation should an event occur.

The proposed project is divided into two key phases with specific needs incorporated into the project design that adhere to safety guidelines in order to further maintain safe practices at the facility. During the *Construction Phase* of the project, Raven SR's contractor would carry responsibility for site conditions and the safety of labor, contractors, and suppliers that may have access to the site. Safety training for the various construction roles prior to access to the site would be mandatory, using programs developed by the general contractor. Daily briefings would be conducted to highlight safety and alert crew and labor to potential hazards that may be scheduled for that day's work. Although not likely to exist, any work areas subject to potential physical harm such as those presenting fall hazards, exposure to hot work, or loud noise will be appropriately marked and identified with physical barriers to prevent unwitting access.

During the *Operations Phase* of the Project, Raven SR will comply with local, state and federal regulations. Raven SR and its operations and maintenance (O&M) service would institute a video library of tutorials on aspects of conduct on-site related to safe operation of equipment. Employees and those contractors needed to access the site during operations would be required to complete applicable training videos.

Raven SR would provide its employees and visitors specialized Personal Protective Equipment ("PPE") (e.g., gloves, goggles, respirators, boots, etc.) required for access to process areas that operate at high temperature and high pressure. Areas requiring PPE would be marked with

signage for clear instruction to those seeking to enter and work within these areas. Raven SR would ensure that employees and visitors are appropriately trained in the use of PPE.

A maintenance program of ~~regular and~~ routine, preventative and predictive maintenance would also be implemented to maintain equipment in a reliable manner. Raven SR would contract with a capable and experienced O&M service provider from among those with experience in feedstock management and with high temperature, high pressure process equipment. As is typical practice, Raven SR would closely oversee the development of operating, training, safety, and maintenance manuals that are specifically targeted for the Project's needs. Raven SR would monitor the development of the requisite Plant documentation and assist in the management of risk during plant operation at the corporate level.

Fugitive Emissions. The ~~system is a closed~~ process ~~once the organic feedstock input is managed. Mechanical~~ unit would have mechanical seals on the feed inlet and the biochar outlet, preventing fugitive emission from the first-stage reformer which operates under mild pressure. The first stage vessel (SR1) has mechanical seals that are purged of air using ~~with~~ pressurized nitrogen, which would prohibit the release of fugitive emissions. Tail gas, generated by the process and consisting of the non-hydrogen syngas components, with residual unrecoverable hydrogen, would be ~~is~~ combined with LFG ~~and used~~ to use its residual energy content as a fuel for the LFG generators to generate ~~additional~~ energy.

Due to its extremely small molecule size, hydrogen has unique physical properties, such as buoyancy. Hydrogen is 14 times lighter than air and moves upward quickly. Raven SR operations would institute proactive measures to periodically monitor plant piping for hot spots that may be indicative of potential gas leaks. Technology, such as an FLIR camera, will be used to highlight and identify a potential hotspot, so remedial actions are implemented to prevent or correct any gas leak, as appropriate. Hydrogen is not a criteria pollutant and is a key mitigation strategy in the 2022 Scoping Plan's objectives for carbon neutrality.

Odor Control. Odors may exist and derive from the organic feedstock input that is already produced and processed at the WCCSL. ~~Nuisance odor from~~ The first step in the Raven process is ~~unlikely since~~ to dry incoming feedstock ~~material would only be on the feedstock management area floor for relatively short periods of time~~ using waste heat from the LFG engines before introduction to Raven's first stage reformer. Dry feedstocks do not typically create or form odors. To proactively address the potential for odors, the Raven SR Project includes the implementation of a number of odor minimization procedures and regulatory requirements. These odor minimization requirements include

i. Feedstock load checking at the Republic site for identification and removal of prohibited material including any highly-odorous loads;
ii. Feedstock pre-processing at the Republic site before being sent to the Raven facility;
iii. Operations protocol for first in/first out feedstock consumption;
iv. Feedstock will typically be processed within 24 hours with a maximum limit within 48 hours of receipt;
v. Daily cleaning of the feedstock handling area; and

vi. Use of odor suppressants if necessary.

Feedstock for the Raven process will only include pre-processed consisting primarily of blended green waste and food waste. The source of this material is from the onsite composting facility referred to as the OMPF. The OMPF receives vehicle loads directly from residential and commercial organics collection programs. The OMPF operating procedures include initial visual screening and a load checking program designed to identify and remove prohibited material, including any highly odorous loads. After screening and load checking, remaining organic material is pre-processed by grinding. Only material that has been through the screening, load checking and grinding process at the OMPF would be delivered to the Raven facility, thus minimizing the potential for receiving prohibited or highly odorous material. In addition, all incoming pre-processed feedstock received at the Raven SR facility would also be subject to the Raven SR's own screening and load checking program as required by State solid waste facility regulations.

To further minimize potential odor effects of the proposed project, the standard operating procedures for the Raven facility would include a "first in first out protocol" for the processing of material. Typically, any material received would be processed within 24 hours of receipt through the hydrogen conversion system. As a requirement of both the draft CUP and the Solid Waste Facility Permit (SWFP) for the facility, all feedstock material would, at a maximum, be processed within 48 hours of receipt. With this minimal time effects of the proposed project in the feedstock handling area, the potential for odor would be greatly reduced as opposed to odors arising over time from decomposing feedstock.

Additional odor minimization provisions and requirements would be incorporated into the proposed project in accordance with the draft CUP and SWFP and addressing maximum volumes for daily input and storage, facility cleaning schedule, complaint response and reporting protocols, preparation and adherence to an Odor Prevention and Management Plan (OPMP) the requires an annual evaluation report. As discussed in more detail in the CEQA assessment of potential odor impacts (Section 4.3, *Air Quality*), Raven SR will implement operating procedures and comply with regulatory requirements related to minimizing potential odor impacts at the Raven SR facility in order to address and minimize potential odor impacts. ~~However, odor control for the proposed Raven SR operation would be in place to minimize possible odors. Also, the proposed industrial metal canopy would be placed over the feedstock floor and infeed equipment to prevent stormwater contact. Odor control would be added to the management area if objectionable odors occur. The facility could also store topical treatment solutions (non-toxic and biodegradable) onsite, which would be applied to neutralize odors if an immediate need arises.~~

Hydrogen Storage and Export Panel. The hydrogen product is compressed for short term storage after the first-stage compressor, before being compressed with a second-state, higher pressure compressor and exported via truck-mounted tube trailers for delivery to facilities using hydrogen for transportation or processes needing green hydrogen. ~~There is no compression tank in the design.~~ The produced hydrogen would be onboarded by a hydrogen gas export panel designed by a global manufacturer of hydrogen fueling stations to industry standards, incorporating best-practice Health, Safety, Security and Environment (HSSE) design. The panel

is compliant with National Fire Protection Association (NFPA) industry standards for handling hydrogen.

Onsite Water Tank / Fire Equipment. A new 250,000-gallon integrated fire water tank and diesel engine is proposed in the northeast corner of the site emergency use, as required by fire department regulations The fire water tank would be up to 25.5 feet tall. (Shown in Figures 2-1 through 2-4.)

2.72.6 Employment

Raven would employ approximately three to four employees per shift for the operation of the Raven facility, for a total of nine to 12 new employees to cover all shifts and provide necessary support of the facility. The facility would not involve customers onsite.

2.82.7 Transportation and Circulation

As indicated under "Safety Controls" above, the proposed project would export the produced hydrogen offsite via truck-mounted tube trailers (shown in Figures 2-2 through 2-4). The operation would involve upis expected to service approximately 1214 hydrogen tube trucks and up to approximately 15 biocarbon trucks (total 37 trucks) per weekday, each with an average trip of 40 miles after leaving the site. In addition, up to approximately 11 biocarbon trucks per day would be in use for the co-product. Considering this with other trucks and employees coming to and leaving the project site daily, 12 employee vehicles and 25 trucks would access the site dailythe project is estimated to generate about 130 vehicle trips on a typical weekday.

In addition, the Raven SR system would only use feedstock from ongoing existing composting BMPC operations on the property that would not leave the WCCSL site. Figures 2-2 and 2-4 show where WCCSL feedstock supply trucks would approach and exit the Raven facility from the feedstock prep area, and in addition to Figure 2-3a show three stalls where the tube trucks would connect to a hose and receive the hydrogen product. The tube trailers would idle for no more than five minutes once at project site, as required per State regulations.

2.92.8 Construction, Site Coverage and Drainage

Raven anticipates initiating construction activity on the project site in FourthSecond Quarter of 20222023, which would continue for approximately eight months. Start-up of the plant is projected to begin in Fourth Quarter of 2023, or First Quarter of 2024early the Second or Third Quarter of 2023.

Construction proposed is to demolish the existing materials and remove existing equipment from the project site, lightly regrade the site, add up to six inches of fill, and erect the new facility. The existing project site is mostly paved and partially pervious compacted soil and ruderal groundcover (see Figure 2-1). Existing materials to be excavated include remnant concrete foundations that would be pulverized and partially used as fill material.

The maximum depth of excavation would be up to 2.5 feet. All excavation spoils and remaining concrete debris would remain on the landfill site. Minimal fill, approximately 250 cubic yards, may be required and would be ~~hauled~~ obtained from suitable, available materials already on site ~~for~~ generated during site grading; only demolition materials (asphalt and concrete) would be off hauled.

Approximately 0.76 acres of the 2.5-acre project site is currently impervious concrete or asphalt. The proposed project would repave the existing 0.76 acres in addition to adding approximately 1.21 acres of impervious area (including modular structures), resulting in a total of 1.97 acres (or 78 percent) of impervious area on the site. Approximately 0.53 acres of unpaved area along the north edge of the site would remain undisturbed. There are no natural drainage paths on the site.

The project would adhere to all applicable regulatory stormwater runoff controls and would pursue its own National Pollutant Discharge Elimination System (NPDES) permit. The project's stormwater plan would be integrated into the existing WCCSL system and ensure drainage from the proposed project site would drain towards existing stormwater runoff control ponds (or bioretention facility) to which the rest of the WCCSL property currently drains.

2.102.9 Off-site Improvements: Landscaping

As part of the proposed project, off-site landscaping improvements are planned for ~~to~~ the Wildcat Marsh Trail and trail head parking located approximately 1,000 feet east of the project location. Due to limited space and potential safety hazards, no new plants or vegetation would be installed within the Raven project site. Instead, new trees would be added to the public parking area near the trailhead.

Eleven drought-tolerant trees would be planted: either six large Coast Live Oak (*Quercus agrifolia*) or Big Leaf Maple (*Acer macrophyllum*), and five small California Buckeye (*Aesculus californica*). Both species are on City's approved list of trees. Tree size planted would be associated with 15-gallon containers.

References

CARB, 2022a. California's Final 2022 Climate Change Scoping Plan, November 16, 2022. Available online: https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents. Accessed on March 4, 2023.

Skinner, 2022. California Senate Bill No. 1075, September 19, 2022. Available online: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220SB1075

3. Environmental Factors Potentially Affected

The environmental factors checked below would be potentially affected by this project, involving at least one impact that is a "Potentially Significant Impact," as indicated by the checklist on the following pages.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☒ Air Quality
☒ Biological Resources	☒ Cultural Resources	☐ Energy
☐ Geology, Soils and Seismicity	☐ Greenhouse Gas Emissions	☐ Hazards /Hazardous Materials
☐ Hydrology and Water Quality	☐ Land Use and Planning	☐ Mineral Resources
☐ Noise/Vibration	☐ Population and Housing	☐ Public Services
☐ Recreation	☐ Transportation	☒ Tribal Cultural Resources
☐ Utilities and Service Systems	☐ Wildfire	☐ Mandatory Findings of Significance

Determination: (To be completed by Lead Agency)

On the basis of this initial study:

☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.

☒ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.

☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.

☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, no further environmental documentation is required.

Lydia Elias
Signature

3/9/2023
Date

Lydia Elias
Printed Name

For

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4. Environmental Checklist and Evaluation

4.1 Aesthetics

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Aesthetics *Except as provided in Public Resources Code Section 21099, would the project:*				
a) Have a substantial adverse effect on a scenic vista?			☒	
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic building within a State Scenic Highway?				☒
c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?			☒	
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?			☒	

Setting

The project site is within the WCCSL within an industrial, commercial, and open space setting of North Richmond. It is an integrated solid waste management and disposal facility and does not have significant visual value. Grading on the site over the years has resulted in topographic variations created by the hill forms or mounds that are the grass-covered landfills. The hill forms range from between elevations 110 and 160 feet above mean sea level, with up to an additional seven feet of soil layer. (WCCSL BMPC Draft EIR, 2003) The area has little or no distinctive visual features, except for leachate treatment ponds, runoff control ponds and lagoons, and marshlands of Wildcat Creek.

Despite the absence of significant visual value within the WCCSL itself, the site provides extensive views in all directions, including unobstructed panoramic views of San Pablo Bay, San Pablo Ridge and Mt. Tamalpais across the Bay. The visual quality of the WCCSL has been assessed in numerous CEQA analyses over the years, and each determined that no aspect of the WCCSL operations would significantly affect visual quality. (WCCSL BMPC Draft EIR, 2003)

Evaluation

a) **Have a substantial adverse effect on a scenic vista?**

Less than Significant Impact. Visual access the WCCSL from nearby public areas are distant and limited, largely because the surrounding areas are mostly at lower elevations than that of the WCCSL; distant views are blocked by buildings or landscaping. Views toward the WCCSL and the project site from Richmond Parkway are blocked by trees and the property is difficult to distinguish from adjacent and background across the Bay. Northbound and southbound motorists on the Richmond Parkway can view the WCCSL, but views are limited, short-term and sometimes obscured or blocked by median landscaping or intervening trees and buildings. The proposed project site within part of the BMPC area is not visible from offsite areas as it is at an even lower elevation and behind intervening berms and levees.

Figure 4.1-1, Wildcat Marsh Trail Approach Toward Project Site (from East), captures part of the project site that would be visible to users of this public trail. The viewshed from this location does not capture any scenic vistas in the direction of the project site. Views toward the opposite direction of the site from the trail provides direct expansive views of the Wildcat Creek Marsh. Moreover, once developed, the facilities will appear consistent with the industrial nature of the existing visible facilities. The project would not have an adverse effect on a scenic vista. The impact would be less than significant.

b) **Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic building within a State Scenic Highway?**

No Impact. No designated scenic highways currently exist within the City of Richmond, according to California Scenic Highway Program mapping system. (Caltrans, 2016) While the City's prior 1994 General Plan and General Plan EIR identified portions of Richmond Parkway as having a positive aesthetic value, the proposed project site is not visible from the parkway. (Richmond, 2011)

c) **In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?**

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SOURCE: ESA, 2022

Raven SR Bioenergy Project Initial Study

Figure 4.1-1
Wildcat Marsh Trail Approach Toward Project Site (from East)

ESA

Less than Significant Impact. The 340-acre WCCSL facility, in which the project site sits, consists of several distinct operations that function as a whole. Notably, these operations and areas include grass-covered disposal areas, notably the main central, landfill hill, runoff control ponds and lagoons, and composting areas, in addition to the tidal marshlands of Wildcat Creek. As previously stated in this section, numerous environmental reviews pursuant to CEQA have been conducted on all WCCSL activities, all of which determined that none of the activities would significantly affect the visual quality of the facility.

The proposed project could be visible from points along the adjacent and lower Bay Trail, since segments of the Trail allow users to observe, from a safe distance, some recycling activities within the WCCSL property. To the extent that the proposed project facilities and operation could be visible, the views would be distant and would not be adverse relative to other visible WCCSL activities. **Figure 4.1-2, Onsite View Toward Project Site**, shows the existing visual character in which the proposed project would exists.

All feedstock material for the proposed operation would be organic materials sorted from the existing onsite ~~BMPC~~OMPF composting operation; no feedstock would be brought directly to the Raven facility from offsite. Product from the project operation would leave the project site in hydrogen tube trucks and biocarbon trucks. Therefore, operations of the Raven facility are not expected to be a source of litter that could exacerbate litter and dumping in the nearby neighborhoods.

Overall, the project's effect on existing visual character or quality of public views of the site and its surroundings would be less than significant.

d) **Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?**

Less than Significant Impact. Many activities within the WCCSL facility operate 24 hours a day, seven days per week, including the onsite OMPF~~BMPC activities and waste recovery~~ composting operations. Other onsite processing operations operate until midnight. All existing operations operate under approved County and City use permits, which requires all lighting systems to reduce glare and to not substantially impact area residents. Existing lighting is varied and includes various sizes of portable and directional flood lights on certain operations.

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SOURCE: ESA, 2022

Raven SR Bioenergy Project Initial Study

Figure 4.1-2
Onsite View Toward Project Site

ESA

The proposed project would also operate 24 hours a day, seven days per week, and would be developed within an existing, functional area of the BMPC ~~operation~~property, which is currently lighted. The project proposes LED lighting mounted on 30-foot-tall poles. Like the existing WCCSL and BMPC conditions, the additional lighting would be focused and shaded, incorporating directional shading (down-shot reflectors) to limit light pollution during night operations. The project would place nine single-light fixtures at throughout the site and three double-light fixtures in the truck loading area in the south portion of the site. Also, the continuous propane pilot light that fuels the flare system used as needed to evacuate or vent organic syngas or on rare occasion vent hydrogen product, would be hooded, thus minimizing its visibility from offsite.

Given existing lighting conditions and that the proposed project site is located within the varied topography of the WCCSL and would not be directly visible from offsite locations, the proposed project would not substantially alter current lighting conditions. Moreover, any new lighting would not affect nighttime views in the area. This impact would be less than significant.

References

California Department of Transportation (Caltrans), 2016. Scenic Highways Program. Available at: https://caltrans.maps.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aacaa. Accessed June 3, 2022.

City of Richmond, 2011. *General Plan 2030 EIR*. August 2011.

Contra Costa County, 2003. *Draft Environmental Impact Report on the West Contra County Sanitary Landfill Bulk Materials Processing Center and Related Actions,* SCH# 2002102057. November 2003.

4.2 Agriculture and Forestry Resources

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Agriculture and Forestry Resources *In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Dept. of Conservation as an optional model to use in assessing impacts on agriculture and farmland. In determining whether impacts to forest resources, including timberland, are significant environmental effects, lead agencies may refer to information compiled by the California Department of Forestry and Fire Protection regarding the State's inventory of forest land, including the Forest and Range Assessment Project and the Forest Legacy Assessment project; and forest carbon measurement methodology provided in Forest Protocols adopted by the California Air Resources Board. Would the project:*				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?				☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?				☒
c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?				☒
d) Result in the loss of forest land or conversion of forest land to non-forest use?				☒
e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?				☒

Setting

The project site and its surroundings are zoned for "Open Space", and has no history of agricultural uses (Richmond, 2012). Richmond sanitary service operations initiated within the area that is now the WCCSL in the early 1950s on previously undeveloped land.

Evaluation

a) **Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program (FMMP) of the California Resources Agency, to non-agricultural use?)**

No Impact. The project site is located entirely within an area of and surrounded by industrial, commercial and open space uses. The site is not identified as Prime Farmland, Unique Farmland, or Farmland of Statewide or Local Importance by the FMMP, but is designated as Other Land, and is surrounded by lands designated as Urban Land and Other Land. The proposed project would have no impact on important farmland. (DLRP, 2012)

b) **Conflict with existing zoning for agricultural use, or a Williamson Act contract?**

No Impact. The project site and its surroundings are zoned for "Open Space", and has no history of agricultural uses (Richmond, 2012). Also, the site is not covered by a Williamson Act contract (DLRP, 2012) Therefore, the proposed project would have no impact regarding existing agricultural zoning or a Williamson Act contract.

c) **Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?**

No Impact. The proposed project site is not zoned as forest land or timberland, and there are no forests on the project site. No impact would occur with implementation of the proposed project.

d, e) **Result in the loss of forest land or conversion of forest land to non-forest use? Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use or conversion of forest land to non-forest use?**

No Impact. As stated above, the proposed project is not zoned as forest land and there are no forests on the project site. The project would not result in the loss of forest land or conversion of forest land to non-forest uses, and would have no impact.

Also, the project would be constructed and operated entirely within a previously developed area within the WCCSL that is designated as Other Land by the FMMP. The project site does not contain farmland or forest land and there are no aspects of the project that would affect any agricultural land or forest land off-site. Therefore, the proposed project would not result in conversion of farmland or forest land, on-site or off-site, to a non-agricultural use or non-forest use. The project would have no impact.

References

California Department of Conservation, Division of Land Resource Protection (DLRP), 2012. Contra Costa County Williamson Act FY 2012/2013. Available at: ftp://ftp.consrv.ca.gov/pub/dlrp/wa/. Accessed May 12, 2022.

DLRP, 2014. Farmland Mapping and Monitoring Program. Contra Costa County Important Farmland Available at: www.conservation.ca.gov/dlrp/FMMP/Pages/Index.aspx. Accessed May 12, 2022.

City of Richmond, 2012. *Richmond General Plan 2030: Land Use Element.* April 25, 2012.

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4.3 Air Quality

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Air Quality *Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations.* *Would the project:*				
a) Conflict with or obstruct implementation of the applicable air quality plan?			☒	
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard?		☒		
c) Expose sensitive receptors to substantial pollutant concentrations?			☒	
d) Result in other emissions (such as those leading to odors or) adversely affecting a substantial number of people?			☒	

Setting

The project site is located in Contra Costa County, which is in the San Francisco Bay Area Air Basin (SFBAAB), within the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). The SFBAAB is currently designated as a nonattainment area for state and national ozone standards and national particulate matter ambient air quality standards. Development projects can contribute to a region's adverse air quality impacts on a cumulative basis so the BAAQMD considered the emission levels for which a project's individual emissions would be cumulatively considerable when developing thresholds of significance for air pollutants. The significance thresholds used for project construction and operational impact analyses are based on thresholds set in the BAAQMD's CEQA Guidelines (BAAQMD 2017b).

For the purposes of this air quality analysis, sensitive receptors are defined as facilities and land uses that include members of the population that are particularly sensitive to the effects of air pollutants, such as children, the elderly, and people with illnesses. Examples of these types of uses include schools, hospitals, and daycare centers. Residential areas are also considered sensitive to poor air quality because these sensitive individuals could be present there, and people usually stay home for extended periods of time, which results in greater exposure to ambient air quality. There are no sensitive receptors within 1,000 feet of the project site. The nearest sensitive receptors to the project site are residences at generally West Gertrude Avenue/Malcolm Drive (approximately 0.75 miles southeast), Verde Elementary School at 2000 Giaramita Street (approximately 1.1 miles southeast), and Contra Costa Health Clinic at 1501 Fred Jackson Way (approximately 1.2 miles southeast).

Evaluation

a) **Conflict with or obstruct implementation of the applicable air quality plan?**

Less than Significant Impact. BAAQMD is the regional air quality authority in the project area. Primary goals of BAAQMD's adopted *2017 Clean Air Plan* are to protect public health by achieving attainment of air quality standards (BAAQMD, 2017a). The plan includes a wide range of proposed control measures, which consist of actions to reduce the non-attainment pollutants: state and federal 8-hour ozone standard, the state 1-hour ozone standard, the state PM_{10} standard, and the state and federal $PM_{2.5}$ standards. BAAQMD guidance states that "if approval of a project would not result in significant and unavoidable air quality impacts, after the application of all feasible mitigation, the project would be considered consistent with the Clean Air Plan" (BAAQMD 2017b). As indicated in the discussion of criteria "b" and "c" below, the project would not result in significant air quality impacts. Therefore, this impact would less than significant.

b) **Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?**

Construction

Emissions from the construction phase of the project would be generated primarily from heavy duty equipment such as excavators, cranes, and forklifts. Criteria air pollutant emissions from equipment and on-road vehicle exhaust were estimated using CalEEMod (version ~~2020.4.0~~2022.1); modeling output files are included in **Appendix A** to this checklist. Construction is assumed to take place over an eight-month period. Project specific data for construction phasing schedule and equipment fleet provided by the Project Applicant was used in the model to estimate emissions for the construction period. The total emissions (without mitigation) generated over the duration of construction were divided by the number of construction days for each partial construction year to determine average ~~annual~~ daily emissions from construction. Emissions from equipment and vehicle exhaust are presented in **Table 4.3-1**. As shown in the table, emissions of reactive organic gases (ROG) and nitrogen oxides (NOx), which are ozone precursors, and particulate matter (PM_{10} and $PM_{2.5}$) would all be below their respective significance thresholds, which for construction have been established by BAAQMD in terms of average ~~annual~~ daily emissions.

TABLE 4.3-1
AVERAGE DAILY CONSTRUCTION-RELATED CRITERIA POLLUTANT EMISSIONS
(~~TONS PER YEAR~~POUNDS PER DAY) WITHOUT MITIGATION

Project Average Daily Construction Emissions by Year	ROG	NO_x	Exhaust PM_{10}	Exhaust $PM_{2.5}$
~~2022~~2023	~~3.33~~0.11	~~16.67~~1.00	~~0.77~~0.04	~~0.70~~0.04
~~2023~~2024	~~0.13~~0.06	~~1.14~~0.48	~~0.05~~0.02	~~0.04~~0.02
BAAQMD Threshold for Significant Construction Impacts	~~10~~54	~~10~~54	~~15~~82	~~10~~54
Potential Significant Impact?	No	No	No	No

NOTES: Construction emissions were revised to account for the one-year construction schedule delay. The BAAQMD significance thresholds for pounds-per-day (rather than tons-per-year) now apply.

SOURCE: ~~ESA~~Ramboll (Appendix A to this document~~checklist~~)

Operations

After the project is built, operational emissions, including stationary, mobile, and area sources, are anticipated to occur continuously throughout the project's lifetime. The project is anticipated to begin operations in ~~2023~~2024.

The Project Applicant has submitted an air permit application that includes multiple stationary sources, shown in **Table 4.3-2**. According to the applicant's air permit application, the majority of emissions would be generated from the biogas engine combustion process, where the engines emit exhaust that heats up a green waste rotary drier. The biogas engines are included in the list of proposed permitted sources, along with ~~a green waste storage pile of up to 200 tons,~~ a sheltered storage of limestone pellets that would be used as a co-feed to the feedstock needed to reduce acid gas formation in the system process, a diesel-fired fire pump engine, as well as a flare that is a backup for the evacuation or venting of organic syngas or on rare occasion vent hydrogen product.

Fugitive emissions from piping components such as valves and pumps are also anticipated. Cooling towers, pressure storage tanks, raw water storage tanks, treated water storage tanks, bisulfite storage tanks, anti-scalant storage tanks, and condensate recovery tanks are exempt from the permit requirement under BAAQMD Regulation 2, Rule 1 (BAAQMD 2017c), as described in the permit application. **Table 4.3-3** shows the anticipated emissions from the permitted sources. The air quality analysis prepared for the IS/MND is based on protocols used for the emissions analysis under review by the BAAQMD as part of the Authority to Construct (ATC) permit application.

This replacement would result in a lower emissions profile in contrast to current operations at the facility using the existing engine. ~~The project is also~~For a given volume of LFG combusted, NOx emissions would be reduced by 81 percent and CO emissions would be reduced by 53 to 62 percent. The WCCSL engines remain active, permitted sources, but have not been used recently due to disrepair. This results in the majority of LFG produced being flared. The Project is therefore expected to increase the functional use of landfill-produced biogas, thereby reducing the amount of organic gas sent to a flare

for venting or evacuation and ultimately reducing the flare-based emissions. The reduction in flaring emissions has been quantified below.

~~Notably, the~~ project would replace ~~an~~three (3) existing WCCSL biogas-fired engines with three (3) newer, lower emitting, and more efficient ~~Waukesha or~~ Jenbacher engines, equipped with state-of-the-art air emissions controls, including Selective Catalytic Reduction (SCR) and oxidation catalyst, which represent BACT for this type of equipment. This replacement would result in a lower emissions profile in contrast to operating the facility using the existing engine. ~~The project is also~~ For a given volume of LFG combusted, NOx emissions would be reduced by 81 percent and CO emissions would be reduced by 53 percent to 62 percent. The WCCSL engines remain active, permitted sources, but have not been used recently due to disrepair. This results in the majority of LFG produced being flared. The project is therefore expected to increase the functional use of landfill-produced biogas, thereby reducing the amount of organic gas sent to a flare for venting or evacuation and ultimately reducing the flare-based emissions.

Operational-related mobile source activities, such as employee commuting, truck trips for delivery and materials hauling, use of landscape equipment, and other sources would generate emissions of criteria air pollutants, their precursors, and toxic air contaminants (TACs). Area sources generally include fuel combustion from space and water heating, landscape maintenance equipment, and fireplaces/stoves, evaporative emissions from architectural coatings, and consumer products. Although these sources are not regulated under the BAAQMD's air permitting program, **Table 4.3-4** shows the emissions from operational emission sources as background considered with the project emissions~~sources that are not part of the air permit application~~.

TABLE 4.3-2
PROCESS OPERATIONS ~~AIR PERMIT APPLICATION'S~~ AVERAGE ANNUAL OPERATIONAL CRITERIA POLLUTANT EMISSIONS
(TONS PER YEAR)

Project Operations Emissions by Source	CO	NO_x	VOC/ROG	SO_2	PM_{10}	$PM_{2.5}$
Biogas engines	50.69	7.19	~~5.~~70 6.83	6.63	5.13	5.13
~~Green waste off gas~~	~~N/A~~	~~N/A~~	~~2.38~~	~~N/A~~	~~N/A~~	~~N/A~~
Fugitive component leaks	N/A	N/A	0.63	N/A	N/A	N/A
Limestone handling	N/A	N/A	N/A	N/A	0.003	0.0005
Limestone storage	N/A	N/A	N/A	N/A	0.016	0.0024
Flare	0.092	0.16	0.0098	0.0002	0.0086	0.0086
Fire pump engine	0.055	0.04	0.0022	0.00009	0.0033	0.0033
Total	**50.84**	**7.39**	**~~8.72~~ 7.47**	**6.64**	**5.16**	**5.14**

NOTES: Operational emissions were revised to align with the more detailed project information from the Project Applicant.

SOURCE: Ramboll ~~Permit Application~~ (~~Raven, 2022a~~Appendix A to this document)

TABLE 4.3-3
~~CALEEMOD~~AUXILIARY OPERATIONS AVERAGE ANNUAL OPERATIONAL-RELATED CRITERIA POLLUTANT EMISSIONS
(TONS PER YEAR)

Project Operations Emissions by Category	ROG	NO_x	~~Exhaust~~ PM_{10}	~~Exhaust~~ $PM_{2.5}$
Area	0.18	0	0	0
Energy	<0.01	0.05	<0.01	<0.01
Mobile	0.03 ~~0.14~~	2.3 ~~0.16~~	0.16 ~~<0.01~~	0.07 ~~<0.01~~
Mobile – Road Dust	0	0	0.14	0.02
Off-road	0.15	1.45	0.05	0.04
~~Waste~~	~~N/A~~	~~N/A~~	~~0~~	~~0~~
~~Water~~	~~N/A~~	~~N/A~~	~~0~~	~~0~~
Total	**0.18 ~~0.47~~**	**3.75 ~~1.66~~**	**0.35 ~~0.05~~**	**0.13 ~~0.05~~**

NOTES: Operational mobile emissions were revised to align with the more detailed project information from the Project Applicant.

SOURCE: ESA and Ramboll (Appendix A to this document~~checklist~~)

TABLE 4.3-4
AVERAGE ANNUAL OPERATIONAL- RELATED CRITERIA POLLUTANT EMISSIONS
(TONS PER YEAR)

Project Operations Emissions	NO_x	VOC/ROG	~~Exhaust~~ PM_{10}	~~Exhaust~~ $PM_{2.5}$
~~Air Permit~~Process Operations	7.39	7.47 ~~8.72~~	5.16	5.14
~~CalEEMod~~Auxiliary Operations	3.75 ~~1.66~~	0.18 ~~0.47~~	0.35 ~~0.05~~	0.13 ~~0.05~~
Reduction in Flared Landfill Gas	~~15.83~~ 8.71	0.10 ~~-0.19~~	3.35 ~~6.09~~	3.35 ~~-6.09~~
Overall Total	**~~9.05~~ 2.43**	**~~9.19~~ 7.55**	**~~5.21~~ 2.16**	**~~5.19~~ 1.92**
BAAQMD Threshold for Significant Operational Impacts	*10*	*10*	*15*	*10*
Potential Significant Impact?	No	No	No	No

NOTES: Operational mobile emissions were revised to align with more detailed project information from the Project Applicant.

Source: ESA and Ramboll (Appendix A to this document~~checklist~~) ~~and Ramboll Permit Application (Raven, 2022a)~~

TABLE 4.3-5
AVERAGE DAILY OPERATIONAL- RELATED CRITERIA POLLUTANT EMISSIONS
(POUNDS PER DAY)

Project Operations Emissions	NO_x	VOC/ROG	PM_{10}	$PM_{2.5}$
Process Operations	40.49	40.94	28.27	28.16
Auxiliary Operations	20.55	0.99	1.92	0.72
Reduction in Flared Landfill Gas	-47.70	-0.57	-18.35	-18.35
Overall Total	13.34	41.36	11.85	10.54
BAAQMD Threshold for Significant Operational Impacts	*54*	*54*	*82*	*54*
Potential Significant Impact?	No	No	No	No

NOTES: Operational mobile emissions were revised to align with more detailed project information from the Project Applicant.

SOURCE: ESA and Ramboll (see Appendix A to this document)

Table 4.3-4 and **Table 4.3-5** present the facility total annual operational emissions and their comparison to BAAQMD thresholds of significance for operations. These tables show that on a project-level assessment, emissions do not exceed ~~significant~~significance thresholds determined by BAAQMD under CEQA for criteria pollutants emitted during operations, and therefore would result in ~~are~~ less than significant impacts.

Construction Air Emissions

Less than Significant Impact. Construction activities would result in emissions of the following non-attainment pollutants: reactive organic gases (ROG) and nitrogen oxides (NOx), which are ozone precursors, and particulate matter (PM_{10} and $PM_{2.5}$). These pollutant emissions would be generated in the form of fugitive dust (PM_{10} and $PM_{2.5}$) and in the form of exhaust by construction equipment, on-road vehicle trips of haul trucks for delivering construction material, water trucks for site dust control, and construction worker commutes to and from the project site.

Construction Dust

Less than Significant Impact, after Mitigation. Activities that generate dust include excavation and equipment movement across unpaved construction sites. Dust can be an irritant causing watering eyes or irritation to the lungs, nose, and throat. Excavation, grading, and other construction activities can cause wind-blown dust that adds PM_{10} and $PM_{2.5}$ to the local atmosphere. The BAAQMD has taken a qualitative approach to addressing fugitive dust emissions during construction, such that any project that implements the BAAQMD Basic Construction Mitigation Measures Recommended for All Projects (Best Management Practices) would not result in a significant impact with respect to fugitive dust (BAAQMD 2017b). Mitigation Measure AQ-1: Best Management Practices, provided below, specifies BAAQMD recommended measures and would apply to all individual projects to address construction dust. In conclusion, while air emissions

from construction equipment are all below the BAAQMD CEQA thresholds construction dust emissions are always considered significant within the SFBAAB unless the mitigation measures below are applied.

Mitigation Measures

AQ-1: Best Management Practices.

~~All subsequent projects, regardless of size,~~The project shall implement the following best management practices to reduce construction impacts, particularly fugitive dust, to a less-than-significant level:

- All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day, except when not required for dust control.
- All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
- All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
- All vehicle speeds on unpaved roads shall be limited to 15 mph.
- All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
- Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.
- BMP #6: All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph.
- BMP #7: All trucks and equipment, including their tires, shall be washed off prior to leaving the site.
- BMP #8: Unpaved roads providing access to sites located 100 feet or further from a paved road shall be treated with a 6- to 12-inch layer of compacted layer of wood chips, mulch, or gravel.

- Additional BMP: Limit the simultaneous occurrence of excavation, grading, and ground- disturbing construction activities.
- Additional BMP: Install wind breaks (e.g., trees, fences) on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity.
- Additional BMP: Plant vegetative ground cover (e.g., fast-germinating native grass seed) in disturbed areas as soon as possible and watered appropriately until vegetation is established.
- Additional BMP: Install sandbags or other erosion control measures to prevent silt runoff to public roadways from sites with a slope greater than one percent.
- Additional BMP: Minimize the amount of excavated material or waste materials stored at the site.
- Additional BMP: Hydroseed or apply non-toxic soil stabilizers to construction areas, including previously graded areas, that are inactive for at least 10 calendar days.
- Require zero visible fugitive dust and use fence line air monitoring to demonstrate compliance with this requirement.
- Set requirements for when dust generating operations have to be shut down due to dust crossing the property boundary or if dust is contained within the property boundary but not controlled after a specified number of minutes.
- Prohibiting grading on days when a Spare the Air is in effect (https://www.sparetheair.org/) Prohibiting grading on days with an Air Quality Index forecast of greater than 100 for particulates for the project area.[16]

Operational Air Emissions

Less than Significant Impact. Based on the operational emissions modelled and summarized in Table 4.3-4 and Table 4.3-5 above, activities related to operating the bioenergy system would all be below significance thresholds. Appendix A contains additional analyses and emissions numbers in support of this conclusion.

c) **Expose sensitive receptors to substantial pollutant concentrations?**

Construction

Less than Significant Impact. Construction equipment and associated heavy-duty truck traffic generate diesel exhaust, which is a known TAC. Construction exhaust emissions may pose health risks for sensitive receptors. However, there are no sensitive receptors near~~by~~ the project site, which is zoned for open space uses. The nearest sensitive receptors are 0.75 miles southeast, or more than 1,000 feet, which is the distance considered in the BAAQMD CEQA Guidelines. Therefore, any concentrations of diesel

[16] The additional bulleted items to Mitigation Measure AQ-1 (formatted as single underline since they are not updates proposed in this updated IS/MND) were added as expanded mitigation at the Planning Commission.

particular matter (DPM) generated during construction would be less than significant. Although the nearest sensitive receptor is located further than the 1,000 distance, Raven conducted a Health Risk Assessment (HRA) to quantify construction-related emissions and associated health risks due to DPM exposure during construction. The results of this analysis are presented in Appendix A. Even though an HRA was not required based on adopted thresholds, the HRA demonstrates that health impacts are below significance thresholds, and the project would result in a less than significant impact during construction.

Operations

Less than Significant Impact. The proposed project would introduce new sources of TAC emissions, including the biogas engines and a new flare. Sources have been assumed to operate on a continuous basis at their maximum rated capacity, when determining emissions. The proposed project would also introduce a new source of DPM and $PM_{2.5}$ emissions due to the installation of an ~~emergency~~backup firepump diesel engine~~generator~~ at the centralized treatment facility that would use California Air Resources Board (CARB)- certified diesel fuel. Emergency generators would be subject to BAAQMD permit requirements, which would ensure that operation of these generators would not significantly impact nearby receptors. These activities would result in minimal TAC emissions for emergency operations only (typically less than 50 hours per year), and therefore have negligible associated health risks to existing sensitive receptors in the area, the nearest being 0.75 miles from the project site. Other annual TAC concentrations from non-emergency operations of the generator were estimated in an annual emissions summary for operations at the project site (Raven, 2022a). ~~An HRA was not conducted due to there not being any sensitive receptors within 1,000 feet of the project site and trigger levels not applying to the project.~~ There would also be a rubber-tired loader associated with operations that would run 24 hours a day 7 days a week. Emissions from the loader were calculated using CalEEMod and included in the operational emissions, shown in **Table 4.3-4.** Reduced TAC emissions due to the reduction in flaring of landfill gas at the existing WCCSL flare were also quantified and included in this analysis.

An HRA was conducted to quantify impacts from construction and operational sources. The HRA uses EPA's AERMOD model, version 22112, to model hourly and annual average TAC and $PM_{2.5}$ concentrations at nearby receptors. Modeling inputs, including emission rates in grams of pollutant emitted per second, and source characteristics (e.g., release height, stack diameter, plume width) were based on data provided by the Project Applicant, and all exposure parameters and the overall risk calculation methodology are consistent with guidance provided by OEHHA and BAAQMD. The results of this analysis are included in Appendix A and are presented in **Table 4.3-6**. The results in Table 4.3-6 demonstrates that health impacts associated with operational sources are below significance thresholds, including impacts due to toxic air contaminants released by the biogas engines.

TABLE 4.3-6
HEALTH RISK IMPACTS AT THE MAXIMUM EXPOSED SENSITIVE RECEPTORS

Risk Scenario / Receptor Type	Maximum Cancer Risk (per million)	Chronic Hazard Index	Acute Hazard Index	$PM_{2.5}$ concentration ($\mu g/m^3$)
Construction + Operations				
Worker	3.0	0.058	0.22	0.57
Resident	0.70	0.0086	0.0039	0.024
School	0.49	0.011	0.036	0.030
Clinic	0.46	0.0058	0.032	0.016
Landfill Reductions				
Worker	-5.7	-0.21	-0.49	-0.84
Resident	-1.3	-0.018	-0.10	-0.042
School	-0.81	-0.019	-0.091	-0.044
Clinic	-0.79	-0.011	-0.077	-0.026
Project Construction + Operations with Landfill Reductions				
Worker	-2.7	-0.16	-0.27	-0.27
Resident	-0.57	-0.009	-0.064	-0.018
School	-0.32	-0.0084	-0.055	-0.014
Clinic	-0.33	-0.0056	-0.045	-0.010
BAAQMD Threshold of Significance	*10.0*	*1.0*	*1.0*	*0.3*
Exceeds Significance Threshold?	Yes	No	No	No

NOTES: Numbers may not appear to sum correctly due to rounding.

SOURCE: Ramboll (Appendix A to this document)

The HRA also evaluated health impacts at Verde Elementary School (1.1 miles from the Project site) and at the Contra Costa Health Clinic (1.2 miles from the Project site). The results are also presented in Table 4.3-6 and documented in Appendix A. As shown in Table 4.3-6, health impacts due to toxic air contaminants at each location are below significance thresholds.

The HRA concluded that the project provides an overall *reduction* of cancer risk, chronic hazard index, acute hazard index, and particulate matter concentrations as compared to the portions of the existing landfill flare operation it would be replacing.

Cumulative Impact

Cumulative community risk impacts were addressed through an evaluation of TAC sources located within 1,000 feet of the sensitive receptors. These sources include freeways or highways, busy surface streets, and stationary sources identified by BAAQMD. For local roadways, BAAQMD has provided the *Roadway Screening Analysis Calculator* to assess whether roadways with traffic volumes of over 10,000 vehicles per day may have a potentially significant effect on a proposed Project (BAAQMD, 2015). These estimated

health impacts were added to the total project health impacts and are presented in **Table 4.3-7** and Appendix A. The screening calculator does not provide estimates of chronic HI because chronic HI is expected to be minor for traffic sources. Therefore, the impact from vehicles on chronic HI is not included in the cumulative analysis.

TABLE 4.3-7
CUMULATIVE HEALTH RISK IMPACTS AT THE MAXIMUM EXPOSED SENSITIVE RECEPTORS

Receptor Type / Risk Scenario	Maximum Cancer Risk (per million)	Hazard Index	$PM_{2.5}$ concentration ($\mu g/m^3$)
Worker			
Existing Stationary Source Risk	45.0	0.52	1.02
Existing Roadway Source Risk	1.8	--	0.04
Existing Railway Source Risk	3.7	--	0.0049
Project Risk (Construction + Operations + Landfill Reductions)	-2.7	-0.16	-0.272
Total (Project Risk + Exiting Risk)	47.6	0.36	0.797
BAAQMD Cumulative Threshold of Significance	*100.0*	*10.0*	*0.8*
Exceeds Significance Threshold?	No	No	No
Resident			
Existing Stationary Source Risk	0.0041	4.70E-05	0.001
Existing Roadway Source Risk	6.6	--	0.19
Existing Railway Source Risk	4.3	--	0.0059
Project Risk (Construction + Operations + Landfill Reductions)	-0.57	-0.009	-0.018
Total (Project Risk + Exiting Risk)	10	-0.009	0.18
BAAQMD Cumulative Threshold of Significance	*100.0*	*10.0*	*0.8*
Exceeds Significance Threshold?	No	No	No
School			
Existing Stationary Source Risk	7.10E-05	8.20E-07	1.80E-05
Existing Roadway Source Risk	3.2	--	0.074
Existing Railway Source Risk	15	--	0.02
Project Risk (Construction + Operations + Landfill Reductions)	-0.32	-0.008	-0.014
Total (Project Risk + Exiting Risk)	18	-0.0084	0.08
BAAQMD Cumulative Threshold of Significance	*100.0*	*10.0*	*0.8*
Exceeds Significance Threshold?	No	No	No
Clinic			
Existing Stationary Source Risk	5.70E-05	6.60E-07	1.40E-05
Existing Roadway Source Risk	2.8	--	0.067
Existing Railway Source Risk	5.6	--	0.0077
Project Risk (Construction + Operations + Landfill Reductions)	-0.33	-0.006	-0.01
Total (Project Risk + Exiting Risk)	8.1	-0.0056	0.065
BAAQMD Cumulative Threshold of Significance	*100.0*	*10.0*	*0.8*
Exceeds Significance Threshold?	No	No	No

NOTE: The BAAQMD tool for calculating chronic hazard index does not include risk from railways or roadways. Therefore, cumulative chronic hazard index for the resident, school, and clinic receptors would likely not be negative; however the project presents an overall reduction in chronic risk to the existing conditions.

SOURCE: Ramboll (Appendix A to this document)

Table 4.3-7 reports both the project and cumulative community risk impacts. The cumulative cancer risk, hazard indexes, and $PM_{2.5}$ concentrations would not exceed their cumulative source thresholds and the project presents an overall *reduction* risk to the existing conditions. Thus, a **less-than-significant cumulative** impact would occur during construction and operation of the proposed project.

d) **Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?**

Less than Significant Impact. Existing uses on and near the WCCSL include operations that are among typical odor sources of concern. These include wastewater treatment plants, sanitary landfills, transfer stations, composting facilities, petroleum refineries, chemical manufacturing facilities, and auto body shops. As a hydrogen production facility, the project would include organic feedstock processed during operations at the WCCSL, which is known to create odors. WCCSL implements various control measures to minimize odors associated with operation of the mixed waste processing.

The nearest sensitive receptors to the project site are residences at generally West Gertrude Avenue/Malcolm Drive, approximately 0.75 miles southeast. This is closer than the 1.0-mile odor screening distance for greenwaste handling established in the BAAQMD's CEQA Guidelines. Also, an elementary school and a health clinic exist approximately 1.1 and 1.2 miles, respectively, from the project site - slightly beyond the screening distance. Uses between the project site and these the nearest sensitive receptors to the southeast include the West County Wastewater District Treatment Plant, EBMUD's North Richmond Water Reclamation Plant, the Richmond Sanitary District, and other refuse services, automobile repair and towing businesses, and lawn services, etc. Topography in the area is relative flat, and no substantial areas of vegetation exist.

The prevailing wind direction in this area for the majority of the year (February through November) is from the south, blowing away from area of sensitive receptors. This prevailing wind direction shifts to the north, blowing toward the sensitive receptor area, for approximately two months of the year (December and January).

Nuisance odor from Raven is unlikely ~~since~~ based upon the initial process step of subjecting the feedstock ~~material would only be on the feedstock management area floor for relatively short periods of time.~~ to drying given the project procedures and requirements outlined below. Nor would the system's tail gas or the infrequent use of the as-needed flare generate noticeable odor. Also, other than the input of organic feedstock within the system, the process would not involve the storage or processing of other potentially odorous materials nor contribute to odor from nearby existing WCCSL activities.

The Raven SR Project introduces a number of odor minimization procedures and compliance with regulatory requirements. First, it is important to note that the feedstock for the Raven process will only include pre-processed material consisting primarily of blended green waste and food waste. The source of the material will be from the onsite composting facility referred to as OMPF. The OMPF receives vehicle loads directly from residential and commercial organics collection programs. The OMPF operating procedures include initial visual screening and a load checking program designed to identify and remove prohibited material including any highly odorous loads. After screening and load checking, remaining organic material will be pre-processed by grinding. Only material that has been through the screening, load checking and grinding process at the OMPF will be delivered to the Raven SR facility, thus minimizing the potential for receiving prohibited or highly odorous material. In addition, all incoming pre-processed feedstock received at the Raven SR facility will also be subject to the Raven SR's own screening and load checking program as required by State solid waste facility regulations.

To further minimize potential odor impacts, the Raven SR facility standard operating procedures will include a "first in first out protocol" for the processing of material. Typically, any material received will be processed within 24 hours of receipt through the hydrogen conversion system. As a requirement of both the CUP and the Solid Waste Facility Permit (SWFP) for the facility all feedstock material shall, at a maximum, be processed within 48 hours of receipt (draft Condition of Approval #48).

~~Regardless, as described in Section 2, *Project Description,* the project would involve odor control mechanisms to minimize possible additional odors from its operation. The~~In addition, the proposed industrial metal canopy would be placed over the feedstock floor and infeed equipment to prevent stormwater contact.~~ The project may incorporate control measures similar to those current employed by WCCSL, such as ensuring the input of feedstock into the system within a designated period of time from receiving it from WCCSL's onsite organic material processing facility to prevent potential odor buildup;~~ The project will also include routine cleaning of floors, walls, and equipment~~;~~ and use of odor suppressants as deemed necessary. Odor control would be added to the management area if objectionable odors occur. The Raven facility could also store topical treatment solutions (non-toxic and biodegradable) onsite, which would be applied to neutralize odors if an immediate need arises. To the extent that any new sources of odor is attributable to the proposed project, the P~~p~~roject A~~a~~pplicant shall promptly log and respond to any complaints and work to remediate~~d~~.

The CUP and SWFP impose additional odor minimization provisions and requirements on facility operations. These include but are not limited to:

- Maximum Daily Quantities – 99.9 tons per day
- Maximum Storage Capacity – 200 tons
- Daily facility cleaning
- Compliance with state minimum standards under solid waste provisions

contained in Title 14 and Title 27 including Nuisance Control and odor compliant response and reporting requirements

- Cooperation with Bay Area Air Quality Management District (BAAQMD), the City and the County, to identify and implement measures to minimize odor emissions through the development and implementation of an Odor Prevention and Management Plan (OPMP) (draft Condition of Approval #77), which will require an Annual Evaluation Report. This includes the following minimum measures:
    - feedstock load checking at the Republic site for identification and removal of prohibited material including any highly-odorous loads;
    - feedstock pre-processing at the Republic site before being sent to the Raven facility;
    - operations protocol for first in/first out feedstock consumption;
    - feedstock will typically be processed within 24 hours with a maximum limit within 48 hours of receipt; v) daily cleaning of the feedstock handling area; and
    - use of odor suppressants if necessary.

Therefore, any odor impacts from the proposed project would not be ~~considered substantial nor likely~~significant and the Raven SR Project will not contribute ~~substantially~~significant odor emissions to any existing odor sources of the WCCSL. The impact would be less than significant.

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BAAQMD, 2017c. Regulations 2 Permits Rule 1 General Requirements. Available online: https://www.baaqmd.gov/~/media/dotgov/files/rules/regulation-2-rule-1/documents/20171206_fr_0201-pdf.pdf?la=en&rev=42c6de7702484ea58dfcbcecaeafa29f. Accessed May 1, 2022.

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4.4 Biological Resources

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Biological Resources *Would the project:*				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or United States Fish and Wildlife Service?		☒		
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Wildlife or United States Fish and Wildlife Service?				☒
c) Have a substantial adverse effect on State or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?				☒
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of wildlife nursery sites?			☒	
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?			☒	
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan?				☒

Setting

The project site is located in the upland area of the approximately 340-acre WCCSL, within the context of expansive grasslands and hills. The WCCSL borders San Pablo Bay and tidal marshland of naturalized portions of San Pablo and Wildcat creeks. The broader surrounding area of the WCCSL property is a low density industrial and open space area.

The local context in Figure 1-2 shows the project site located approximately 0.25-mile east of the San Pablo Bay shoreline, mudflats, and open water. The tidal marshland of San Pablo Creek is approximately 0.3 miles north/northeast of the project site, bordering the WCCSL north boundary which is an elevated levee. As shown in Figure 2-0, the marshlands of Wildcat Creek sit

approximately 280 feet south/southeast of the project site, bordering the WCCSL south boundary, which is also an elevated levee. A closed Class I landfill is immediately north of the project site and the main access road supports a cover of non-native grassland and ruderal vegetation species. No trees exist on the project site. Several landscape trees occur at the Golden Bear Waste Recycling Facility (part of the BMPC), located approximately 300 feet southwest of the project site.

Biological resources were characterized through the review and compilation of existing information and a biological reconnaissance survey conducted by ESA biologists on June 29, 2022. The biological reconnaissance study area included the project construction area plus an additional 250-foot buffer, to account for potential indirect impacts to special-status species. The study area for special-status plant species includes the project construction area, plus an additional 10-foot buffer due to the lack of potential for indirect impacts to plants. No detailed surveys were conducted for special-status plants or wildlife or are deemed necessary based on the developed and manipulated conditions of the project site and surroundings, the scope of the proposed project's construction and operations, and the proposed standard methods to minimize disturbance to sensitive resources in the vicinity.

Species / Habitats

The uplands of the WCCSL are either devoid of vegetation from on-going landfill operations and roadways, or are dominated by nonnative grasses and forbs. Plant species observed in the grassland at the periphery of the project site are dominated by non-native species such as Italian rye grass (*Festuca perennis*), wild oats (*Avena* spp.), storksbill (*Erodium cicutarium*), bristly ox-tongue (*Helminthotheca echioides*), and ribwort (*Plantago lanceolata*). Several weedy species are also present along the margins of the site, including fennel (*Foeniculum vulgare*), wild radish (*Raphanus* spp.), black mustard (*Brassica nigra*), curly dock (*Rumex crispus*), prickly lettuce (*Lactuca serriola*), and iceplant (*Carpobrotus edulis*). Clumps of native coyote brush (*Baccharis pilularis*) are scattered through grasslands, road margins, and upper edge of the marshlands and levees.

While the highly disturbed project site provides little habitat that is suitable for special-status plants and wildlife, the surrounding grasslands and wetlands provide habitat for a variety of wildlife and plant species. Wildlife observed in the surrounding study area during the site reconnaissance survey include American crow (*Corvus brachyrhynchos*), red-tailed hawk (*Buteo jamaicensis*), western bluebird (*Sialia mexicana*), barn swallow (*Hirundo rustica*), common raven (*Corvus corax*), Canada goose (*Branta canadensis*), wild turkey (*Meleagris gallopavo*), black-necked stilt (*Himantopus mexicanus*), turkey vulture (*Cathartes aura*), mallards (*Anas platyrhynchos*), killdeer (*Charadrius vociferus*), and several gull species (*Larus* spp.).

Sensitive aquatic habitats occur outside of the project boundary, and include wetlands, sloughs, creek channels, and the San Pablo Bay shoreline. San Pablo Creek is located approximately 600 feet east/northeast of the project site and is separated from WCCSL developed areas by a levee. San Pablo Creek is tidally influenced and flows into the San Francisco Bay after flowing through San Pablo Creek Marsh. Emergent salt marsh vegetation occurs approximately 280 feet south/southwest of the project site within Wildcat Marsh, 0.3 miles north/northeast of the project

site. Numerous shorebirds, waterfowl, and other wildlife use the marsh and mudflats for foraging and resting; however, the marsh is beyond the 250-foot project study area.

A number of special-status animal species have been reported from nearby creeks and marshes, including the state and federally-endangered salt marsh harvest mouse (*Reithrodontomys raviventris*) and California Ridgway's rail (*Rallus longirostris obsoletus*), state-threatened California black rail (*Laterallus jamaicensis coturniculus*), and several other species considered to be California Species of Special Concern and Fully Protected by the State. **Appendix B** presents the special-status species considered in the analysis, including each species' legal or protective status, habitat requirements, and blooming period (for plants), and the potential for occurrence within study areas. Higher elevations of the marsh typically provide important refuge for small mammals and birds during storms and high tides. However, due to the extent of developed and otherwise disturbed habitat on the project site, the narrow band of cover along the levee slope, and the intensity of human activity, the project site is not expected to provide upland retreat habitat for wildlife species, including species associated with salt marsh and other wetland habitats.

Several special-status plant species are known from the uplands and coastal salt marsh habitats along the shoreline of San Francisco and San Pablo Bays, but none have been reported from the vicinity of the WCCSL. A single occurrence of fragrant fritillary (*Fritillaria liliacea*) was reported from the Point Richmond area in 1900, but this occurrence is believed to have been extirpated by development, and suitable habitat is absent on the site. Other special-status plant species known from marshland habitat along the shoreline of San Pablo Bay include: the State rare soft-haired bird's beak (*Chloropyron molle* ssp. *molle*), Mason's lilaeopsis (*Lilaeopsis masonii*), and San Francisco gumplant (*Grindelia hirsutula* var. *maritima*). These California Rare Plant Rank 1B species are considered rare under Section 13580 of the California Environmental Quality Act (CEQA) Guidelines. None have been reported from the WCCSL, and suitable habitat is absent on portions of the site proposed for improvements.

Wetlands

No wetlands or other aquatic resources occur within the project site. Jurisdictional wetlands and unvegetated waters extend over the northern coastal salt marsh, open water habitat, and San Pablo Creek channel. The sloughs, creek channel, and bay shoreline which border the WCCSL property are all under tidal influence. The upland portions of the WCCSL property do not support wetlands, and the engineered basins designed for runoff control and leachate treatment, including basins located to the south and west of the project site, are exempt from state and federal wetland jurisdiction.

Evaluation

a) **Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or United States Fish and Wildlife Service?**

A list of special-status species that occur in the project region was identified based upon review of existing information, including queries of the California Natural Diversity Database (CNDDB), U.S. Fish and Wildlife Service (USFWS) Official Species List, and the California Native Plant Society (CNPS). Habitats at the project area were assessed for their potential to support special-status species using information about local species occurrences and species' habitat requirements, in combination with the site visit described above (Appendix B).

Plants

No special-status plant species are expected to occur on the disturbed project site. Site preparation for the project would involve minimal grading for the erection of the modular building and the replacement of existing compacted soil, ruderal groundcover and partially paved areas where special-status plants are not expected to occur. Hence, no impacts would occur to special-status plants.

Wildlife

The project site exists within a previously disturbed upland portion of the WCCSL that does not provide habitat for special-status wildlife species. Due to the extent of past development, no special-status wildlife species are expected to occur within the project site. Additionally, basins and runoff control ponds located to the south and west of the project site do not provide suitable habitat for special-status species.

~~Beyond the site boundaries,~~S~~s~~urrounding wetland and annual grassland habitat may provide habitat for special-status wildlife species. The following species are considered to have the potential to occur within these areas: short-eared owl (*Asio flammeus*), western burrowing owl (*Athene cunicularia hypugaea*), northern harrier (*Circus hudsonius*), loggerhead shrike (*Lanius ludovicianus*), California black rail (*Laterallus jamaicensis coturniculus*), and California Ridgway's rail (*Rallus longirostris obsoletus*). Short-eared owl, western burrowing owl, northern harrier, and loggerhead shrike are California Species of Special Concern. Uplands and wetlands outside of the project site provide potential foraging habitat for these species. Upland grassland and ruderal habitats provide potential nesting habitat. Short-eared owl and northern harrier are ground nesting species, while loggerhead shrikes nest in shrubs and occasionally items such as brush piles, generally between two and four feet off the ground. Western burrowing owls nest underground in burrows dug by mammals such as California ground squirrels (*Otospermophilus beecheyi*).

California Ridgway's is listed as endangered under both the Federal Endangered Species Act (FESA) and the California Endangered Species Act (CESA), and is a state fully-protected species. Ridgway's rails are found in tidal and brackish marshes where they typically construct nests in or under dense marsh vegetation, such as marsh gumplant and pickleweed at an elevation high enough to avoid inundation during high tides. California black rail is listed as threatened under CESA and is a state fully-protected species. This species nests and forages in tidal emergent wetland. Suitable marsh habitat for both of

these species is present within 500 feet of the project site and multiple occurrences are known from marshes adjacent to or nearby the project site.

In addition to the aforementioned special-status species, common raptors and other bird species may forage in uplands and marshes on the edges of the study area. While no trees exist on the project site, trees approximately 300 feet southwest of the project site at the Golden Bear Waste Recycling Facility have potential to support raptor nesting. Current activity on the project site involves large truck traffic, human activity, operation of machinery and elevated noise levels. Regardless, some bird species, such as killdeer (*Charadrius vociferus*) and American crow (*Corvus brachyrhynchos*), tend to be highly tolerant of human disturbance and may still nest in areas with relatively high levels of human activity.

Construction

***Less than Significant Impact, after Mitigation*.** Bird species listed under FESA and CESA, as well as non-ESA-listed birds, are afforded conservation protections. Breeding birds are protected under California Fish and Game Code (FGC) Section 3503 and raptors are protected under Section 3503.5. In addition, FGC Section 3513 and the Federal MBTA (16 USC, Sec. 703 Supp. I, 1989) prohibit the killing, possession, or trading of migratory birds. Finally, FGC Section 3800 prohibits the taking of non-game birds, which are defined as birds occurring naturally in California that are not game birds or fully protected species. Impacts during the non-breeding season are not considered significant, primarily due to the birds' mobility and ability to access other high-quality foraging habitat in the region. Also, the project site is disturbed and provides poor habitat for nesting birds. However, equipment staging and project construction could render the site and adjacent areas temporarily unsuitable for breeding birds due to the noise, vibration, and increased activity levels associated with grubbing, earth moving, heavy equipment operation, and increased human presence even when the nest itself is unaffected. These activities could cause birds that have established a nest prior to the start of construction to change their behavior or even abandon an active nest, putting eggs and nestlings at risk for mortality. This would be considered a significant impact.

Implementation of Mitigation Measure BIO-1: Avoid and Minimize Impacts to Nesting Birds, Except Rails, and Mitigation Measure BIO-2: Avoid and Minimize Impacts to California Black Rail and California Ridgway's Rail would reduce potential construction-related impacts to nesting special-status birds to a less-than-significant level by requiring avoidance of construction-related work during the nesting bird season, or if avoidance of the nesting season is not possible, pre-construction nesting bird surveys and establishment of no-construction buffer zones around active bird nests. With implementation of Mitigation Measures BIO-1 and BIO-2, construction-related impacts would be less than significant.

Mitigation Measure BIO-1: Avoid and Minimize Impacts to Nesting Birds, Except Rails

~~To the extent practicable,~~ Pproject construction activities requiring heavy equipment, or any tree trimming, shall be performed outside of the bird nesting season (February 1st through August 31st) to avoid impacts to nesting birds. If these activities must be performed during the nesting bird season, a qualified biologist shall be retained to conduct a pre-construction survey in the project construction and staging areas for nesting birds and verify the presence or absence of nesting birds no more than 14 calendar days prior to construction activities or after any construction breaks of 14 calendar days or more. Surveys shall be performed for the project construction and staging areas and suitable habitat within 250 feet of the project construction and staging areas in order to locate any active passerine (perching bird) nests and within 500 feet of the project construction and staging areas to locate any active raptor (birds of prey) nest, including potential burrowing owl burrows. If nesting birds and raptors do not occur within 250 and 500 feet of the project area, respectively, then no further action is required if construction begins within 14 calendar days.

If active nests are located during the pre-construction bird nesting surveys, no-disturbance buffer zones shall be established around nests, with a buffer size established by the qualified biologist. Typically, these buffer distances are between 50 feet and 250 feet for passerines and between 150 feet and 500 feet for raptors. These distances may be adjusted depending on the level of surrounding ambient activity and if an obstruction, such as a building or structure, is within line-of-sight between the nest and construction. Reduced buffers may be allowed if a full-time qualified biologist is present to monitor the nest and has authority to halt construction if bird behavior indicates continued activities could lead to nest failure. Buffered zones shall be avoided during construction-related activities until young have fledged or the nest is otherwise abandoned. If active burrowing owl dens are found within the survey area, the Project Applicant shall implement measures at least equal to the 2012 (or subsequent applicable) CDFW Staff Report (CDFG, 2012), as determined by the qualified biologist.

Mitigation Measure BIO-2: Avoid and Minimize Impacts to California Black Rail and California Ridgway's Rail

- To minimize or avoid the loss of individual California black rail and Ridgway's rail, construction activities requiring heavy equipment, adjacent to tidal marsh areas (within 500 feet [150 meters] or a distance determined in coordination with U.S. Fish and Wildlife (USFWS) or the California Department of Fish and Wildlife (CDFW)), shall be avoided during the breeding season from February 1 through August 31.

- If areas within 500 feet of rail habitat cannot be avoided during the breeding season (February 1 through August 31), protocol-level surveys shall be conducted to determine rail nesting locations. The surveys will focus on potential habitat that could be indirectly disturbed by construction activities during the breeding season to ensure that rails are not breeding within 500 feet of project activities.

  Survey methods for rails will follow the *Site-Specific Protocol for Monitoring Marsh Birds*, which was developed for use by USFWS and partners (Wood et al. 2017). Surveys are concentrated during the approximate period of peak detectability, January 15 to March 25 and are structured to efficiently sample an area in three

rounds of surveys by broadcasting calls of target species during specific periods of each survey round. Call broadcast increase the probability of detection compared to passive surveys when no call broadcasting is employed. This protocol has since been adopted by Invasive Spartina Project (ISP) and Point Blue Conservation Science to survey Ridgway's rails at sites throughout San Francisco Bay Estuary. The survey protocol for Ridgway's rail is summarized below.

- Previously used survey locations (points) should be used when available to maintain consistency with past survey results. Adjacent points should be at least 200 meters apart along transects in or adjacent to areas representative of the marsh. Points should be located to minimize disturbances to marsh vegetation. Up to 8 points can be located on a transect.

- At each transect, three surveys (rounds) are to be conducted, with the first round of surveys initiated between January 15 and February 6, the second round performed February 7 to February 28, and the third round March 1 to March 25. Surveys should be spaced at least one week apart and the period between March 25 to April 15 can be used to complete surveys delayed by logistical or weather issues. A Federal Endangered Species Act Section 10(a)(1)(A) permit is required to conduct active surveys.

- Each point on a transect will be surveyed for 10 minutes each round. A recording of calls available from USFWS is broadcast at each point. The recording consists of 5 minutes of silence, followed by a 30-second recording of Ridgway's rail vocalizations, followed by 30 seconds of silence, followed by a 30-second recording of California black rail, followed by 3.5 minutes of silence.

- If no breeding Ridgway's rails or black rails are detected during surveys, or if their breeding territories can be avoided by 500 feet (150 meters), then project activities may proceed at that location.

- If protocol surveys determine that breeding Ridgway's rails or black rails are present in the project area, the following measures would apply to project activities conducted during their breeding season (February 1- August 31):

  - The applicant shall coordinate with the USFWS- and CDFW, as appropriate depending upon species, to ~~determine~~ verify if project activities can continue during the nesting season based on nest location, natural visual barriers (e.g., levees) between the project and marshlands, and the distance between proposed activities and identified activity centers. If impact cannot be avoided during the rail nesting season, activities would be delayed until after the nesting season.

Operations

Less than Significant Impact. Current activity on the project site involves large truck traffic, human activity, operation of machinery and elevated noise levels associated with the Republic Services BMPC property and the existing landfill power plant. The proposed Raven SR operation is not expected to significantly change the level of activity that is currently conducted within the project area and, therefore, long-term operation of the Raven SR operation is not expected to result in significant impacts to biological resources within the project area.

There is also existing permanent lighting associated with the current 24-hour activities of the adjacent BMPC and the project site. The proposed project would not substantially increase existing nighttime lighting to result in an adverse impact to existing bird species. The project proposes LED lighting mounted on 30-foot-tall poles. Similar to existing conditions, the project lighting would be focused and shaded, incorporating directional shading (down-shot reflectors) to limit light pollution during night operations. The project would place nine single-light fixtures at throughout the site and three double-light fixtures in the truck loading area in the south portion of the site.

No part of the proposed facility would exceed 31 feet in height, which is the height of the industrial feed material handler. Other elements of height and size include the nitrogen tank (30 feet tall); the cooling tower and the fire water tank (both 25.5 feet tall); and the industrial metal canopy over the feed/unload storage area, the adjacent steam reformer structure, and the nitrogen tank (each 26 feet tall). Therefore, no part of the project would exceed 45 feet in height, in which case the project would comply with the City of Richmond's Bird-Safe Buildings Municipal Ordinance.

Overall, the proposed project also would not alter any of the area's natural resources or native vegetation in a way that could adversely impact biological resources. The impact would be less than significant.

b) **Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Wildlife or United States Fish and Wildlife Service?**

No Impact. The project site does not contain any riparian habitat or other sensitive natural communities. The nearest sensitive habitat is well-preserved coastal salt marsh occur along the San Pablo Bay shoreline, Wildcat Marsh, and along the upper banks of San Pablo Creek. The project site is located 0.25 miles east of the shoreline, approximately 0.3 miles south of San Pablo Creek's upper banks, and within 300 feet of Wildcat Marsh, which is separated from the project site by the Bay Trail levee. The proposed project does not involve any activity that would affect these areas. Therefore, the proposed project would have no impact.

c) **Have a substantial adverse effect on State or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?**

No Impact. The project site does not contain any State or federally protected wetlands. The proposed development would not impact any waterbodies in any way and therefore would have no impact on protected wetlands.

d) **Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of wildlife nursery sites?**

Less than Significant Impact. The project site is not in a natural condition and contains development and current truck and other operations of the BMPC. Due to the existing developed nature of the site, the project site does not provide suitable habitat to be considered a wildlife nursery site. Additionally, wildlife movement within the project site is restricted by existing privacy fencing that surrounds the project area. While the surrounding uplands and wetlands provide habitat for the movement of native resident and migratory wildlife, activities associated with the project are not expected to directly impact these areas or impede wildlife movement. Therefore, this impact would be less than significant.

e) **Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?**

Less than Significant Impact. Construction or operation of the proposed project would not conflict with any local policies or ordinances protecting biological resources. There are no existing trees on the project site, nor are any proposed due to limited space and potential safety hazards. However, as part of the proposed project, off-site landscaping improvements are proposed to the Wildcat Marsh Trail and trail head parking located approximately 1,000 feet east of the project site. Eleven drought-tolerant trees would be planted: either six large Coast Live Oak (*Quercus agrifolia*) or Big Leaf Maple (*Acer macrophyllum*), and five small California Buckeye (*Aesculus californica*). Both species are on City's approved list of trees. Tree size planted would be associated with 15-gallon containers. The project is subject to and would adhere to the City's local tree protection policies and regulations. Also, as addressed under Section 4.12, *Noise and Vibration*, of this checklist, the project would adhere to the City of Richmond Noise Ordinance regarding noise levels during temporary construction activity, as well as the operational noise levels. Therefore, this impact would be less than significant.

f) **Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan?**

No Impact. The project site does not lie within the boundaries of any an adopted Habitat Conservation Plan (HCP) or Natural Community Conservation Plan (NCCP) or any other approved local, regional, or State habitat conservation plan.

References

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4.5 Cultural Resources

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Cultural Resources *Would the project:*				
a) Cause a substantial adverse change in the significance of a historical resource as pursuant to Section 15064.5?				☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?		☒		
c) Disturb any human remains, including those interred outside of formal cemeteries?		☒		

Setting

To determine the cultural resources sensitivity of the project site, ESA completed a records search and background research, including a review of historic maps, aerial imagery, and geologic/soils data. ESA staff conducted a records search at the Northwest Information Center (NWIC) of the California Historical Resources Information System on March 23, 2022 (File No. 21-1575). The purpose of the records search was to (1) determine whether known cultural resources have been recorded in the vicinity of the project site; (2) assess the likelihood for unrecorded cultural resources to be present based on historical references and the distribution of nearby sites; and (3) develop a context for the identification and preliminary evaluation of cultural resources. The records search consisted of an examination of the following documents:

- NWIC digitized base maps (USGS San Quentin, CA 7.5-minute topographic map), to identify recorded archaeological sites and studies within a 0.5-mile radius of the project site.
- NWIC digitized base maps (USGS San Quentin, CA 7.5-minute topographic map), to identify recorded historic-era resources of the built environment (building, structures, and objects) within and adjacent to the project site.
- Resource Inventories: *California Inventory of Historical Resources, California Historical Landmarks, Built Environment Resource Directory* (BERD) (through March 2020) and *Archaeological Determinations of Eligibility* (as of April 2012) for Contra Costa County.

No cultural resources have been previously recorded in the vicinity of the project site and there are no historic-age architectural resources in or adjacent to the project site. The nearest cultural resources are a series of pre-contact archaeological sites nearly 1 mile to the east that contribute to the Lower San Pablo Creek Archaeological District. These resources would not be impacted by the proposed project. The underlying geology of the project site consists of artificial fill over Holocene Bay Mud deposits. The historic shoreline is approximately 0.4 miles (2,000 feet) east of the project site; pre-contact and historic-era archaeological sites in this environment would be located at or very near to the historic shoreline.

Therefore, this analysis concludes that the sensitivity for pre-contact and historic-era archaeological resources is low and the potential to uncover archaeological resources during project implementation is also low.

Evaluation

a) **Cause a substantial adverse change in the significance of a historical resource as pursuant to Section 15064.5?**

No Impact. CEQA Guidelines Section 15064.5 requires the lead agency to consider the effects of a project on historical resources. A historical resource is defined as any building, structure, site, or object listed in or determined to be eligible for listing in the California Register of Historical Resources (California Register), or determined by a lead agency to be significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, or cultural annals of California. The following discussion focuses on architectural and structural resources. Archaeological resources, including those that are potentially historical resources according to CEQA Guidelines Section 15064.5, are addressed below under question b).

As a result of the records search and background research, it was determined that there are no architectural or structural resources in or adjacent to the project site that potentially qualify as historical resources, as defined in CEQA Guidelines Section 15064.5. As such, there are no historical resources present within the project site and there would be no impact on historical resources.

b) **Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?**

***Less than Significant Impact, after Mitigation*.** This section discusses archaeological resources, both as historical resources according to CEQA Guidelines Section 15064.5, as well as unique archaeological resources, as defined in California Public Resources (PRC) (CEQA) Section 21083.2(g). A significant impact would occur if the project would cause a substantial adverse change to an archaeological resource through physical demolition, destruction, relocation, or alteration of the resource.

Based on the results of the background research and environmental context, the potential for encountering archaeological resources during project implementation is low. However, in the unlikely event that a previously unrecorded archaeological resource is identified during project ground-disturbing activities and found to qualify as a historical resource or a unique archaeological resource, any impacts on the resource resulting from the project could be potentially significant.

Implementation of Mitigation Measure CUL-1a: Cultural Resources Awareness Training and Mitigation Measure CUL-1b: Inadvertent Discovery of Cultural Materials or Tribal Cultural Resources would reduce potentially significant impacts to less than significant. In the event of an inadvertent discovery of any cultural materials or tribal cultural resource,

these mitigation measures would ensure that all personnel complete a cultural resources awareness training prior to any ground-disturbing activity and that work halts in the vicinity until a qualified archaeologist can make an assessment and provide additional recommendations if necessary, including contacting Native American tribes.

Mitigation Measure CUL-1a: Cultural Resources Awareness Training.

Prior to authorization to proceed, the City shall engage a qualified archaeologist, defined as an archaeologist meeting the U.S. Secretary of the Interior's Professional Qualification Standards for Archeology, to conduct a training program for all construction workers involved on site disturbance. On-site personnel shall attend a mandatory pre-project training that outlines the general archaeological sensitivity of the vicinity and the procedures to follow in the event an archaeological resource and/or human remains are inadvertently discovered.

Mitigation Measure CUL-1b: Inadvertent Discovery of Cultural Materials or Tribal Cultural Resources.

If pre-contact or historic-era cultural materials are encountered during project implementation, all construction activities within 100 feet of the find shall halt and the contractor shall notify the City. The City shall notify a qualified archaeologist who will inspect the find within 24 hours of discovery and provide the City of an initial assessment. Pre-contact cultural materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); and battered stone tools, such as hammerstones and pitted stones. Historic-era cultural materials might include building or structure footings and walls, and deposits of metal, glass, and/or ceramic refuse.

If the City determines, based on recommendations from a qualified archaeologist and a Native American representative (if the resource is pre-contact), that the resource may qualify as a historical resource or unique archaeological resource (as defined in CEQA Guidelines Section 15064.5) or a tribal cultural resource (as defined in PRC Section 21080.3), the resource shall be avoided if feasible. Consistent with Section 15126.4(b)(3), this may be accomplished through planning construction to avoid the resource, incorporating the resource within open space, capping and covering the resource, or deeding the site into a permanent conservation easement.

If avoidance is not feasible, the City shall consult with a qualified archaeologist and a Native American representative (if the resource is pre-contact) to determine treatment measures to avoid, minimize, or mitigate any potential impacts to the resource pursuant to PRC Section 21083.2 and CEQA Guidelines Section 15126.4. This shall include documentation of the resource and may include data recovery (according to PRC Section 21083.2), if deemed appropriate, or other actions such as treating the resource with culturally appropriate dignity and protecting the cultural character and integrity of the resource (according to PRC Section 21084.3).

c) **Disturb any human remains, including those interred outside of formal cemeteries?**

Less than Significant Impact, after Mitigation. The records search and background research conducted for the project determined that no human remains are known to exist within the project site. Therefore, the project is not anticipated to impact human remains, including those interred outside of formal cemeteries. While unlikely, if any previously unknown human remains were encountered during ground-disturbing activities, impacts on the human remains resulting from the project could be potentially significant.

Implementation of Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains, would reduce potentially significant impacts to less than significant. This measure shall comply with applicable state laws, including Section 7050.5 of the Health and Safety Code. This would require work halt in the vicinity of a find and the immediate notification of the County Coroner. If the Coroner determines that the human remains are Native American, they would notify the California Native American Heritage Commission, who shall appoint a Most Likely Descendant (PRC Section 5097.98).

Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains.

If human remains are encountered during project implementation, the contractor shall halt all construction activities within 100 feet of the find and notify the City. The City shall contact the Contra Costa County Coroner who will determine that no investigation of the cause of death is required. If it is determined that the remains are Native American, the Coroner shall contact the Native American Heritage Commission within 24 hours. The Commission shall then identify the person or persons it believes to be the Most Likely Descendant from the deceased Native American, who in turn would make recommendations for the appropriate means of treating the human remains and any grave goods.

References

Northwest Information Center (NWIC), Records Search File No. File No. 21-1575. On file, ESA, March 23, 2022.

4.6 Energy

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Energy *Would the project:*				
a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?			☒	
b) Conflict with or obstruct a State or local plan for renewable energy or energy efficiency?				☒

Setting

In 2020, more than 35 percent of the electricity PG&E delivered to its customers came from eligible renewable resources including solar, wind, bioenergy, geothermal and small hydropower and is on target to meet the 2045 goal (PG&E, 2021). As introduced in Section 2, *Project Description,* the Raven SR project would consume electricity to operate, the majority of the power would come from updated onsite power generation, and the fuel to be used is the existing LFG combined with tail gas from the project operation. An existing PG&E power drop is available to the project site.

Evaluation

a) **Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?**

Less than Significant Impact. Both construction and operation of the project would involve expenditure of energy. Below are discussions of the energy resources that would be consumed during construction and operation of the project.

Construction

During construction, energy use would be both direct and indirect. Direct energy use would include the consumption of fuel (typically gasoline and diesel fuel) for the operation of construction equipment and vehicles. Energy in the form of electricity may also be consumed by some pieces of construction equipment, such as welding machines, power tools, lighting, etc.; however, the amount of consumed electricity would be relatively minimal. Indirect energy use would include the energy required to make the materials and components used in construction. This includes energy used for extraction of raw materials, manufacturing, and transportation associated with manufacturing.

CEQA focuses on the efficient use of energy rather than comparisons of estimated energy amounts to be consumed to quantitative significance thresholds. Construction activities at the project site would occur over a period of approximately 8 months. Construction activities would include use of heavy-duty construction equipment and offsite vehicles to transport equipment, materials, and workers to the project component sites.

Energy use requirements in the form of diesel fuel that would be consumed by off-road construction equipment at the project site have been estimated based on the GHG emissions estimates obtained from the CalEEMod and EMFAC2021 modeling conducted for the Air Quality and GHG analysis in Sections 4.3 and 4.8, respectively, of this checklist. GHG emissions from CalEEMod were used in conjunction with The Climate Registry's 2021 default factors for calculating carbon dioxide (CO_2) emissions from diesel fuel (TCR, 2021). The analysis assumes that all off-road construction equipment would be fueled by diesel.

The analysis assumes that light-duty automobiles and trucks used by commuting construction workers would be fueled by gasoline, and that vendor vehicles and trucks that would haul demolition debris, soil, and other materials would use diesel fuel. This analysis assumes that no electric on-road vehicles would be used during project construction. GHG emissions associated with commuting workers and vendor and haul trips were estimated using information provided by the City for estimated trip counts and CalEEMod default trip lengths.

In addition to fuels used by equipment and vehicles, construction activities would use water for dust suppression and management, which in turn would require electricity to supply, treat, and transport the water to the project area.

It is estimated that over the entire construction period of the project, off-road equipment and on-road ~~vender~~ vendor and haul trucks would consume approximately ~~25,061~~20,062 gallons of diesel fuel, and commuting worker vehicles would consume approximately ~~146~~ 203 gallons of gasoline[17].

Due to the relatively small scope of the project, as well as the limited duration of construction activities, the consumption of fuel energy during construction would be temporary, localized, and would amount to a very small fraction of the 47 million gallons of diesel and 336 million gallons of gasoline sold in Contra Costa County (California Energy Commission [CEC], 2020). Vehicles used for project construction and operation would be required to comply with all federal and state efficiency standards. Additionally, there are no project characteristics or features that would be inefficient or that would result in the use of equipment and vehicles in a manner that would be less energy efficient than similar construction projects.

[17] Construction energy estimates are updated to account for the project's construction schedule delay. As part of the updated construction modeling, the most recent version of CalEEMod (version 2022.1) and EMFAC2021 were utilized, which result in differing emission factors for the CO_2e estimates for both off-road and on-road equipment. Fuel consumption estimates are based on the changed CO_2e emissions.

Therefore, project construction would not result in wasteful, inefficient, or unnecessary use of energy, and would result in a less-than-significant impact associated with energy consumption.

Operation

Once operational, the majority of the project's power requirements would come from electricity generated onsite. The electricity would be generated using equipment such as newly installed Jenbacher generator sets. The fuel that would be used for the generation is LFG from the Republic Services landfill, blended with the tail gas from a pressure swing adsorption (PSA) unit to purify the hydrogen product. Republic Services would offtake approximately 0.5 MW from the power generation for its onsite operational needs and the rest of the generated energy would be used to power the hydrogen plant. The plant would consume approximately 6.0+ MWe to operate and produce 200 kg of hydrogen per hour. Any additional electricity needed to operate the facility would be sourced from an existing PG&E power drop to the site and no new distribution power line would be required for the project. Operation and maintenance of the new facility would require 3 to 4 employees per shift, for a total of 9 to12 new employees per day to cover all shifts and provide necessary support of the facility; energy use from employee trips would therefore be minimal. Energy would be consumed by new truck trips to the site, ~~with~~which is also relatively minimal at up to approximate ~~100~~ 125 truck trips per week.[18] The facility would not involve customers onsite.

Since the majority of the required power would be generated onsite, and the power would be used to produce hydrogen fuel at the plant, ~~the energy use~~ imports of grid power associated with the project would be net positive (i.e., more~~ power would be generated than consumed~~ energy available in the hydrogen product as compared to the grid power import) and are not ~~be~~ considered inefficient or wasteful and hence, this impact would be considered less than significant.

b) **Conflict with or obstruct a State or local plan for renewable energy or energy efficiency?**

No Impact. As discussed above, project construction would require the use of off-road construction equipment and on-road trucks. Construction activities would comply with state and local requirements designed to minimize idling and associated emissions, which would also minimize the use of fuel. Specifically, pursuant to 13 CCR Sections 2485 and 2449, idling of commercial vehicles over 10,000 pounds and off-road equipment over 25 horsepower would be limited to a maximum of five minutes. Fuel use for project construction would be consistent with typical construction and manufacturing practices, and energy standards such as the Energy Policy Acts of 1975 and 2005, which promote

[18] This estimate assumes 25 trucks per day, evenly distributed on five weekdays (per the Project Applicant, see Table 4.15-1, note "d").

strategic planning and building standards that reduce consumption of fossil fuels, increase use of renewable resources, and enhance energy efficiency.

Once operational, the project's primary energy use would be electricity generated onsite using a fuel that would consist of LFG combined with tail gas. Energy used for operational vehicle trips would be negligible. Any additional electricity would be provided by PG&E, which would be subject to SB 100 under California's Renewable Portfolio Standard (RPS) Program. Signed into law by Governor Brown, SB 100 increased California's RPS target to 60 percent of total electric retail sales by 2030, and requires 100 percent of electric retail sales to come from eligible renewable or carbon-free resources by 2045. PG&E, as the utility provider, is subject to these requirements. As a result, even if the availability of flaring of landfill gas produced from the decomposition of organic solid wastes declines over time, which would require the project to import a larger fraction of its power from the existing PG&E facilities (and/or a renewable source) to maintain operational levels, 100 percent of this electricity will renewable by 2045. There are no aspects of the proposed project that would conflict with or obstruct a state or local plan for renewable energy or energy efficiency, so there would be no impact.

References

California Energy Commission (CEC), 2020. 2020 California Annual Retail Fuel Outlet Report Results (CEC-A15), August 31, 2020. Available: https://www.energy.ca.gov/media/3874. Accessed April 26, 2022.

Pacific Gas & Electricity (PG&E), 2021. PG&E Currents, April 19, 2021. Available: https://www.pgecurrents.com/2021/04/19/a-renewable-revolution-how-pge-and-its-customers-helped-write-californias-clean-energy-success-story/. Accessed April 26, 2022.

The Climate Registry (TCR), 2021. 2021 Default Emission Factors, Table 2.1—U.S. Default Factors for Calculating CO2 Emissions from Combustion of Transport Fuels. May 2021. Available: https://www.theclimateregistry.org/wp-content/uploads/2021/05/2021-Default-Emission-Factor-Document.pdf?mc_cid=4b45d12237&mc_eid=5f138d1baa. Accessed March 29, 2022.

4.7 Geology, Soils and Mineral Resources

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Geology and Soils *Would the project:*				
a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:				
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.			☒	
ii) Strong seismic ground shaking?			☒	
iii) Seismic-related ground failure, including liquefaction?			☒	
iv) Landslides?			☒	
b) Result in substantial soil erosion or the loss of topsoil?			☒	
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?			☒	
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?				☒
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?				☒
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?		☒		
Mineral Resources *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?				☒
b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?				☒

Setting

There are several known active faults in the vicinity of the project site. The location lies within a geologic province of the San Francisco Bay named the “Richmond Basin," bounded by the San Pablo and Hayward faults. The active fault in the region that are capable of producing the most significant ground shaking at the project site is the Hayward Fault, located approximately 3.7 miles southwest of the project site. (Rockridge, 2022)

A Geotechnical Investigation report was prepared for the proposed project (Rockridge, 2022). The project site is blanketed by about 12 to 18 feet of heterogeneous fill, the upper five feet of which in the areas studied generally appears to be relatively well compacted. The fill is underlain by young bay sediments known locally as Bay Mud, which extends to depths of approximately 110 to 117 feet below ground surface (bgs). Bay Mud layer is generally soft to depths of approximately 50 to 60 feet bgs, but can be more stiff below, depending on the degree of over consolidation. The Bay Mud is underlain by alluvium consisting of dense to very dense sand/silty sand that extends to the maximum depth explored (120 feet bgs).

This analysis considers information from the geotechnical investigation as well as from numerous studies conducted for the WCCSL property.

Evaluation

Geological Resources and Soils

a) **Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving (i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42. (ii) Strong seismic ground shaking? (iii) Seismic-related ground failure, including liquefaction? (iv) Landslides?**

Less than Significant Impact. Intense ground shaking during a large earthquake would be expected at the project site, particularly given its close proximity of the nearest active fault. The project would adhere to standard industry practices, code requirements, and any geotechnical recommendations or design parameters identified in the geotechnical study prepared for the project (Rockridge, 2022). (for the proposed earthwork, foundation slabs, and any surrounding related improvements, utilities, or paved areas associated with the project, would reduce the potential impacts associated with ground shaking during a major seismic event; seismically-related ground failure, including liquefaction for which the project area is susceptible (Richmond, 2012). The project would also adhere to all requirements in the applicable versions of the California Building Code, which would generally reduce known seismic hazards to minimize potential adverse effects. The project would introduce an industrial operation and modular structures on the project site, involving up to three to four employees onsite at any particular time, and no customers. The impact would be less than significant.

b) **Result in substantial soil erosion or the loss of topsoil?**

Less than Significant Impact. The project, which relatively flat and partially paved and partially compacted soil and ruderal groundcover, would develop and implement an Erosion Control Plan and applicable best management practices as part of the National Pollutant Discharge Elimination System (NPDES) Construction General Permit, would reduce potential impacts associated with erosion to a less than significant level.

c) **Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?**

Less than Significant Impact. As mentioned in criterion "a" above, the project would adhere to standard industry practices, code requirements, and any geotechnical recommendations or design parameters that would reduce the likelihood of landslide, lateral spreading, subsidence, liquefaction or collapse due to unstable geologic units or soil. Based on the results of previous analyses, most of the sand layers present at the site (primarily within the Bay Mud) are sufficiently dense, have sufficient clay content, and/or are overlain by a sufficient thickness of Bay Mud, such that the potential for liquefaction is low although the site is in a liquefaction hazard zone (see "a"). The greatest potential for liquefaction is approximately 0.3 miles northward, adjacent to San Pablo Creek. The project site is not located on areas of landfill, which also sits upon Bay Mud and is susceptible to risks of settlement over time. The impact would be less than significant.

d) **Be located on expansive soil, as defined in Table 18- 1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?**

No Impact. Expansive soil is not known to exist at the WCCSL site (County, 2004). No impact would occur.

e) **Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?**

No Impact. The project does not proposed installation or use of septic tanks or alternative wastewater disposal systems; the site is currently served by West County Wastewater District sanitary sewer service and facilities which would continue with the proposed project.

f) **Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?**

Less than Significant Impact, after Mitigation. Based on the evaluation in Section 4.5, *Cultural Resources,* in this checklist, the potential for encountering paleontological or unique geologic features on the project site during ground-disturbing activities for the

proposed project is unlikely. However, the implementation of **Mitigation Measure CUL-1a: Cultural Resources Awareness Training**, **Mitigation Measure CUL-1b: Inadvertent Discovery of Cultural Materials or Tribal Cultural Resources**, and **Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains,** all identified above in Section 4.5, *Cultural Resources*, also apply to reduce the potential and unlikely event paleontological resources are discovered.

Mineral Resources

a, b) **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? Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?**

No Impact. ~~The proposed project would not require the use of vast amounts of natural resources or mineral resources for construction or operation. Input to the operation is existing organic feedstock from the project site. No impact would occur.~~ The California Geological Survey (formerly California Division of Mines and Geology) identifies mineral resources present within California and designates mineral resource zones. These mineral resource zones (MRZs) are based on known mineral resources present (e.g., existing mines) or documented geological units present or underlying surface locations. Each MRZ is classified based on potential economic value of the underlying resources. The proposed Project is located in MRZ-1. This zone classification indicates that no significant mineral deposits are present, or little likelihood exists for their presence (Stinson, Manson and Plappert, 1987). Therefore, the proposed Project would not result in the loss of a locally important mineral resource and no impact would occur.

References

City of Richmond, 2012. *Richmond General Plan Update Environmental Impact Report.* SCH. 2008022018. 2012.

City of Richmond, 2012. *Richmond General Plan 2030: Public Safety and Noise Element.* Table 3.7-4, *Liquefaction*. 2012.

Contra Costa County 2004. *Environmental Impact Report on the West Contra County Sanitary Landfill Bulk Materials Processing Center and Related Actions,* SCH. 2002102057. June 2004.

Contra Costa County 2009. *Addendum to the Final EIR for the WCCSL BMPC and Related Actions*, SCH. 2002102057. 2009.

4.8 Greenhouse Gas Emissions

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Greenhouse Gas Emissions *Would the project:*				
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?			☒	
b) Conflict with any applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?			☒	

Setting

State and Regional

The California Global Warming Solutions Act (Assembly Bill [AB] 32, 2006), as amended, sets statewide greenhouse gas (GHG) emissions caps. The California Air Resources Board (CARB) established the Climate Change Scoping Plan, which outlined a framework for achieving the emission reduction goals set in the California Global Warming Solutions Act. In 2016, SB 32 and its companion bill AB 197 established a new climate pollution reduction target of 40 percent below 1990 levels by 2030 and included provisions to ensure the benefits of State climate policies reach into disadvantaged communities.

Senate Bill (SB) 375 requires CARB to develop regional GHG reduction goals for the automobile and light truck sectors. The *Plan Bay Area 2040* is a plan to achieve regional GHG reduction goals by improving transportation access, maintaining the region's infrastructure, and enhancing resilience to climate change through strategies such as fostering open space. There are a number of other laws in California intended to reduce GHG emissions through the regulation of construction standards, growth, and municipal operations.

Governor Brown signed Executive Order B-55-18 in September 2018 to establish a statewide goal to achieve carbon neutrality as soon as possible, and no later than 2045, and to achieve and maintain net negative emissions thereafter. In response to this Executive Order, CARB's Draft 2022 Scoping Plan Update (~~May 10~~CARB, 2022b) presents several scenarios for achieving carbon neutrality statewide no later than 2045. Additionally, in 2022, California enacted the California Climate Crisis Act (AB 1279), which amended AB 32 by establishing state policy to achieve net zero GHG emissions as soon as possible, but no later than 2045, and to ensure that, by 2045, anthropogenic GHG emissions are reduced to at least 85 percent below 1990 levels. CARB's Final 2022 Scoping Plan for Achieving Carbon Neutrality (CARB, 2022a) describes the selected Scoping Plan Scenario to achieve these goals, in comparison to other proposed scenarios and a Reference Scenario.

Significance Threshold

Greenhouse gas impacts are, by their nature, cumulative impacts because one project by itself cannot cause global climate change. As such, GHG emissions are evaluated under CEQA as a cumulative impact. To evaluate cumulative impacts, a lead agency must assess (1) whether the overall cumulative impact would be significant and, (2) if the overall impact is significant, whether the incremental contribution that the individual project under review would add to the overall cumulative problem would be cumulatively considerable.

A conservative threshold of significance for determining the cumulative impact of a project's GHG emissions is "net zero" emissions. This concept is supported by the BAAQMD in its Justification Report: *CEQA Thresholds for Evaluating the Significance of Climate Impacts from Land Use Projects and Plans* (BAAQMD, 2022), which states: "If a land use project incorporates all of the design elements necessary for it to be carbon neutral by 2045, then it will contribute its portion of what is needed to achieve the State's climate goals and will help to solve the cumulative problem. It can therefore be found to make a less-than-cumulatively-considerable climate impact" (BAAQMD 2022).

Further, the State's Office of Planning and Research's (OPR) *Final Statement of Reasons* for Senate Bill 97 revisions to the CEQA Guidelines state that, "AB32, and regulations implementing that statute, will require reductions in emissionsfrom certain sectors in the economy, but do not preclude new emissions. Moreover, as explainedin the Initial Statement of Reasons, the proposed amendments do not establish a zero emissions threshold of significance because there is no 'one molecule rule' in CEQA" (CNRA, 2009).

For GHG thresholds, the BAAQMD published the 2022 Justification Report that presents GHG thresholds, which are based on AB 32 and California Climate Change Scoping Plan reduction targets and strategies developed to reduce GHG emissions statewide (BAAQMD 2022). These thresholds are presented in **Table 4.8-1**. This analysis focuses on presenting Project GHG emissions for informational purposes and evaluating the project against the BAAQMD 2022 GHG significance thresholds.

The new BAAQMD thresholds are focused on land development projects, and the legacy stationary source threshold for operational GHG emissions is 10,000 $MTCO_2e$. This threshold is not being currently updated in the BAAQMD, as staff are focusing on creating land use project and plan thresholds (BAAQMD 2022). This analysis focuses on net zero emissions and the new draft thresholds, while also taking into account the existing BAAQMD threshold.

TABLE 4.8-1
BAAQMD GHG THRESHOLDS OF SIGNIFICANCE
(MUST INCLUDE A OR B FOR OPTION SCHEME)

	Existing and Draft Air District Thresholds
Legacy Stationary Source Threshold	10,000 $MTCO_2e$
Option A	Projects must include, at a minimum, the following project design elements: 1) Buildings a. No natural gas (residential and non-residential) 2) Transportation a. Achieve compliance with EV requirements in the most recently adopted version of CALGreen[1] Tier 2 b. Achieve SB 743 target of 15% reduction in VMT per capita below regional average
Option B	Be consistent with a local GHG Reduction Strategy that meets the criteria under the CEQA Guidelines Section 15183.5(b)

[1] Part 11 of the Title 24 Building Energy Efficiency Standards is referred to as the California Green Building Standards (CALGreen) Code

SOURCES: BAAQMD 2022. *Justification Report: CEQA Thresholds for Evaluating the Significance of Climate Impacts from Land Use Projects and Plans*, April.

Evaluation

a) **Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?**

Less than Significant Impact. GHG emissions would be generated during both construction and operational phases of the project.

Construction

The combustion of diesel fuel to provide power for the operation of various construction equipment results in the generation of GHGs. Construction emissions associated with the project were estimated using project-specific information provided by the Project Applicant, such as construction schedule and phasing; types, number, and horsepower rating of constructionequipment to be used, their daily usage in terms of hours per day, and the number of dayseach piece of equipment is used over the construction period; and information on construction vehicle trips for worker commute, equipment and material transport and hauling trips. Appendix A to this checklist contains the data and assumptions used to estimate the construction-phase GHG emissions that would be associated with the project.

Carbon Dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) emissions from off-road construction equipment and construction vehicle trips were derived from the CalEEMod

run to estimate criteria air pollutant emissions. N_2O and CH_4 emissions were multiplied by their respective Global Warming Potentials GWPs (25 and 298) and added to the CO_2 emissions to obtain CO_2e emissions.

Construction of the proposed project is anticipated to occur over a period of approximately eight months. It is estimated that project construction would generate a total of approximately ~~258.9~~186.1 $MTCO_2e$ over an 8-month construction period, as shown in **Table 4.8-2**. BAAQMD does not have adopted significance thresholds for construction-related GHG emissions in its 2017 CEQA Guidelines (BAAQMD, 2017). However, it recommends that the Lead Agency (i.e., the City of Richmond) quantify and disclose construction GHG emissions and incorporate best management practices to reduce GHG emissions during construction, as applicable.

TABLE 4.8-2
ANNUAL CONSTRUCTION-RELATED GREENHOUSE GAS EMISSIONS

Year	GHG ($MTCO_2e$)
~~2022~~ 2023	~~178.3~~ 179.3
~~2023~~ 2024	~~80.6~~ 6.8
Total	**~~258.9~~ 186.1**
Amortized	**~~8.63~~ 6.2**

NOTES:

$MTCO_2e$ = metric tons of carbon dioxide equivalent

Construction-related GHG emissions were amortized over 30 years, which is a commonly accepted method for including construction emissions as part of the proposed project's average annual emissions.

Construction emissions are updated in this updated IS/MND to account for the project's one-year construction schedule delay.

SOURCE: ~~Data compiled by Environmental Science Associates in 2022~~Ramboll (Appendix A to this document~~checklist~~)

In addition, the GHG thresholds proposed by the BAAQMD in response to SB 32's GHG reduction goals also do not contain significance thresholds for construction (BAAQMD, 2022). GHG emissions from the construction phase of a project represent a very small portion of emissions over the project's lifetime, which for the projects such as the proposed project would be at least 30 years.

The BAAQMD's proposed thresholds are instead designed to address operational GHG emissions from land use development projects which represent the majority of a project GHG emissions. The primary source of GHG emissions from construction is diesel-powered construction equipment. Large reductions in construction emissions are difficult to realize because there are currently no economical alternatives to diesel fuel for powering most construction equipment. Improvements in statewide regulations governing construction equipment and fuel standards driven by SB 32 and other initiatives will also contribute to reduced emissions from construction activities. Therefore, GHG emissions associated with project construction would be considered less than significant.

Though not required as mitigation to reduce a significant impact, implementation of **Mitigation Measure AQ-1: Best Management Practices**, identified above in Section

4.3, *Air Quality,* will help reduce GHG emissions in addition to providing air quality benefits. Therefore, GHG emissions associated with project construction would be considered less than significant.

Appendix A contains details on the calculations and assumptions used to estimate construction GHG emissions as well as model outputs.

Operational

The current BAAQMD thresholds have been set using the "fair share" analysis, which looks at how new land use development projects need to be designed and built to ensure that they will be consistent with the goal of carbon neutrality by 2045 (BAAQMD 2022). The existing legacy stationary source threshold is 10,000 $MTCO_2e$ annually.

The proposed system takes up to 99.9 wet-tons per day (WTPD) of blended green waste (GW), food waste (FW), using landfill gas (LFG) to provide power to the process and converts the feed into renewable, transportation grade hydrogen. This waste would otherwise be put into the landfill where it would produce GHG emissions in the form of methane gas. ~~The landfill gas would also otherwise be creating GHG emissions if not for the bioenergy facility taking it and converting it into hydrogen.~~ By redirecting this waste into the Raven SR, it reduces the amount of GHG emissions produced at the project site. Biogenic CO_2 emissions from green waste are not accounted for in operational GHG impacts as they are a result from materials that are derived from living cells, not fossil fuels (BAAQMD 2017b).

The Raven SR system does not have any free oxygen in its process, and instead uses steam promoted processes to thermally decompose the feed into its chemical elements. ~~This~~ The process does not involve any type of combustion, and therefore does not have an GHG emissions associated with the system operational emissions. Once project operations fully begin, GHG emissions are expected to be net negative, and will continue to be net negative even if LFC is ever fully depleted.

Table 4.8-3 shows operational emissions calculated using CalEEMod (version 2020.4.0) and EMFAC2021 as well emissions from permitted activities added to the amortized construction emissions to get the total annual project GHG emissions. BAAQMD does not currently have a quantitative threshold for GHG emissions. The current qualitative significant thresholds are found in Table 4.8-1. The project would satisfy the BAAQMD Best Available Control Technology (BACT) requirements, and thus the proposed project is consistent with the 2017 Climate Change Scoping Plan as well as the draft and final 2022 Scoping Plan Update in terms of following the GHG reduction strategy to reach the statewide goal of climate neutrality by 2045 (CARB 2017, 2022a, 2022b).

TABLE 4.8-3
UNMITIGATED ANNUAL OPERATIONAL GREENHOUSE GAS EMISSIONS

Source	GHG ($MTCO_2e$)
Process Operations	
Biogas Engines	16,398
Flare	205
Fire Pump Engines	2.5
Auxiliary Operations	
Area	<1
Energy	80.5
Mobile	~~262.6~~ 1909.2
Off-road	303.2
Waste	96.7
Water	17.0
Amortized Construction Emissions	6.2
~~Amortized Construction Emissions~~Landfill Flare Reductions (blended gas)	~~8.63~~ -9,019
Total Project GHG Emissions (blended gas)	**~~697.17~~ 9,999**
Landfill Flare Reductions (100% LFG)	-16,398
Total Project GHG Emissions (100% LFG)	**2,620**

NOTES:

A 30-year lifetime was assumed for the project, which was used to amortize construction emissions.

Landfill flare reductions were estimated based on the landfill gas usage of the Project biogas engines, which can operate using a blended gas consisting of at least 55 percent landfill gas and up to 100 percent landfill gas

$MTCO_2e$ = metric tons of carbon dioxide equivalent

Operational emissions are revised in this updated IS/MND to align with more detailed project information from the Project Applicant.

SOURCE: Data compiled by Environmental Science Associates. (See Appendix A to this document~~checklist~~.)

Based on the state carbon neutrality goal for 2045, the proposed project would contribute its portion of what is needed to achieve the State's climate goals and would help to solve the cumulative climate problem. Its emissions are considerably less than the current BAAQMD operational emissions threshold of 10,000 metric tons of CO_2e per year (see Table 4.8-3 above. It can therefore be found to make a less-than-cumulatively-considerable climate impact. The project emission calculations, along with the supporting data from the life cycle analysis, shows that the project would be below both the new draft significant thresholds and the legacy stationary source threshold, with the possibility of reaching net negative GHG emissions, contributing to the determination of the project having a less than significant impact and a less-than-cumulatively-considerable climate impact. Therefore, operation of the proposed project would have a less than significant impact.

b) **Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?**

Less than Significant Impact. In response to AB 32 GHG reduction goals, CARB adopted the Climate Change Scoping Plan, which outlined a framework for achieving the emission reduction goals set in the California Global Warming Solutions Act. The Scoping Plan was most recently updated in ~~2017~~2022 (~~2017 Scoping Plan;~~ CARB, 2022a~~2017~~) to address ~~California's 2030~~how the state will achieve AB 1279's goals of achieving net zero GHG emissions ~~target~~ and ~~identifies how the State can reach the 2030 climate target established~~ an 85 percent reduction in anthropogenic GHG emissions below 1990 levels by 2045~~SB 32 while making substantial advancements toward the 2050 climate goal established by Executive Order (EO) S-3-05 (2005)~~.

The City of Richmond developed and adopted a climate action plan (CAP) in 2016 to meet a city-wide 2020 GHG emissions target consistent with AB 32 and achieve reductions in line with the longer-term statewide goal to reduce emissions 80 percent below 1990 levels by 2050, as established by Executive Order B-3-15.

The project would generate GHG emissions primarily from operational activities ~~and would most likely result in net negative emissions on an annual basis~~, and contributes to the long-term California goals of finding alternative sources of green energy. As such, the project would help the City achieve its long-term GHG emissions goal. Neither the ~~2017~~2022 Scoping Plan Update or the City's existing CAP contain any actions or measures that address GHG emissions from construction. The majority of electricity supplied to the project would come from an onsite power generator, fueled by LFG from the Republic Services WCCSL. Any additional power required would be supplied from an on-site PG&E power drop; PG&E is required to comply with SB 100 and the RPS. SB 100 requires that the proportion of electricity from renewable sources be 60 percent by 2030 and 100 percent renewable power by 2045. Therefore, the project would be consistent with all applicable plans, policies and regulations adopted for the purpose of reducing GHG emissions. This impact would be less than significant.

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4.9 Hazards and Hazardous Materials

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Hazards and Hazardous Materials *Would the project:*				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?			☒	
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?			☒	
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?				☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?				☒
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?				☒
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?			☒	
g) Expose people or structures, either directly or indirectly to a significant risk of loss, injury or death involving wildland fires?			☒	

Setting

The project site sits within the existing WCCSL, which does not accept hazardous wastes; under State and federal laws, the landfill is permitted to accept non-hazardous wastes only. Although the municipal solid waste stream does contain small quantities of hazardous wastes that result from disposal of household waste and waste from small quantity generators, such as auto repair, auto dealers, and gas stations, the proposed project only involves a variety of organic waste feedstock. As discussed below and ~~in Section 2.5 (~~under *Safety and Controls* (in Section 2.6~~*Non-Combustion*~~), the Raven SR process incorporates internal safety functions and would adhere to numerous applicable state and federal regulations, plans and procedures that apply specifically to its production of hydrogen gas from organic solids. The project facility and operation located

within the WCCSL would also benefit from the numerous existing safety regulations, plans and procedures.

A Phase I Environmental Site Assessment has been prepared for the project (CEC, 2022). The Phase I reports relevant site conditions observed include the storage of various commonly used hazardous materials, such as used oil, lubricants, anti-freeze, HDPE pipe sealant, pipe glue solvent, spray paint, and household cleaning supplies. All observed materials were properly stored and maintained. The Phase I also reports numerous above-ground storage tanks (ASTs) containing petroleum products located within and near the existing landfill power plant and maintenance buildings near the project site.

As previously described, the project is contiguous to a closed hazardous waste landfill portion of the WCCSL operation. Also, the project site was formerly occupied by three leachate evaporation ponds. Groundwater contamination on the WCCSL site was confirmed in a January 2021 Corrective Action Groundwater Monitoring Program Report.[19] Groundwater at the WCCSL also has reported PFAS chemicals detected in groundwater. This is considered a recognized environmental condition (REC), but regularly monitored and the results are submitted to the State regulatory agency. Additionally, the groundwater impact is not expected to pose a risk of unacceptable exposure to workers at the project site. (CEC, 2022)

Regarding potential site contamination, Republic previously initiated corrective actions to address the California Department of Toxic Substance Control's (DTSC's) concerns in 1996. These actions included installing additional wells to monitor and control leachate at the site and maintain it within the landfill boundaries as required. Republic currently operates systems to collect and treat both leachate and landfill gas under existing conditions.

The proposed project is designed to avoid interfering with existing groundwater monitoring and recovery wells, along with any associated leachate recovery systems. Leachate recovery infrastructure at the site will remain operational, and the proposed project will not affect the operation or maintenance of these facilities.

The proposed project is designed to avoid interfering with existing LFG monitoring and recovery wells. Project design would not alter the existing LFG collection and recovery infrastructure at the site, which will remain operational. The proposed project will accept LFG from existing, permitted equipment, downstream of the liquid collection system to be blended with tailgas from the Raven SR process for use as a fuel to the new, lower emitting, higher efficiency LFG engines for power production.

Raven SR will conduct a limited site investigation to validate subsurface environmental conditions during the Project's engineering design. This evaluation will characterize soil-gas conditions at the proposed project site to ensure that project components are constructed safely and meet all OSHA and CalOSHA requirements. Raven SR will install impermeable vapor

[19] CEC, 2022. Operation of a groundwater monitoring system and a groundwater extraction system is required under the West County Landfill (WCL) corrective action groundwater monitoring program (CAGMP), in accordance with Corrective Action Enforcement Order, Docket Number 20061079 dated September 26, 2007.

barriers under foundations during construction to prevent potential release of soil-gas during subsurface activities. This pre-construction verification of site conditions will address concerns pertaining to potential soil-gas, also known as volatile organic compounds (VOCs), that may have migrated from the adjacent landfill in the past and beneath the proposed project site.

In regard to hazards and safety concerns, the draft CUP includes several conditions that address hazards and safety concerns. These conditions include:

- Condition 82 requires Raven to prepare and submit for approval a Public Health and Safety Plan, as well as an Emergency Plan to protect the facility and its employees from harm, and protect human health off-site as well. These measures include:
    - preparation of and adherence to a comprehensive Process Safety Information (PSI) regarding safe work practices and operating procedures;
    - ensuring employees are involved in Raven's required process safety and risk management programs (PSM/RMP);
    - training all employees and contractors on the potential hazards and safe operations;
    - establishing and implementing a process to evaluate any new systems, components, parts, etc. before they are placed into service;
    - establishing and implementing a Pre-Start Safety Review (PSSR) procedure to verify that the Raven process and equipment is functional and ready for service before starting;
    - ensuring operators are aware of and trained on any process or equipment changes;
    - managing contractors to ensure their safety awareness;
    - conducting routine maintenance of mechanical equipment;
    - investigating the cause of any equipment or system failures and implementing corrective and preventative actions; and
    - establishing and adhering to emergency planning and response plan protocols.

    During construction, safety training for the various construction roles prior to access to the site would be mandatory. Daily safety briefings would be conducted to alert crew and labor to potential hazards that may be scheduled for a particular day/shift. During operations, Raven SR would contract with a capable and experienced operations and maintenance (O&M) service provider from among those with experience in feedstock management and with high temperature, high pressure process equipment. Also, Raven SR would closely oversee the implementation of the Raven-specific operating, training, safety, and maintenance manuals described above.

- Condition 83 requires the project to comply with all design measures, safety precautions, and emergency response procedures as required by federal, state, and local laws and regulations.

- Condition 84 requires the project to implement on and off site emergency response procedures, as outlined in the Emergency Plan described in Condition 82 above.
- Condition 85 requires the project to develop and implement training (and refresher training) covering accident prevention, safety, identification and handling of hazardous materials, first aid, and instruction for use of equipment.
- Condition 89 states that the project is further bound by the California Fire Code for all systems and equipment installation containing flammable, combustible, or hazardous materials. The City is requiring that the project have an equipment maintenance program agreed upon by the City and the Fire Marshall.

Evaluation

a, b) **Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials? Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?**

Less than Significant Impact. The proposed operation of transforming blended green waste and food waste into transportation-grade hydrogen-rich synthesis gas (syngas) and charcoal (biochar) could result in an adverse effect through the exposure to or spill of chemicals. The green waste and food waste feedstock would not be considered a hazardous material. Also, in 1993, DTSC determined that the Raven SR process for the production of syngas from organic solids was not categorized as either incineration or combustion and was therefore a suitable technology for use in California.[20]

The conversion method uses a non-combustion (i.e., anoxic, indirect external heating), low pressure process. The only chemicals added would be carbon dioxide (CO2), calcium/magnesium carbonate (dolomite limestone), and steam (i.e., water heated into a vapor state). No hazardous materials would be used in the process. The conversion occurs in sealed rotating ~~drums that drop~~retort that drops out solid matter from the green and food waste feedstock, which would consist largely of hot biocarbon, along with dirt, glass, grit, rocks, and inorganic salts. The biocarbon ~~materials~~components are inert to the process (i.e., not gasified) and drop out in the first stage. ~~The process also drops out excess~~ A spray of water is used on the biocarbon to quickly cool it to manageable temperature. Neither the biocarbon nor the water would be considered a hazardous material.

There would be no long-term hydrogen storage onsite; the material would be fed directly into the tube trucks and transported offsite. For transportation, the United States Department of Transportation (USDOT) classifies hydrogen gas as a Division 2.1

[20] According to the definitions listed in Section 260.10, Title 40, Code of Federal Regulations (40 CFR) and Section 66260.10, Title 22, California Code of Regulations (22 CCR). Also, since 2017, a Raven pilot engineering unit, sized at 100 wet pounds per day of feedstock, has been operating at the UC Berkeley's Richmond Field Station and is permitted for operation by the Bay Area Air Quality Management District (BAAQMD) under permit Nos. 23993 and 23320.

Flammable Gas. Vehicles transporting flammable gas are mandated to display USDOT flammable gas placards. The proposed project would pump the hydrogen gas into standard pressurized hydrogen gas trucks, called tube trailers. The gaseous hydrogen is compressed to pressures of 380 gas (about 5,500 pounds per square inch [psig]) or higher into long cylinders that are stacked on a trailer that the truck hauls. This gives the appearance of long tubes, hence the name tube trailer.

To support development of the hydrogen economy, development of tube trailers capable of storing hydrogen at pressure of about 500 bar are approved for use on public throughways use by USDOT regulations (Federal Motor Carrier Safety Administration, 49 CFR Part 393). Such tube trailers are routinely used to transport hydrogen gas, as well as other gases such as natural gas and propane. Regulations regarding the design of tube trailers that transport hydrogen gas ~~is~~are in OSHA 1910.103, Subpart H, Hydrogen, which includes requirements for the containers, pressure relief valves, piping, tubing, fittings, and labeling. On-road transport of hydrogen gas must comply with applicable USDOT regulations, which include equipment requirements and driver safety training. In California, a specific driver's license is required, a commercial driver's license with a Hazard Materials endorsement.

A new 250,000-gallon integrated fire water tank and diesel engine ~~is proposed~~would be installed in the northeast corner of the site for emergency use, as required by fire department regulations (see Figures 2-1 through 2-4). Diesel fuel is classified as a hazardous material, and therefore the above ground tanks would require compliance with containment requirements in a Spill Prevention, Control, and Countermeasure (SPCC) Plan pursuant to federal requirements. Propane for the continuous flare pilot would be supplied from a standard 1000-gallon propane tank installed on-site. A local propane supplier would service and fill the tank as needed.

Overall, the project operations would be equipped with continuous monitoring systems and can automatically shut down plant operations without human intervention. Specifically, the facility's controls would be distributed through the various process islands, taking their direction from a central Human-Machine Interface in the control room with centralized data collection. Process setpoints would be bounded by high/low alarm limitations to draw the operator's attention to the specific problem. The control system would represent state-of-the-art digital technology with redundant instrumentation where necessary to ensure safe operation.

Because the process itself is oxygen-free, there would be no opportunity ~~within~~during the process for explosion. As previously described (*Section 2.5*), piping and vessels would be periodically scanned with infrared equipment during each working shift to identify hot spots or gas leaks that may threaten safety. If hot spots or leaks were identified, immediate steps would be taken to correct or mediate the condition. Also, remote monitoring of the facility by Raven SR corporate provides oversight of the operation and early identification of problems in the event~~as~~ they were to occur~~development~~.

The project would comply with applicable Environmental Protection Agency (EPA) risk management plan (RMP) and Occupational Safety and Health Administration (OSHA) process safety management (PSM) guidelines, as may be applied to the facility to ensure the safety of its operations staff and the surroundings A maintenance program of regular and preventative maintenance would be developed to maintain equipment in a reliable manner.

The ~~project's~~ Raven SR Project would result in a less than significant impact as designed based on the Project's adherence to all applicable regulatory ~~requirements mentioned in this section~~, combined with the operational controls and redundancy designed as part of the Raven RS process, materials and operations~~, the impact would be less than significant~~.

c) **Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?**

No impact. As discussed above, the proposed project would not emit hazardous emissions or handle hazardous materials or waste. Moreover, the project site is located approximately 1.1 miles from Verde Elementary School at 2000 Giaramita Street. Therefore, no impact would occur.

d) **Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?**

No impact. An inactive waste disposal area that is a Class I Hazardous Waste Management Facility (HWMF) is located within the WCCSL and directly north of the BMPC and project site (see Figure 1-3 in Chapter 1, and Figure 2-0 in Chapter 2). The facility was closed pursuant to State and federal regulations, and final cap construction was completed prior to 2003. It is a totally enclosed facility with required environmental control systems. The proposed project site is not within the previous HWMF area; therefore, no impact would occur.

e) **For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?**

No impact. The proposed project is not located within an airport land use plan, and the closest airport to the project site is the San Rafael Airport located approximately 8.3 miles southeast. Therefore, the proposed project would not be located within two miles of an airport, and no impact would occur.

f) **Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?**

Less than Significant Impact. In the event of a large-scale disaster, emergency response to the site would be coordinated by WCCSL facility, City and County fire responders, and in adherence to the WCCSL Emergency Response and Evaluation Plan and local agency protocols. Emergency fire control procedures are also included in the composting and wood waste recycling operations plans. The WCCSL facility and project site are accessed from and exit to Parr Boulevard, and a serious of roadways and paths throughout the 340-acre WCCSL provide sufficient width for emergency access. The proposed project would be developed within part of the existing BMPC property and would not create new or interfere with existing access or egress roads. As detailed in the *Setting* above, in addition, the proposed project would comply with applicable Environmental Protection Agency (EPA) risk management plan (RMP) and Occupational Safety and Health Administration (OSHA), including additional voluntary compliance with OSHA process safety management (PSM) guidelines, as may be applied to the facility to ensure the safety of its operations staff and the surrounding community. PSM includes a comprehensive collection of agencies and programs providing oversight over all aspects of plant operation and maintenance. Therefore, there is no potential for the project to impair implementation of emergency evacuation or an adopted emergency response plan.

g) **Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?**

Less than Significant Impact. The project site is flat and surrounded by the WCCSL facility, which is composed of grass-covered disposal areas of the landfill mounds, runoff control ponds and lagoons, and composting areas, and tidal marshlands of San Pablo and Wildcat Creek. Open water of San Pablo Bay is approximately 0.25 miles westward from the project site. Wildfire hazard maps show the site as not being within a high wildfire hazard zone (CPUC, 2018). Further, as discussed in criteria "a and b", the project would include a new 250,000-gallon integrated fire water tank and diesel engine is proposed for emergency use, as required by fire department regulations.

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4.10 Hydrology and Water Quality

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Hydrology and Water Quality *Would the project:*				
a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality?			☒	
b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?			☒	
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:				
(i) result in substantial erosion or siltation on- or off-site;			☒	
(ii) substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;			☒	
(iii) create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or			☒	
(iv) impede or redirect flood flows?			☒	
d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?			☒	
e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?			☒	

Setting

No surface water bodies exist on the project site. As previously described throughout other sections of this analysis, the following surface water bodies exist within the WCCSL property and directly south/southwest of the project site: runoff ponds or lagoons delineated as "Area B" and tidal waters delineated as "Area C" (shown in Figure 3-1, *Vicinity Map*, of the 2004 EIR).

San Pablo Creek is approximately 0.3 miles north of the project site, and Wildcat Creek is approximately 280 feet south/southeast of the project site, bordering the WCCSL south boundary which is an elevated levee (see Figure 2-0 and Figure 2-1 in Chapter 2 of this

document). Many small tributaries that drain and feed the brackish marshlands of these creeks, and the 100-year flood flows in San Pablo Creek would be totally contained in the channel. Open water of San Pablo Bay is approximately 0.25 miles west of the project site. The levees around the WCCSL have been designed and maintained to exceed flood levels and the upland portions are located outside wetlands under U.S. Army Corps of Engineers (Corps) jurisdiction.

Depth to groundwater at specific areas of the project site can range from 5 to 7 feet or up to 10-1/2 feet below the ground surface. The depth to groundwater varies seasonally. Groundwater contamination on the WCCSL site was confirmed in a Phase I Environmental Site Assessment prepared for the project (CEC, 2022). This recognized environmental condition (REC) is regularly monitored and the results are submitted to the State regulatory agency. There are no anticipated plans for use of existing groundwater by the Project.

Evaluation

a, b) **Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality? Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?**

Less than Significant Impact. WCCSL implements a Storm Water Pollution Prevention Plan (SWPPP) under the NPDES permit, as amended. The drainage plan for the WCCSL, which currently encompasses the project site, accommodates the 100-year storm event. The WCCSL is managed to prevent the infiltration of surface water into the waste materials and to maximize and control the amount of surface water that runs off via overland flow with berms, bench drains, down drains, which would manage runoff from the project. Area 1 runoff is diverted to the siltation control basin located behind (east of) the Golden Bear Waste Recycling Center.

As introduced in Section 2.9~~2.8~~, *Construction, Site Coverage and Drainage*, the project would adhere to all applicable regulatory stormwater runoff controls and will pursue its own NPDES permit. The project's SWPPP would be developed prior to construction and operation of the facility and flows would be integrated into the existing WCCSL system and ensure drainage from the proposed project site would drain towards existing stormwater runoff control ponds (or bioretention facility) to which the rest of the WCCSL property currently drains. The drainage control systems would be designed such that the two systems are segregated and independent of one another. This would minimize the creation of contact water (water that has come into contact with organic feedstock) as well as protecting the site from various health and safety hazards.

The receiving and handling area would be in a modular structure and industrial canopy to minimize rainfall from coming in contact with the feedstock material. The receiving area would also incorporate a berm at the opening of the receiving area to keep any potential contact water inside. The aprons around the facility would direct any rainfall away from the canopy and into the stormwater drainage and management system described above.

Any excess contact water that may be generated inside the canopy receiving area will either be reabsorbed into incoming feedstock or collected via floor drains and diverted to the facility's sanitary sewer.

The SWPPP also requires site inspections and a preventive storm water control maintenance program, with triggers for evaluation monitoring and corrective action as needed under RWQCB review and oversight pursuant to State regulations. Also, neither construction nor operation of the project would involve use of groundwater. Taken together, the proposed stormwater program and project development would not impair water quality or decrease groundwater. The impact is less than significant.

c) **Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:**

(i) **result in substantial erosion or siltation on- or off-site;**

(ii) **substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;**

(iii) **create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or**

(iv) **impede or redirect flood flows?**

Less than Significant Impact. The proposed project would involve minimal grading as needed to prepare the site for new paving and foundations for the proposed modular buildings. The site is current flat and would remain so, except for slight grading around the proposed modular structure to prevent contact water. As described in Section ~~2.8~~2.9, *Construction, Site Coverage and Drainage*, in Chapter 2, the proposed project would add approximately 1.21 acres of new impervious surface area (including modular structures) to the existing 0.76 acres of impervious area that would be repaved. This would result in approximately 78 percent of the project site (2.5 acres) being impervious. Approximately 0.53 acres, or 22 percent, of unpaved area along the north boundary of the site would remain undisturbed.

Although the amount of impervious area on the project site would nearly double compared to the existing conditions, the proposed drainage management would effectively manage increased flows to the existing system and not exceed the capacity of the system. A draft Stormwater Control Plan has been prepared for the project (Power, 2022). It delineates two nearly equally-sized drainage management areas (DMA 1 and DMA 2) across the project site. DMA 1 is the northern part of the site where the modular building and facilities are proposed and its flows would drain to an existing pump that is part of the existing stormwater system. DMA 2 is generally the south and southwest part of the project site where existing development and paved areas exist for truck traffic and

circulation; its flows would integrate directly into the existing stormwater system. The DMA's are delineated to effectively capture and direct runoff to not exceed the existing system. Based on the 24-hour, 100-year storm, pre-development flow is estimated at 11.89 cubic feet per second (cfs). Post-development is estimated at 12.47 cfs, which is less than 5 percent potential change.

Also, permanent source controls would be implemented to address potential runoff flows~~, including~~. Examples include use of equipment closures and regular inspection of potential pollutant sources for debris or blockages that may interfere with intended stormwater flows. Adherence to the SWPPP under the NPDES permit (see criterion "a and b") would also minimize erosion as well as polluted runoff.

Overall, the proposed site alterations would not result in changes in stormwater flows that could exceed the capacity of the existing stormwater control system to which the project site would flow. It would also not impede or redirect storm flows. The impact is less than significant.

d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

Less than Significant Impact. The California Geological Survey has mapped tsunami inundation areas along the Richmond shoreline, and the project site is located within the hazard zone (CGS, 2021). Seiche risk at areas along Richmond's shoreline are minimal because there are no large confined bodies of water with depths that would cause this hazard (City of Richmond, 2011). As discussed in the above *Setting,* the 100-year flood flows in San Pablo Creek adjacent to the project site and would be totally contained in the channel, also the levees around the WCCSL have been designed and maintained to exceed flood levels. Therefore, risk of inundation at the site is low, particularly due to risk of a seiche or flooding on the project site. Moreover, even if inundation were to occur, the risk of release of pollutants from the proposed project is also low. The impacts would be less than significant.

e) **Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?**

Less than Significant Impact. As discussed in criterion "a", the proposed project would not conflict with implementation of the existing water quality plan nor release pollutants from its construction or operation.

References

State of California, 2021, Tsunami Hazard Area Map, Contra Costa County; produced by the California Geological Survey, the California Governor's Office of Emergency Services, and AECOM; dated 2021. Accessed and printed September 13, 2022.

Contra Costa County 2004. *Environmental Impact Report on the West Contra County Sanitary Landfill Bulk Materials Processing Center and Related Actions,* SCH. 2002102057. June 2004.

Contra Costa County 2009. *Addendum to the Final EIR for the WCCSL BMPC and Related Actions*, SCH. 2002102057. 2009.

City of Richmond, 2012. *Richmond General Plan Update Environmental Impact Report.* SCH. 2008022018. 2012.

Power, 2022. *Draft Stormwater Control Plan for Raven One*, July 22, 2022.

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4.11 Land Use and Planning

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Land Use and Planning *Would the project:*				
a) Physically divide an established community?				☒
b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?			☒	

Setting

The proposed project area is the existing approximately 340-acre WCCSL, a self-contained area and operation within the broader area of industrial and open space land uses, including the Bay Trail / Wildcat Creek Marsh Trail. Other nearby uses include the West County Wastewater District Treatment Plant, EBMUD's North Richmond Water Reclamation Plan, the Richmond Sanitary District, and other refuse services, automobile repair and towing businesses, and lawn services, etc. The Richmond Parkway is a major roadway through the area and spurs the Parr Boulevard approach to the WCCSL and adjacent uses. The next nearest established community is the residential development at generally West Gertrude Avenue/Malcolm Drive, approximately 0.75 miles southeast.

Evaluation

a) **Physically divide an established community?**

No Impact. The proposed operation is consistent with current BMPC activities on the site and activities throughout the WCCSL site. Therefore, the project could not divide any established community, as the project is located within an existing closed landfill in an area that will not impede established transportation infrastructure to the community, is located at the outer edges of the City's limits and is essentially surrounded by water on three sides, and is not within proximity to existing neighborhoods or other sensitive receptors. The project would have no impact.

b) **Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?**

Less than Significant Impact. The proposed facility and operation to convert blended green waste and food waste obtained from the existing OMPF located~~operation adjacent to~~ west of the project site into renewable, transportation grade hydrogen would not conflict with any existing land use plan, policy or regulation intended to mitigate

environmental effects. As proposed, the project does not require approval of an amendment to any aspect of the General Plan or the City's Zoning Ordinance or Map. CEQA does not require the project to be consistent with all policies in the General Plan, nor does it require an assessment of compliance with every applicable General Plan policy. Overall, the project advances *Policy EC2.2* Climate-Friendly Fuel Support production and distribution of climate-friendlier fuels (when and if any are identified) and identify appropriate locations for fuel storage and distribution (*Energy and Climate Change Element*). The project also advances CARB's Final 2022 Scoping Plan, the state's identified scenario for achieving carbon neutrality statewide no later than 2045, including through the increased use of renewable and green hydrogen in zero-emissions vehicles and heavy-duty vehicles and by increasing the current amount of hydrogen supply. This impact would be less than significant.

References

CARB, 2022a. California's Final 2022 Climate Change Scoping Plan, November 16, 2022. Available online: https://ww2.arb.ca.gov/our-work/programs/ab-32-climate-change-scoping-plan/2022-scoping-plan-documents. Accessed on March 4, 2023.

City of Richmond, 2012. *Richmond General Plan Update Environmental Impact Report.* SCH. 2008022018. 2012.

City of Richmond, 2012. *Richmond General Plan 2030: Public Safety and Noise Element.* Table 3.7-4, *Liquefaction*. 2012.

City of Richmond, 2012. *Richmond General Plan 2030: Conservation, Natural Resources and Open Space Element*. 2012.

City of Richmond, 2012. *Richmond General Plan 2030 Historic Resources Element*. 2012.

City of Richmond, 2012. *Richmond General Plan 2030: Energy and Climate Change Element*. 2012.

Contra Costa County 2004. *Environmental Impact Report on the West Contra County Sanitary Landfill Bulk Materials Processing Center and Related Actions,* SCH. 2002102057. June 2004.

Contra Costa County 2009. *Addendum to the Final EIR for the WCCSL BMPC and Related Actions*, SCH. 2002102057. 2009.

4.12 Noise and Vibration

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Noise *Would the project result in:*				
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?			☒	
b) Generation of excessive groundborne vibration or groundborne noise levels?			☒	
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?				☒

Setting

The proposed project is located entirely within the City of Richmond. The West County Wastewater District Treatment Plant and other industrial uses exist east of the property. The nearest residential receptors are 0.75 miles (approximately 3,949 feet) southeast from the project site. Approximately 7- to 8-foot-high sound walls were installed at these residences when Richmond Parkway was constructed to lower noise levels (WCCSL BMPC, 2003).

The primary noise sources in the vicinity of the project site include vehicles on adjacent and nearby roadways: Richmond Parkway and Parr Boulevard. The existing ambient noise environment in the project vicinity may be characterized by traffic noise modeling conducted for a previous EIR (City of Richmond, 2011) for primary roadways. Results of this traffic modeling are presented in **Table 4.12-1** and are representative of transportation noise levels generated by roadways.

TABLE 4.12-1
LOCALIZED ROADWAY TRAFFIC NOISE [1]

Roadway	Segment Description	Predicted, Ldn[2], dB at 50 feet
		Background
Richmond Parkway	Gertrude Street and Parr Boulevard	75.9
Richmond Parkway	Parr Boulevard and San Pablo Avenue	74.7

NOTES:

1 Analytical Environmental Services. 2011. *Point Molate Mixed-Use Tribal Destination Resort and Casino Project*. Available online: https://www.ci.richmond.ca.us/DocumentCenter/View/7685/Section_4p11?bidId=

2 L_{dn} is the energy average of the A-weighted sound levels occurring during a 24-hour period, and which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night ("penalizing" nighttime noises).

SOURCE: Brown and Buntin Associates, 2008.

Evaluation

a) **Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.**

Less than Significant Impact. Noise would be generated during both construction and operational phases of the project.

Construction

Construction of the proposed project would occur over a period of approximately eight months, starting ~~Fourth~~ Second Quarter of ~~2022~~2023, and start-up of the plant is projected to begin in the ~~Second to Third~~Fourth Quarter of 2023 or First Quarter of 2024.

Project construction would result in temporary increases in ambient noise levels. Onsite construction activities would require the use of heavy construction equipment (e.g., excavator, loader, crane) that would generate varying noise levels. Offsite construction noise sources would consist of passing trucks and other construction-related vehicles. City of Richmond Noise Ordinance, Section 15.04.605.060, regulates construction noise by allowing construction work that generates noise to occur weekdays between the hours 7:00 a.m. and 6:00 p.m., except outside of these hours or on Sundays and federal holidays unless a temporary waiver is granted by the Building Official or his or her authorized representative (City of Richmond, 2018).

The proposed project would adhere to the City's construction work hours. The City's construction noise level limitation of 75 dBA is used to assess whether daytime L_{eq} construction-related noise levels would cause a substantial temporary or periodic increase in ambient noise levels at sensitive receptor locations. City of Richmond Noise Ordinance, 9.52.110 Temporary construction activity, limits noise levels measured at SFR-1, SFR-2, SFR-3 Zoning Districts (Single-Family Residential) to 75 dBA between the hours of 7:00 a.m. to 7:00 p.m. on weekdays.

The operation of each piece of equipment would not be constant throughout the day, as equipment would be turned off when not in use. Over a typical workday, the equipment would be operated at different locations and all the equipment would not operate concurrently at the same location within the project site or roadways to and from the site. Construction noise levels have been estimated using typical equipment source noise levels suggested in the Federal Highway Administration's (FHWA) Roadway Construction Noise Model (RCNM) and based on the type of construction equipment that are proposed to be used. To quantify construction-related noise exposure that would occur at the nearest sensitive receptors, it was assumed that the two loudest pieces of construction equipment would operate concurrently at the location within the project site and construction vehicle paths to the nearest sensitive receptor locations.

The estimated L_{max} and L_{eq} for each of the two loudest pieces of equipment that would be used to construct the project components, and the combined L_{eq} noise level associated with the two loudest pieces of construction equipment at the closest sensitive receptor locations for each project component are identified in **Table 4.12-2**. The combined L_{eq} construction noise levels would not exceed the City's construction noise level limitation of 75 dBA described in Table 4.12-2. This modest noise contribution would not increase the existing ambient noise level at the nearest receptor.

TABLE 4.12-2
CONSTRUCTION EQUIPMENT NOISE LEVELS

Type of Equipment	Distance to Closest Sensitive Receptor (feet)	Equipment L_{max}, dBA	Equipment Hourly L_{eq}, dBA/Usage%	Combined Leq at Sensitive Receptor, dBA
Demolition				
Crushing/Proc. Equipment	3,949 (Residences)	52.3	45.3/20%	46.2
Excavators		42.8	38.8/40%	
Site Preparation				
Tractors	3,949 (Residences)	46.0	42.1/40%	45.6
Rough Terrain Forklifts		47.0	43.1/40%	
Grading				
Excavators	3,949 (Residences)	42.8	38.8/40%	43.7
Tractors		46.0	42.1/40%	
Building Construction				
Rough Terrain Forklifts	3,949 (Residences)	45.4	41.5/40%	46.0
Other Construction Equipment		47.0	44.0/50%	

NOTES: L_{max} = maximum instantaneous noise level; L_{eq} = the equivalent sound level used to describe noise over a specified period of time, in terms of a single numerical value; L_{max} = the instantaneous maximum noise level measured during the measurement period of interest.

SOURCE: Federal Highway Administration, 2008. *FHWA Roadway Construction Noise Model, Version 1.1*, December 2008.

In addition to on-site construction equipment, the project would also result in short-term increases in local daytime traffic volumes. The project components would each add up to approximately 84 one-way daily construction-related vehicle trips to area roadways, including 72 one-way daily hauling trips, 4 one-way daily vendor trips, and 8 one-way daily worker trips. The project truck trips would access the nearest freeway (Interstate 580) via Parr Boulevard and Richmond Parkway and would not utilize roadways with noise-sensitive land uses. Therefore, the associated increase in short-term construction vehicular noise levels would not be expected to increase noise levels in the vicinity of existing sensitive receptors beyond the levels described in Table 4.12-2.

Operation

The Raven SR system would run up to 24 hours per day, 7 days per week, although an average of 1.5 days per month are planned down times. The primary source of noise during project operation would be mechanical equipment associated with the Steam/CO_2 Reformation system, including heating systems, HVAC equipment. Also, feedstock would be physically deposited in the receiving area via self-unloading transfer trucks or other suitable vehicles. The hydrogen compressors are industrial pieces that could generate noise up to as much as 85 dBa at 1.0 meter. Additionally, trucks used to distribute fuels generated on the site would be maneuvering within the parking lot of the proposed facility.

City of Richmond Noise Ordinance, Section 9.52.100, regulates operational noise levels from public property at residential areas. Per Section 9.52.100, noise levels caused by mechanic equipment on public property in residential areas should not result in noise levels in excess of 65 dBA measured at any boundary of a residential zone (City of Richmond, 2022). Guidelines identified in the Richmond General Plan 2030, Action SN4.A, proposed commercial and industrial uses that locate in an area with day-night average sound level (L_{dn}) of 55 or greater to provide noise study reports the City's goal for maximum outdoor noise levels in residential areas is 60 L_{dn} (City of Richmond, 2012). The 65 dBA L_{eq} measured at any boundary of a residential zone is used here to assess whether operational noise levels would cause a substantial permanent increase in ambient noise levels.

It is not possible to provide specific noise levels at individual receptor locations that would result from operation of stationary sources. However, the nearest noise-sensitive receptor would be approximately 0.75 miles from the project site property line. **Table 4.12-3** presents reference noise levels for many of the stationary sources for informational purposes. Given the data in Table 4.12-3 and the known distance to the nearest noise receptors, the operational noise levels would be substantially below the 65 dBA standard of the City of Richmond Noise Ordinance and the operational noise impact would be less than significant.

TABLE 4.12-3
REFERENCE NOISE LEVELS FOR STATIONARY NOISE SOURCES ASSOCIATED WITH THE PROPOSED PROJECT

Stationary Noise Source	Documented Sound Levels (dBA)	Noise Level at Nearest Receptor	Source
HVAC Equipment	72–78 dBA at 30 feet without acoustical treatments	19-25 dBA	Trane, *Sound Data and Application Guide*, 2002
Standby Diesel Generator	75–90 dBA at 23 feet (size dependent) without acoustical enclosure	19-34 dBA	Cummins Power Generation, *Sound Attenuated and Weather Protective Enclosures*, 2008
Loading Dock	77 dBA at 20 feet	20 dBA	Urban Crossroads, *Moreno Valley Walmart Noise Impact Analysis*, 2015

NOTES:
dBA = A-weighted decibels; ESA = Environmental Science Associates; HVAC = heating, ventilation and air conditioning
SOURCE: Data compiled by Environmental Science Associates in 2022. (Additional sources noted above.)

b) **Generation of excessive groundborne vibration or groundborne noise levels?**

Less than Significant Impact. Operations and maintenance of the project facility would not include any sources of vibration that would be considered excessive. Groundborne vibration and noise associated with some construction activities, including the use of pile drivers, blasting, and vibratory rollers, can cause excessive vibration. The project would not include any such activities. Groundborne vibration and noise levels generated by the types of equipment required to prepare the site and construct the proposed facility would be minimal and would not cause human annoyance or structure damage at a distance of 25 feet or beyond from the source (FTA, 2018). No existing historic structures that would be potentially vulnerable to vibration are located in the immediate vicinity of the project site such that any damage related to groundborne vibration from construction activities would occur. This impact would be less than significant and mitigation measures are not warranted.

c) **For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?**

No Impact. The project is located approximately 8.3 miles southeast of the San Rafael Airport and is not located within the 55 dBA L_{dn} noise contours for the San Rafael Airport (City of San Rafael, 2021). The proposed project would not involve the development of noise-sensitive land uses that would be exposed to excessive aircraft noise. Therefore, there would be no impact.

References

California Department of Transportation (Caltrans), 2013. *Technical Noise Supplement (TeNS)*. September 2013.

City of Richmond, 2012. Richmond General Plan 2030, Chapter 12, Public Safety and Noise. April 25, 2012.

City of Richmond, 2022. Richmond Municipal Code, Article 15.04.605 - Noise. March 16, 2022.

City of San Rafael, 2012. San Rafael General Plan 2040 & Downtown Precise Plan, Chapter 4.13, Noise. January, 2021.

Federal Highway Administration (FHWA), 2008. FHWA Roadway Construction Noise Model, Version 1.1, December 2008.

Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. September 2018. Available: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf. Accessed March 31, 2022.

4.13 Population and Housing

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Population and Housing *Would the project:*				
a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				☒
b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?				☒

Setting

As previously discussed in Section 4.11, *Land Use and Planning,* in this section, the project area entails open space and a range of industrial and commercial uses. No housing exists within 0.75 miles of the area, and the proposed project would be developed within the existing WCCSL and BMPC facilities and operations.

Evaluation

a) **Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?**

No Impact. The proposed project does not entail new housing, roads or other infrastructure that would induce substantial growth; the new business would involve 3 to 4 new employees per shift, for a total of 9 to12 new employees per day, which would not constitute substantial population growth. There would be no impact.

b) **Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?**

No Impact. No housing or people exist on the project site. The project would have no impact.

References

None.

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4.14 Public Services and Recreation

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Public Services *Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:*				
a) Fire protection?			☒	
b) Police protection?				☒
c) Schools?				☒
d) Parks?				☒
e) Other public facilities?				☒
Recreation				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?				☒
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?				☒

Setting

The project area is currently serviced by the Richmond Fire Department (RFD), which also manages the West County Fire District, which also serves San Pablo, El Sobrante, and unincorporated areas of Western Contra Costa County, including North Richmond. The nearest fire station is RFD Station 62 at 1065 7th Street, Richmond.

Evaluation

Public Services

a) **Fire Protection and Emergency Medical**

Less than Significant Impact. The project site would be served by the same fire and emergency services that currently serve the WCCSL. The project would also install a new 250,000-gallon fire water tank and diesel engine in the northeast corner of the site for emergency use, as required by fire department regulations The fire water tank would be up to 25.5 feet tall and include two pumps, a small jockey pump for normal circulation, and the diesel-powered fire pump (shown in Figures 2-1 through 2-4.) All construction-related mitigation measures identified in this analysis would apply to that development onsite.

The proposed operation would involve up to 3 to 4 new employees per shift and would not involve customers onsite. Also, the Raven SR system itself is not a combustion process and would incorporate several safety measures, including continuous monitoring systems, automatic plant operations shut down without human intervention, compliance with applicable EPA RMP and OSHA PSM guidelines, including applicable USDOT regulations for the on-road transport of hydrogen gas. Overall, the project would not result in noticeable increased demand for service that would require new fire or emergency medical facilities. The impact would be less than significant.

b,c) **Police Protection, Schools, Parks, Other**

No Impact. The project would not involve changes that would increase the demand for policy protection on the project site. There would be no impact. Also, the project would not involve changes that would increase the demand for schools, parks or other public services. There would be no impact.

Recreation

a) **Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?**

No Impact. The project would not introduce new people onsite that would increase the use of recreational facilities or parks. New population would consist of up to 3 to 4 new employees per shift; no customers would be onsite. There would be no impact

b) **Does the project include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?**

No Impact. The project would include new or expanded recreational facilities or parks. There would be no impact.

References

City of Richmond, 2011. *General Plan 2030 – Map 12.6 Police and Fire Services*. August 2011.

City of Richmond, 2012. *Richmond General Plan Update Environmental Impact Report.* SCH. 2008022018. 2012.

Google Earth Pro, Richmond Fire Stations, June 2022.

4.15 Transportation

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Transportation *Would the project:*				
a) Conflict with a program plan, ordinance or policy of the circulation system, including transit, roadway, bicycle and pedestrian facilities?			☒	
b) Would the project conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?			☒	
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?			☒	
d) Result in inadequate emergency access?			☒	

Setting

The Richmond Parkway is a major roadway in the area that extends from Interstate 580 near the east approach to the Richmond-San Rafael Bridge northeasterly to Interstate 80 near Hilltop Drive. Parr Boulevard from Richmond Parkway is the main approach to the project site within the WCCSL and other nearby uses.

Evaluation[21]

a) Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities?

Less than Significant Impact. **Table 4.15-1** summarizes the daily vehicle trip generation for the project based on the expected number of employees and truck activity at the site. ~~Since trucks are larger and operate slower than passenger vehicles, a passenger car equivalent (PCE) ratio of 2.0 is used to convert the truck trips to passenger vehicle trips (each truck is counted as two passenger vehicles). Accounting for PCE trips, the project is estimated to generate about 130 net new PCE trips on a typical weekday~~Based on input from Raven, a total of 25 trucks are projected to access the Raven site on a daily basis, in addition to 12 employee vehicles daily.

[21] All technical analysis conducted for this transportation analysis is included in this section; no separate technical appendix is warranted.

TABLE 4.15-1
PROJECT DAILY TRIP GENERATION SUMMARY

Use	Amount	Daily Trip Rate	~~Passenger Car Equivalent (PCE)~~ [a]	Daily Trips ~~(~~passenger cars and trucks~~)~~ [a]
Employees	12 [b]	2.5 [c]	~~1.0~~	30
Trucks	25 [d]	2.0 [e]	~~2.0~~	~~100~~50
Total Daily Trips ~~(PCE)~~				~~130~~80

NOTES:
a Specifically for use in the operational emissions and energy analysis in this document (see Sections 4.3 *Air Quality,* 4.6 *Energy*, and 4.8, *GHG Emissions*), a~~A~~ passenger car equivalent (PCE~~)~~ of 2.0 is used to convert truck trips to passenger vehicle trips (each truck is counted as two passenger vehicles, or a total of 100 PCE trips) ~~for trucks~~ because they are larger and operate slower than passenger vehicles. The project would have a total of 130 PCE trips (100 truck PCE trips + 30 employee trips).
b Per the Project Applicant and described in Chapter 2, *Project Description*.
c One inbound and one outbound trip per employee per day plus 0.5 trips per employee per day for other trips such as deliveries, running errands, etc.
d Per the Project Applicant and as described in Chapter 2, *Project Description*, 125 trucks would serve the site during a typical week. This estimate assumes they would be evenly distributed on five weekdays.
e One inbound and one outbound trip per truck.

SOURCE: Fehr & Peers, 2022

For informational purposes, ~~T~~the addition of ~~130~~80 new trips on a typical weekday would not substantially increase the motor vehicle volumes on the nearby streets, including Parr Boulevard and Richmond Parkway.[22] In addition, considering that both Parr Boulevard and Richmond Parkway~~streets currently have high truck volumes because they~~ are City-designated truck routes (established in the Richmond General Plan, Map 4.4) that serve primarily industrial areas, the additional trips generated by the project would not conflict with existing and proposed transit, roadway, bicycle, and pedestrian facilities in the project vicinity, which are located and planned in coordination with the designated truck routes.

Although level of service (LOS) and other measures of vehicle delay cannot be used to identify significant impacts under CEQA, the Contra Costa Transportation Authority (CCTA), as described in their *Technical Procedures* (November 2022), requires the evaluation of project effects on multimodal transportation service objectives (MTSOs), (including LOS at intersections along the regional routes of significance) outside of the CEQA process for development projects that generate more than 100 net new peak hour vehicle trip. As shown in Table 4.15-1, the project would generate less than 100 net new trips daily and would be below this threshold. Thus, analysis of project impacts on traffic operations and congestion is not required for the project.

[22] Or 130 new passenger car equivalent (PCE) trips on a typical weekday, as specifically calculated for use in the operational emissions and energy analysis in this document, since trucks are larger and operate slower than passenger vehicles. A PCE ratio of 2.0 is used to convert the 50 truck trips to 100 trips. Combined with the 30 employee trips per day, the project has a total 130 daily PCE trips.

The project would also not modify any transit, roadway, bicycle, or pedestrian facilities and would not conflict with existing or proposed facilities in the project vicinity.

The project would be consistent with programs, plans, ordinances, and policies addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities. The impact is less than significant.

b) Would the Project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

Less than Significant Impact. CEQA Guidelines Section 15064.3, added in December 2018 and consistent with the requirements of SB 743, states that vehicle miles traveled (VMT) is the most appropriate metric to assess the environmental impacts of a project on transportation.

The City of Richmond adopted VMT analysis guidelines, methodology, and thresholds of significance on April 6, 2021, consistent with ~~the Contra Costa Transportation Authority (~~CCTA~~)~~'s adopted VMT guidelines, which are also consistent with the State's Office of Planning and Research's (OPR) *Technical Advisory on Evaluating Transportation Impacts in CEQA* (December 2018). The City of Richmond guidelines includes screening criteria for development projects that meet certain criteria that can readily lead to the conclusion that they would not cause a significant impact on VMT. The screening criterion applicable to the project is the Small Projects criterion, which states that projects generating less than 836 VMT per day can be presumed to cause a less than significant impact on VMT.

Error! Not a valid bookmark self-reference. summarizes the estimated VMT generated by the project on a typical weekday. Since the City of Richmond's adopted guidelines, which are based on the CCTA Guidelines and consistent with CEQA Guidelines section 15064.3, subdivision (a) state that the VMT analysis for transportation impact purposes can focus solely on VMT generated by passenger vehicles and light-duty trucks and not include the VMT generated by heavy trucks, the project VMT summarized in **Error! Not a valid bookmark self-reference.** does not include the VMT generated by trucks for the project. As shown in **Error! Not a valid bookmark self-reference.**, the project is estimated to generate 174 VMT per day, which is below the screening criterion of 836 VMT per day.

Therefore, the project can be presumed to have a less than significant impact on VMT and is consistent with CEQA Guidelines section 15064.3, subdivision (b) and the impact is less than significant.

TABLE 4.15-2
PROJECT VMT SUMMARY

Use	Amount	Daily VMT Rate	Total VMT
Employees	12[a]	14.5[b]	174
Total			174
Threshold			836
Below Threshold?			Yes

NOTES:
a Per the Project Applicant and described in Chapter 2, *Project Description*
b Daily commute VMT per worker in 2020 based on the CCTA Travel Demand Model for TAZ 10347, where the project is located
c ~~Per the Project Applicant and as described in Chapter 2, *Project Description*, 125 trucks would serve the site during a typical week. This estimate assumes they would be evenly distributed on five weekdays~~
d ~~Per the Project Applicant and described in Chapter 2, *Project Description*, average truck trip would be 40 miles; assuming two trips (one inbound and one outbound) per truck.~~

SOURCE: Fehr & Peers, 2022

c) Substantially increase hazards due to a geometric design feature, (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

Less than Significant Impact. The project would not modify the access point to the existing WCCSL facility, the internal circulation within WCCSL, or the public right-of-way. Passenger vehicles and trucks would continue to access the project site through Parr Boulevard and Richmond Parkway. The project is located in an industrial area with high volume of large trucks already present on surrounding roadways, including Parr Boulevard and Richmond Parkway. The additional trucks added by the project would not result in incompatible uses or increase hazards. Thus, the impact on ~~hazards~~ existing roadway uses due to ~~a geometric~~ existing design features or incompatible uses is less than significant.

d) Result in inadequate emergency access?

Less than Significant Impact. As discussed above, the project would not modify the access point to the existing WCCSL facility, the internal circulation within WCCSL, or the public right-of-way. Emergency vehicles would continue to access the project site on Parr Boulevard.

The project would be designed and constructed according to the applicable fire and safety standards at the time of construction. Therefore, the WCCSL site would continue to be accessible by fire and emergency vehicles through public streets and the internal roadways within the WCCSL. Thus, the impact on emergency access is less than significant.

References

California State's Office of Planning and Research's (OPR) *Technical Advisory on Evaluating Transportation Impacts in CEQA* (December 2018).

City of Richmond, 2012. *Richmond General Plan 2030, Element 4 Circulation.* Available at: https://www.ci.richmond.ca.us/DocumentCenter/View/8846/Map-44---Existing-Truck-Routes?bidId= . Accessed March 6, 2023.

Contra Costa Transportation Authority (CCTA), 2020. *Contra Costa County Transportation Analysis Guidelines*, 2020. Available at: https://www.contracosta.ca.gov/DocumentCenter/View/70739/FINAL-CCC-Transportation-Analysis-Guidelines-v3-5-10-21?bidId=. Accessed March 6, 2023.

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4.16 Tribal Cultural Resources

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Tribal Cultural Resources *Would the project:*				
a) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:				
i) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or		☒		
ii) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.		☒		

Setting

ESA contacted the California State Native American Heritage Commission (NAHC) on October 20, 2021, to request a search of the NAHC's Sacred Lands File and a list of Native American representatives who may have knowledge of tribal cultural resources in the project vicinity or interest in the proposed project. The NAHC replied to ESA by email on November 19, 2021, noting that the Sacred Lands File has no record of any sacred sites within the project site. The NAHC response included a list of 15 Native American representatives from 13 tribal groups who may have knowledge of tribal cultural resources in the vicinity of the project site.

On May 4, 2022, the City received a response for consultation from Chairwoman Corrina Gould of the Confederated Villages of Lisjan. On May 18, 2022, the City held a virtual meeting with tribal members, Chairwoman Gould, Deja, and Cheyenne, to discuss the project and any potential impacts to cultural resources. Based on the discussion, the tribe has no concerns with the project as it relates to impacts to tribal cultural resources and cultural resources, and is comfortable with the proposed mitigation measures. See Section 4.5, *Cultural Resources*, of this checklist for a summary of ESA's NWIC records search and cultural resources sensitivity assessment.

Evaluation

a.i, a.ii)

Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k), or significance of the resource to a California Native American tribe.

Less than Significant Impact, after Mitigation. CEQA requires the lead agency to consider the effects of a project on tribal cultural resources. As defined in PRC Section 21074, tribal cultural resources are sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are listed, or determined to be eligible for listing, on the national, state, or local register of historical resources.

Based on the NWIC records search and the NAHC SLF negative search results, there are no known tribal cultural resources listed or determined eligible for listing in the California Register of Historical Resources or included in a local register of historical resources as defined in PRC Section 5020.1(k), pursuant to PRC Section 21074(a)(1), would be affected by the project. No tribal cultural resources have been identified by Native American representatives, and background research did not identify any tribal cultural resources. In addition, the City did not determine any resource that could potentially be affected by the project to be a significant tribal cultural resource pursuant to criteria set forth in PRC Section 5024.1(c).

In the event that cultural materials are identified during project construction activities that are determined to be tribal cultural resources, implementation of **Mitigation Measure CUL-1a: Cultural Resources Awareness Training**, **Mitigation Measure CUL-1b: Inadvertent Discovery of Cultural Materials or Tribal Cultural Resources**, and **Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains**, all identified above in Section 4.5, *Cultural Resources*, would reduce potentially significant impacts to less than significant. These mitigation measures would ensure that all personnel complete a cultural resources awareness training prior to any ground-disturbing activity and that work halt in the vicinity of a find until a qualified archaeologist and a Native American representative can make an assessment and provide additional recommendations.

References

Northwest Information Center (NWIC), Records Search File No. File No. 21-1575. On file, ESA, March 23, 2022.

4.17 Utilities and Service Systems

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Utilities and Service Systems *Would the project:*				
a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?			☒	
b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?			☒	
c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?			☒	
d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?			☒	
e) Comply with federal, State, and local management and reduction statutes and regulations related to solid waste?			☒	

Setting

The project site, within the WCCSL BMPC property, is currently served by all public utilities, including water and wastewater treatment by EBMUD and West County Wastewater District, respectively, as well as the reuse of runoff water, and PG&E provides electric power, natural gas.

Evaluation

a) **Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?**

Less than Significant Impact. The existing WCCSL would use offtake approximately 0.5 MW hour from the power generation for Republic's onsite operation needs and the rest would be used to power the proposed project. Any additional electrical power required beyond that generated onsite, including that required as LFG may supplies diminish or are depleted, would come from an existing PG&E power drop to the site and/or a renewable source. The project would also involve a new 250,000-gallon

integrated fire water tank and diesel engine for emergency use, per fire regulations, but would continue to be served by RFD and the West County Fire District. As previously discussed in 4.14, *Public Services and Recreation,* all construction-related mitigation measures identified in this analysis would apply to that development onsite, which would ensure any environmental effects from the project would be less than significant.

b) **Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?**

Less than Significant Impact. Steam is injected into the process to promote the thermal decomposition of the feedstock. Estimated water flow required for boiler feedwater and for cooling tower make-up is about 70 percent of the total required and is on the order of 60 gallons per minute (gpm) (81,500 gallons per day [gpd]). Adding in required water flow for overall processes and wash water for cleaning, the total water flow required for the project is estimated to be 81 gpm (116,200 gpd) (Raven SR, 2022b).

Potable water is available for both domestic and fire protection to the subject property from existing major facilities (e.g., reservoirs, pumping plants), which are serviced and maintained by EBMUD. Service would be granted subject to compliance with the District's regulations governing water service and Schedule of Rates and Charges, which may include water main extensions and/or off-site pipeline improvements (Raven SR, 2022c). For this analysis, it is not anticipated that the proposed project would require new water supplies for its operation to the extent that it would make future water supplies insufficient during future scenarios considering foreseeable future development. The impact would be less than significant.

c) **Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?**

Less than Significant Impact. Wastewater generated by the process is mainly cooling tower blowdown, RO system blowdown, and boiler system blowdown, along with a small flow from the syngas wash columns. Intermittent flow is from potable sources (restrooms, sinks, etc.) and area wash down water. Wastewater would be generated from the syngas wash columns, which can potentially contain low concentrations of organic compounds. Wastewater would be treated before it is discharged to the sewer systems through sump and grease/oil where the organic content would be removed for capture/reclaim/disposal, and the water portion sent to the wastewater sewer.

Total wastewater discharge from all project processes (or waste streams) is estimated to be 50,200 gallons per day, and the West County Wastewater District would permit this additional use upon its determination that the discharge may be covered by the Districts' Pretreatment and/or Pollution Prevention programs (Raven SR, 2022b).

Discussions are occurring between the Pproject Aapplicant and the West County Wastewater District and are in the permitting process. At this time, there are no

anticipated capacity issues expected. Given the small scale of the proposed project, the lack of notable new population onsite, it is reasonable that the West County Wastewater District, as wastewater treatment provider, would maintain adequate capacity to meet its demands with the addition of the proposed project. The impact would be less than significant.

d,e) **Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals? Comply with federal, State, and local management and reduction statutes and regulations related to solid waste?**

Less than Significant Impact. The project would not generate substantial solid waste but would convert existing organic waste into a reusable fuel product. Therefore, the project would not conflict with existing local or other laws or policies regarding the reduction, reuse and management of solid waste. The impact would be less than significant.

References

City of Richmond, 2012. *Richmond General Plan Update Environmental Impact Report.* SCH. 2008022018. 2012.

Contra Costa County 2004. *Environmental Impact Report on the West Contra County Sanitary Landfill Bulk Materials Processing Center and Related Actions,* SCH. 2002102057. June 2004.

Contra Costa County 2009. *Addendum to the Final EIR for the WCCSL BMPC and Related Actions*, SCH. 2002102057. 2009.

RAVEN SR, 2022b. West County Wastewater District Wastewater Discharge Permit Application. October 2022.

RAVEN SR, 2022c. Correspondence from Tracy Barrow, East Bay Municipal Utilities District, to Mike Fatigati, Raven SR. September 2022.

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4.18 Wildfire

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Wildfire *If located in or near State Responsibility Areas or lands classified as very high fire hazard severity zones, would the project:*				
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?			☒	
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?			☒	
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?				☒
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?			☒	

Setting

The project site borders expansive non-native grassland and ruderal species in open and that can get very dry during summer months. Factors that contribute to the risk of fire include dense and fire-prone vegetation, poor access to fire-fighting equipment because of slopes or inadequate roads, lack of adequate water pressure and service in fire-prone locations, and seasonal atmospheric conditions that result in warm, dry fire seasons with strong afternoon winds. Wildfire hazard maps show the site as not being within a high wildfire hazard zone (CPUC, 2018).

Evaluation

a) **Substantially impair an adopted emergency response plan or emergency evacuation plan?**

Less than Significant Impact. As discussed under Section 4.15, *Transportation*, the project would not modify the access point to the existing WCCSL facility, the internal circulation within WCCSL, or the public right-of-way. Therefore, the project would not impair any existing plans for emergency response or evaluation. The impact would be less than significant.

b) **Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?**

Less than Significant Impact. Certain project characteristics could have the potential to exacerbate wildfire risks, such as diesel fuel storage for the fire water take. However, no hazardous materials would be used in the conversion process. The biocarbon materials produced are inert to the process (i.e., not gasified). Also, the conversion process also derives electricityfrom fuel cells or turbines and/or internal combustion engine generator sets.

The project site is relatively flat, within the context of marshlands and Bay shoreline, and would also include a new fire water tank and diesel engine per fire regulations onsite. The tank would be used for emergency use, although the project site would still be~~ing~~ served by the RFD and the West County Fire District. The impact would be less than significant.

c) **Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?**

No Impact. The project site is fully served by existing infrastructure that currently service the WCCSL operations. It would not require the installation or maintenance of additional infrastructure that may exacerbate fire risk. There would be no impact.

d) **Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes**

Less than Significant Impact. The project would not introduce new people on the site, other than up to three to four employees per shift. As previously mentioned, the site is relatively flat, not located within downstream flood or landslide areas. The proposed project is not located in a high wildfire hazard zone (CPUC, 2018). The impact would be less than significant.

References

California Public Utilities Commission. Fire-Threat Map – State of California. January 19, 2018.

City of Richmond, 2011. *General Plan 2030 – Map 12.6 Police and Fire Services*. August 2011.

City of Richmond, 2012. *Richmond General Plan Update Environmental Impact Report.* SCH. 2008022018. 2012.

4.19 Mandatory Findings of Significance

Environmental Issues	Potentially Significant Impact	Less than Significant Impact with Mitigation Incorporated	Less than Significant Impact	No Impact
Mandatory Findings of Significance				
a) Does the project have the potential to substantially degrade the quality of the environment, 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 or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?		☒		
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?			☒	
c) Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?			☒	

Findings

a) **Does the project have the potential to substantially degrade the quality of the environment, 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 or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?**

Less than Significant Impact, after Mitigation. The proposed project may result in potential construction-related impacts to nesting special-status birds and to California Black Rail and California Ridgway's Rail. The potential impacts are reduced to less than significant by requiring surveys and avoidance of construction-related work during specific times of year:

- **Mitigation Measure BIO-1: Avoid and Minimize Impacts to Nesting Birds, Except Rails**
- **Mitigation Measure BIO-2: Avoid and Minimize Impacts to California Black Rail and California Ridgway's Rail**

The proposed project may result in potential impacts to Cultural Resources, Paleontological Resources (Geology and Soils), and Tribal Cultural Resources, unless the following mitigation measures are implemented, which would reduce the potential impacts to less than significant:

- **Mitigation Measure CUL-1a: Cultural Resources Awareness Training**
- **Mitigation Measure CUL-1b: Inadvertent Discovery of Cultural Materials or Tribal Cultural Resources**
- **Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains.**

b) **Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?**

Less than Significant Impact, after Mitigation. CEQA Guidelines Section 15355 defines a cumulative impact as the condition under which "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects." (California Code of Regulations [C.C.R.] Section 15355). The purpose of the cumulative analysis is to understand the incremental impacts of the project on the neighboring areas.

The project does not result in a ~~cumulative consideration~~cumulatively considerable impact for any environmental factors. The HRA evaluated the Raven SR project's contribution to cumulative health risk-related impacts based on CEQA's requirements for evaluating cumulative impacts and the BAAQMD's methodology for calculating a proposed project's contribution to background risk. The project's contribution to cumulative health risk-related impact was less than significant. The Raven SR project impacts were measured against baseline conditions on the project site. The Raven SR project lessens air quality impacts when measured against the impacts generated by the existing WCCSL operations. CCTA Guidelines (which the City has adopted) require a cumulative analysis only if a project impact is significant and unavoidable. Moreover, the project is below the VMT screening criterion and therefore presumed to have a less than significant transportation impact. For comparative purposes, the project's total VMT considering cumulative growth is substantially below the applicable threshold.[23] ~~One common exception, this evaluation does identify the BAAQMD Basic Construction Mitigation Measures Recommended for All Projects (Best Management Practices) to address fugitive dust during construction, which applies even though the project's construction air emissions are all below the BAAQMD CEQA thresholds of significance.~~

[23] The 2040 VMT rate is 15.0, so the total VMT = 12 daily trips x 15.0 = 180, compared to the 836 threshold (see Table 4.15-2).

~~The BMPs also apply to all individual projects and ensure that a significant impact with respect to fugitive dust is less than significant.~~

- ~~**Mitigation Measure AQ-1: Best Management Practices.**~~

~~Given the relatively small scope of the proposed project, its limited potential impacts, as well as the~~ Also, the mitigation measures identified in this ~~Draft~~updated IS/MND to address potentially significant impacts would also apply to other cumulative projects that have or could occur concurrently with the proposed project and effective reduce or avoid potential combined significant effects.~~and listed below, the~~ The incremental effects of the project are not cumulatively considerable when considered with the potential effects of past, current, and probable future projects. The project does not have any significant cumulative impacts. Impacts would be less than significant.

c) **Does the project have environmental effects, which will cause substantial adverse effects on human beings, either directly or indirectly?**

Less than Significant Impact, after Mitigation. All impacts identified in this ~~Draft~~updated IS/MND are either less than significant after implementation of identified mitigation measures (~~all~~ listed in criterion "a" above and below in this criterion "c"), or less than significant without the need for mitigation. Of those impacts that require mitigation, only the potential impact of PM_{10} and $PM_{2.5}$ (fugitive dust) being added to the local atmosphere during construction has the potential to adversely affect human beings, directly or indirectly. ~~As discussed under finding "b" above, t~~The project's implementation of **Mitigation Measure AQ-1: Best Management Practices**~~,~~ would reduce the impact to less than significant.

All mitigation measures identified for the proposed project, and clarified in this updated IS/MND, are listed in the updated Draft Mitigation Monitoring and Reporting Program (MMRP) in **Appendix C** to this document.

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5. Document Preparers

5.1 CEQA Consultant

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APPENDIX A

Emissions Data, Assumptions and Modeling Files

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A.1-1 Original Emissions Data, Assumptions and Modeling Files

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RAVEN - Contra Costa County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

RAVEN

Contra Costa County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Light Industry	40.00	1000sqft	1.30	40,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	58
Climate Zone	5			**Operational Year**	2023
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	203.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Project specific info

Construction Phase - Project specific information

Off-road Equipment - Project specific information

Off-road Equipment - Project specific information

Off-road Equipment - Project specific information

Off-road Equipment - Project specific information

Trips and VMT - Client provided information

Grading - Project specific information

Vehicle Trips - Project specific information

Area Coating - Project specific information

RAVEN - Contra Costa County, Annual

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Construction Off-road Equipment Mitigation -

Operational Off-Road Equipment - Project specific information

Stationary Sources - Emergency Generators and Fire Pumps -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	200.00	138.00
tblConstructionPhase	NumDays	20.00	5.00
tblConstructionPhase	NumDays	4.00	30.00
tblConstructionPhase	NumDays	2.00	30.00
tblGrading	AcresOfGrading	15.00	4.00
tblLandUse	LotAcreage	0.92	1.30
tblOffRoadEquipment	HorsePower	97.00	247.00
tblOffRoadEquipment	HorsePower	78.00	81.00
tblOffRoadEquipment	HorsePower	78.00	97.00
tblOffRoadEquipment	HorsePower	212.00	187.00
tblOffRoadEquipment	HorsePower	85.00	247.00
tblOffRoadEquipment	HorsePower	158.00	97.00
tblOffRoadEquipment	HorsePower	158.00	187.00
tblOffRoadEquipment	HorsePower	80.00	247.00
tblOffRoadEquipment	HorsePower	100.00	97.00
tblOffRoadEquipment	HorsePower	100.00	89.00
tblOffRoadEquipment	LoadFactor	0.37	0.40
tblOffRoadEquipment	LoadFactor	0.48	0.73
tblOffRoadEquipment	LoadFactor	0.48	0.37
tblOffRoadEquipment	LoadFactor	0.43	0.41
tblOffRoadEquipment	LoadFactor	0.78	0.40
tblOffRoadEquipment	LoadFactor	0.38	0.37
tblOffRoadEquipment	LoadFactor	0.38	0.41
tblOffRoadEquipment	LoadFactor	0.38	0.40

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

tblOffRoadEquipment	LoadFactor	0.40	0.37
tblOffRoadEquipment	LoadFactor	0.40	0.20
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	1.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	2.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOperationalOffRoadEquipment	OperDaysPerYear	260.00	365.00
tblOperationalOffRoadEquipment	OperHoursPerDay	8.00	24.00
tblOperationalOffRoadEquipment	OperOffRoadEquipmentNumber	0.00	1.00
tblTripsAndVMT	HaulingTripNumber	0.00	20.00
tblTripsAndVMT	HaulingTripNumber	0.00	32.00
tblTripsAndVMT	HaulingTripNumber	0.00	20.00
tblTripsAndVMT	VendorTripNumber	7.00	4.00
tblTripsAndVMT	WorkerTripNumber	10.00	2.00
tblTripsAndVMT	WorkerTripNumber	20.00	2.00
tblTripsAndVMT	WorkerTripNumber	10.00	2.00
tblTripsAndVMT	WorkerTripNumber	17.00	2.00
tblVehicleTrips	ST_TR	1.99	0.67
tblVehicleTrips	SU_TR	5.00	0.67
tblVehicleTrips	WD_TR	4.96	0.67

2.0 Emissions Summary

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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					
2022	0.1109	1.0010	0.9211	2.0500e-003	4.8300e-003	0.0433	0.0481	9.8000e-004	0.0411	0.0420	0.0000	176.5135	176.5135	0.0420	8.4000e-004	177.8124
2023	0.0572	0.4813	0.5134	9.4000e-004	1.3300e-003	0.0217	0.0230	3.7000e-004	0.0208	0.0212	0.0000	80.1650	80.1650	0.0148	3.8000e-004	80.6476
Maximum	**0.1109**	**1.0010**	**0.9211**	**2.0500e-003**	**4.8300e-003**	**0.0433**	**0.0481**	**9.8000e-004**	**0.0411**	**0.0420**	**0.0000**	**176.5135**	**176.5135**	**0.0420**	**8.4000e-004**	**177.8124**

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					
2022	0.1109	1.0010	0.9211	2.0500e-003	3.6600e-003	0.0433	0.0469	8.5000e-004	0.0411	0.0419	0.0000	176.5133	176.5133	0.0420	8.4000e-004	177.8122
2023	0.0572	0.4813	0.5134	9.4000e-004	1.3300e-003	0.0217	0.0230	3.7000e-004	0.0208	0.0212	0.0000	80.1649	80.1649	0.0148	3.8000e-004	80.6476
Maximum	**0.1109**	**1.0010**	**0.9211**	**2.0500e-003**	**3.6600e-003**	**0.0433**	**0.0469**	**8.5000e-004**	**0.0411**	**0.0419**	**0.0000**	**176.5133**	**176.5133**	**0.0420**	**8.4000e-004**	**177.8122**

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EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	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**	**18.99**	**0.00**	**1.64**	**9.63**	**0.00**	**0.21**	**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	**7-1-2022**	**9-30-2022**	0.4036	0.4036
2	**10-1-2022**	**12-31-2022**	0.6761	0.6761
3	**1-1-2023**	**3-31-2023**	0.5375	0.5375
		Highest	0.6761	0.6761

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	0.1771	0.0000	3.7000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	7.1000e-004	7.1000e-004	0.0000	0.0000	7.6000e-004
Energy	5.3000e-003	0.0482	0.0405	2.9000e-004		3.6600e-003	3.6600e-003		3.6600e-003	3.6600e-003	0.0000	79.9440	79.9440	5.4500e-003	1.5000e-003	80.5276
Mobile	0.0133	0.0161	0.1306	2.8000e-004	0.0289	2.1000e-004	0.0292	7.7300e-003	1.9000e-004	7.9200e-003	0.0000	25.5208	25.5208	1.5700e-003	1.1800e-003	25.9122
Offroad	0.1481	1.4534	0.8266	3.4300e-003		0.0487	0.0487		0.0448	0.0448	0.0000	300.7720	300.7720	0.0973	0.0000	303.2039
Waste						0.0000	0.0000		0.0000	0.0000	10.0684	0.0000	10.0684	0.5950	0.0000	24.9439
Water						0.0000	0.0000		0.0000	0.0000	2.9346	4.6310	7.5656	0.3022	7.2100e-003	17.2675
Total	**0.3438**	**1.5177**	**0.9981**	**4.0000e-003**	**0.0289**	**0.0525**	**0.0815**	**7.7300e-003**	**0.0486**	**0.0564**	**13.0030**	**410.8685**	**423.8714**	**1.0015**	**9.8900e-003**	**451.8558**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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	0.1771	0.0000	3.7000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	7.1000e-004	7.1000e-004	0.0000	0.0000	7.6000e-004
Energy	5.3000e-003	0.0482	0.0405	2.9000e-004		3.6600e-003	3.6600e-003		3.6600e-003	3.6600e-003	0.0000	79.9440	79.9440	5.4500e-003	1.5000e-003	80.5276
Mobile	0.0133	0.0161	0.1306	2.8000e-004	0.0289	2.1000e-004	0.0292	7.7300e-003	1.9000e-004	7.9200e-003	0.0000	25.5208	25.5208	1.5700e-003	1.1800e-003	25.9122
Offroad	0.1481	1.4534	0.8266	3.4300e-003		0.0487	0.0487		0.0448	0.0448	0.0000	300.7720	300.7720	0.0973	0.0000	303.2039
Waste						0.0000	0.0000		0.0000	0.0000	10.0684	0.0000	10.0684	0.5950	0.0000	24.9439
Water						0.0000	0.0000		0.0000	0.0000	2.9346	4.6310	7.5656	0.3022	7.2100e-003	17.2675
Total	**0.3438**	**1.5177**	**0.9981**	**4.0000e-003**	**0.0289**	**0.0525**	**0.0815**	**7.7300e-003**	**0.0486**	**0.0564**	**13.0030**	**410.8685**	**423.8714**	**1.0015**	**9.8900e-003**	**451.8558**

	ROG	NOx	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	7/18/2022	7/22/2022	5	5	
2	Site Preparation	Site Preparation	7/25/2022	9/2/2022	5	30	

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3	Grading	Grading	9/5/2022	10/14/2022	5	30	
4	Building Construction	Building Construction	9/19/2022	3/29/2023	5	138	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0; Striped Parking Area: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Air Compressors	1	8.00	81	0.73
Demolition	Crushing/Proc. Equipment	1	8.00	247	0.40
Demolition	Dumpers/Tenders	1	8.00	16	0.38
Demolition	Excavators	1	8.00	97	0.37
Site Preparation	Dumpers/Tenders	1	8.00	16	0.38
Site Preparation	Excavators	3	8.00	187	0.41
Site Preparation	Plate Compactors	2	8.00	8	0.43
Site Preparation	Rough Terrain Forklifts	1	8.00	97	0.37
Site Preparation	Tractors/Loaders/Backhoes	1	8.00	247	0.40
Grading	Crawler Tractors	1	8.00	187	0.41
Grading	Excavators	1	8.00	158	0.38
Grading	Rollers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Building Construction	Air Compressors	1	8.00	97	0.37
Building Construction	Cranes	1	8.00	231	0.29
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Other Construction Equipment	1	8.00	172	0.42
Building Construction	Rough Terrain Forklifts	1	8.00	89	0.20

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

Building Construction	Welders	2	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	4	2.00	0.00	20.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	8	2.00	0.00	32.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	4	2.00	0.00	20.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	7	2.00	4.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Demolition - 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	2.7900e-003	0.0193	0.0205	5.0000e-005		9.1000e-004	9.1000e-004		8.9000e-004	8.9000e-004	0.0000	4.3996	4.3996	4.1000e-004	0.0000	4.4099
Total	**2.7900e-003**	**0.0193**	**0.0205**	**5.0000e-005**		**9.1000e-004**	**9.1000e-004**		**8.9000e-004**	**8.9000e-004**	**0.0000**	**4.3996**	**4.3996**	**4.1000e-004**	**0.0000**	**4.4099**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.2 Demolition - 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	5.0000e-005	1.7100e-003	3.6000e-004	1.0000e-005	1.7000e-004	2.0000e-005	1.9000e-004	5.0000e-005	1.0000e-005	6.0000e-005	0.0000	0.6262	0.6262	2.0000e-005	1.0000e-004	0.6563
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	1.0000e-005	1.0000e-005	1.2000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0319	0.0319	0.0000	0.0000	0.0322
Total	**6.0000e-005**	**1.7200e-003**	**4.8000e-004**	**1.0000e-005**	**2.1000e-004**	**2.0000e-005**	**2.3000e-004**	**6.0000e-005**	**1.0000e-005**	**7.0000e-005**	**0.0000**	**0.6581**	**0.6581**	**2.0000e-005**	**1.0000e-004**	**0.6884**

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	2.7900e-003	0.0193	0.0205	5.0000e-005		9.1000e-004	9.1000e-004		8.9000e-004	8.9000e-004	0.0000	4.3996	4.3996	4.1000e-004	0.0000	4.4099
Total	**2.7900e-003**	**0.0193**	**0.0205**	**5.0000e-005**		**9.1000e-004**	**9.1000e-004**		**8.9000e-004**	**8.9000e-004**	**0.0000**	**4.3996**	**4.3996**	**4.1000e-004**	**0.0000**	**4.4099**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.2 Demolition - 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	5.0000e-005	1.7100e-003	3.6000e-004	1.0000e-005	1.7000e-004	2.0000e-005	1.9000e-004	5.0000e-005	1.0000e-005	6.0000e-005	0.0000	0.6262	0.6262	2.0000e-005	1.0000e-004	0.6563
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	1.0000e-005	1.0000e-005	1.2000e-004	0.0000	4.0000e-005	0.0000	4.0000e-005	1.0000e-005	0.0000	1.0000e-005	0.0000	0.0319	0.0319	0.0000	0.0000	0.0322
Total	**6.0000e-005**	**1.7200e-003**	**4.8000e-004**	**1.0000e-005**	**2.1000e-004**	**2.0000e-005**	**2.3000e-004**	**6.0000e-005**	**1.0000e-005**	**7.0000e-005**	**0.0000**	**0.6581**	**0.6581**	**2.0000e-005**	**1.0000e-004**	**0.6884**

3.3 Site Preparation - 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					
Fugitive Dust					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0177	0.1696	0.1377	5.0000e-004		5.6500e-003	5.6500e-003		5.2400e-003	5.2400e-003	0.0000	43.0480	43.0480	0.0135	0.0000	43.3865
Total	**0.0177**	**0.1696**	**0.1377**	**5.0000e-004**	**0.0000**	**5.6500e-003**	**5.6500e-003**	**0.0000**	**5.2400e-003**	**5.2400e-003**	**0.0000**	**43.0480**	**43.0480**	**0.0135**	**0.0000**	**43.3865**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.3 Site Preparation - 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	7.0000e-005	2.7400e-003	5.8000e-004	1.0000e-005	2.7000e-004	2.0000e-005	3.0000e-004	7.0000e-005	2.0000e-005	1.0000e-004	0.0000	1.0019	1.0019	3.0000e-005	1.6000e-004	1.0501
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	8.0000e-005	6.0000e-005	7.3000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.1911	0.1911	1.0000e-005	1.0000e-005	0.1929
Total	**1.5000e-004**	**2.8000e-003**	**1.3100e-003**	**1.0000e-005**	**5.1000e-004**	**2.0000e-005**	**5.4000e-004**	**1.3000e-004**	**2.0000e-005**	**1.6000e-004**	**0.0000**	**1.1930**	**1.1930**	**4.0000e-005**	**1.7000e-004**	**1.2430**

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					0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0177	0.1696	0.1377	5.0000e-004		5.6500e-003	5.6500e-003		5.2400e-003	5.2400e-003	0.0000	43.0480	43.0480	0.0135	0.0000	43.3864
Total	**0.0177**	**0.1696**	**0.1377**	**5.0000e-004**	**0.0000**	**5.6500e-003**	**5.6500e-003**	**0.0000**	**5.2400e-003**	**5.2400e-003**	**0.0000**	**43.0480**	**43.0480**	**0.0135**	**0.0000**	**43.3864**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.3 Site Preparation - 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	7.0000e-005	2.7400e-003	5.8000e-004	1.0000e-005	2.7000e-004	2.0000e-005	3.0000e-004	7.0000e-005	2.0000e-005	1.0000e-004	0.0000	1.0019	1.0019	3.0000e-005	1.6000e-004	1.0501
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	8.0000e-005	6.0000e-005	7.3000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.1911	0.1911	1.0000e-005	1.0000e-005	0.1929
Total	**1.5000e-004**	**2.8000e-003**	**1.3100e-003**	**1.0000e-005**	**5.1000e-004**	**2.0000e-005**	**5.4000e-004**	**1.3000e-004**	**2.0000e-005**	**1.6000e-004**	**0.0000**	**1.1930**	**1.1930**	**4.0000e-005**	**1.7000e-004**	**1.2430**

3.4 Grading - 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					
Fugitive Dust					2.1200e-003	0.0000	2.1200e-003	2.3000e-004	0.0000	2.3000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0166	0.1854	0.1437	3.5000e-004		7.5100e-003	7.5100e-003		6.9100e-003	6.9100e-003	0.0000	30.8182	30.8182	9.9700e-003	0.0000	31.0674
Total	**0.0166**	**0.1854**	**0.1437**	**3.5000e-004**	**2.1200e-003**	**7.5100e-003**	**9.6300e-003**	**2.3000e-004**	**6.9100e-003**	**7.1400e-003**	**0.0000**	**30.8182**	**30.8182**	**9.9700e-003**	**0.0000**	**31.0674**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.4 Grading - 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	5.0000e-005	1.7100e-003	3.6000e-004	1.0000e-005	1.7000e-004	2.0000e-005	1.9000e-004	5.0000e-005	1.0000e-005	6.0000e-005	0.0000	0.6262	0.6262	2.0000e-005	1.0000e-004	0.6563
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	8.0000e-005	6.0000e-005	7.3000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.1911	0.1911	1.0000e-005	1.0000e-005	0.1929
Total	**1.3000e-004**	**1.7700e-003**	**1.0900e-003**	**1.0000e-005**	**4.1000e-004**	**2.0000e-005**	**4.3000e-004**	**1.1000e-004**	**1.0000e-005**	**1.2000e-004**	**0.0000**	**0.8173**	**0.8173**	**3.0000e-005**	**1.1000e-004**	**0.8492**

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					9.5000e-004	0.0000	9.5000e-004	1.0000e-004	0.0000	1.0000e-004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0166	0.1854	0.1437	3.5000e-004		7.5100e-003	7.5100e-003		6.9100e-003	6.9100e-003	0.0000	30.8182	30.8182	9.9700e-003	0.0000	31.0674
Total	**0.0166**	**0.1854**	**0.1437**	**3.5000e-004**	**9.5000e-004**	**7.5100e-003**	**8.4600e-003**	**1.0000e-004**	**6.9100e-003**	**7.0100e-003**	**0.0000**	**30.8182**	**30.8182**	**9.9700e-003**	**0.0000**	**31.0674**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.4 Grading - 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	5.0000e-005	1.7100e-003	3.6000e-004	1.0000e-005	1.7000e-004	2.0000e-005	1.9000e-004	5.0000e-005	1.0000e-005	6.0000e-005	0.0000	0.6262	0.6262	2.0000e-005	1.0000e-004	0.6563
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	8.0000e-005	6.0000e-005	7.3000e-004	0.0000	2.4000e-004	0.0000	2.4000e-004	6.0000e-005	0.0000	6.0000e-005	0.0000	0.1911	0.1911	1.0000e-005	1.0000e-005	0.1929
Total	**1.3000e-004**	**1.7700e-003**	**1.0900e-003**	**1.0000e-005**	**4.1000e-004**	**2.0000e-005**	**4.3000e-004**	**1.1000e-004**	**1.0000e-005**	**1.2000e-004**	**0.0000**	**0.8173**	**0.8173**	**3.0000e-005**	**1.1000e-004**	**0.8492**

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	0.0729	0.6117	0.6119	1.0900e-003		0.0291	0.0291		0.0279	0.0279	0.0000	91.9681	91.9681	0.0179	0.0000	92.4146
Total	**0.0729**	**0.6117**	**0.6119**	**1.0900e-003**		**0.0291**	**0.0291**		**0.0279**	**0.0279**	**0.0000**	**91.9681**	**91.9681**	**0.0179**	**0.0000**	**92.4146**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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	3.5000e-004	8.5500e-003	2.5900e-003	3.0000e-005	9.9000e-004	9.0000e-005	1.0800e-003	2.9000e-004	9.0000e-005	3.8000e-004	0.0000	3.1336	3.1336	7.0000e-005	4.6000e-004	3.2713
Worker	2.1000e-004	1.5000e-004	1.8200e-003	1.0000e-005	5.9000e-004	0.0000	6.0000e-004	1.6000e-004	0.0000	1.6000e-004	0.0000	0.4777	0.4777	2.0000e-005	1.0000e-005	0.4823
Total	**5.6000e-004**	**8.7000e-003**	**4.4100e-003**	**4.0000e-005**	**1.5800e-003**	**9.0000e-005**	**1.6800e-003**	**4.5000e-004**	**9.0000e-005**	**5.4000e-004**	**0.0000**	**3.6113**	**3.6113**	**9.0000e-005**	**4.7000e-004**	**3.7535**

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	0.0729	0.6117	0.6119	1.0900e-003		0.0291	0.0291		0.0279	0.0279	0.0000	91.9680	91.9680	0.0179	0.0000	92.4145
Total	**0.0729**	**0.6117**	**0.6119**	**1.0900e-003**		**0.0291**	**0.0291**		**0.0279**	**0.0279**	**0.0000**	**91.9680**	**91.9680**	**0.0179**	**0.0000**	**92.4145**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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	3.5000e-004	8.5500e-003	2.5900e-003	3.0000e-005	9.9000e-004	9.0000e-005	1.0800e-003	2.9000e-004	9.0000e-005	3.8000e-004	0.0000	3.1336	3.1336	7.0000e-005	4.6000e-004	3.2713
Worker	2.1000e-004	1.5000e-004	1.8200e-003	1.0000e-005	5.9000e-004	0.0000	6.0000e-004	1.6000e-004	0.0000	1.6000e-004	0.0000	0.4777	0.4777	2.0000e-005	1.0000e-005	0.4823
Total	**5.6000e-004**	**8.7000e-003**	**4.4100e-003**	**4.0000e-005**	**1.5800e-003**	**9.0000e-005**	**1.6800e-003**	**4.5000e-004**	**9.0000e-005**	**5.4000e-004**	**0.0000**	**3.6113**	**3.6113**	**9.0000e-005**	**4.7000e-004**	**3.7535**

3.5 Building Construction - 2023

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	0.0569	0.4756	0.5101	9.1000e-004		0.0217	0.0217		0.0208	0.0208	0.0000	77.2516	77.2516	0.0148	0.0000	77.6205
Total	**0.0569**	**0.4756**	**0.5101**	**9.1000e-004**		**0.0217**	**0.0217**		**0.0208**	**0.0208**	**0.0000**	**77.2516**	**77.2516**	**0.0148**	**0.0000**	**77.6205**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.5 Building Construction - 2023

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	1.4000e-004	5.6200e-003	1.8400e-003	3.0000e-005	8.3000e-004	3.0000e-005	8.6000e-004	2.4000e-004	3.0000e-005	2.7000e-004	0.0000	2.5248	2.5248	5.0000e-005	3.7000e-004	2.6349
Worker	1.6000e-004	1.1000e-004	1.4100e-003	0.0000	5.0000e-004	0.0000	5.0000e-004	1.3000e-004	0.0000	1.4000e-004	0.0000	0.3886	0.3886	1.0000e-005	1.0000e-005	0.3922
Total	**3.0000e-004**	**5.7300e-003**	**3.2500e-003**	**3.0000e-005**	**1.3300e-003**	**3.0000e-005**	**1.3600e-003**	**3.7000e-004**	**3.0000e-005**	**4.1000e-004**	**0.0000**	**2.9134**	**2.9134**	**6.0000e-005**	**3.8000e-004**	**3.0271**

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	0.0569	0.4756	0.5101	9.1000e-004		0.0217	0.0217		0.0208	0.0208	0.0000	77.2515	77.2515	0.0148	0.0000	77.6204
Total	**0.0569**	**0.4756**	**0.5101**	**9.1000e-004**		**0.0217**	**0.0217**		**0.0208**	**0.0208**	**0.0000**	**77.2515**	**77.2515**	**0.0148**	**0.0000**	**77.6204**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

3.5 Building Construction - 2023

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	1.4000e-004	5.6200e-003	1.8400e-003	3.0000e-005	8.3000e-004	3.0000e-005	8.6000e-004	2.4000e-004	3.0000e-005	2.7000e-004	0.0000	2.5248	2.5248	5.0000e-005	3.7000e-004	2.6349
Worker	1.6000e-004	1.1000e-004	1.4100e-003	0.0000	5.0000e-004	0.0000	5.0000e-004	1.3000e-004	0.0000	1.4000e-004	0.0000	0.3886	0.3886	1.0000e-005	1.0000e-005	0.3922
Total	**3.0000e-004**	**5.7300e-003**	**3.2500e-003**	**3.0000e-005**	**1.3300e-003**	**3.0000e-005**	**1.3600e-003**	**3.7000e-004**	**3.0000e-005**	**4.1000e-004**	**0.0000**	**2.9134**	**2.9134**	**6.0000e-005**	**3.8000e-004**	**3.0271**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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	0.0133	0.0161	0.1306	2.8000e-004	0.0289	2.1000e-004	0.0292	7.7300e-003	1.9000e-004	7.9200e-003	0.0000	25.5208	25.5208	1.5700e-003	1.1800e-003	25.9122
Unmitigated	0.0133	0.0161	0.1306	2.8000e-004	0.0289	2.1000e-004	0.0292	7.7300e-003	1.9000e-004	7.9200e-003	0.0000	25.5208	25.5208	1.5700e-003	1.1800e-003	25.9122

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
General Light Industry	26.80	26.80	26.80	78,243	78,243
Total	26.80	26.80	26.80	78,243	78,243

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 Light Industry	9.50	7.30	7.30	59.00	28.00	13.00	92	5	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
General Light Industry	0.558086	0.056127	0.180570	0.129764	0.024304	0.005480	0.007016	0.007028	0.000551	0.000343	0.026017	0.001231	0.003481

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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	27.4981	27.4981	4.4500e-003	5.4000e-004	27.7700
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	27.4981	27.4981	4.4500e-003	5.4000e-004	27.7700
NaturalGas Mitigated	5.3000e-003	0.0482	0.0405	2.9000e-004		3.6600e-003	3.6600e-003		3.6600e-003	3.6600e-003	0.0000	52.4460	52.4460	1.0100e-003	9.6000e-004	52.7576
NaturalGas Unmitigated	5.3000e-003	0.0482	0.0405	2.9000e-004		3.6600e-003	3.6600e-003		3.6600e-003	3.6600e-003	0.0000	52.4460	52.4460	1.0100e-003	9.6000e-004	52.7576

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

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 Light Industry	982800	5.3000e-003	0.0482	0.0405	2.9000e-004		3.6600e-003	3.6600e-003		3.6600e-003	3.6600e-003	0.0000	52.4460	52.4460	1.0100e-003	9.6000e-004	52.7576
Total		**5.3000e-003**	**0.0482**	**0.0405**	**2.9000e-004**		**3.6600e-003**	**3.6600e-003**		**3.6600e-003**	**3.6600e-003**	**0.0000**	**52.4460**	**52.4460**	**1.0100e-003**	**9.6000e-004**	**52.7576**

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 Light Industry	982800	5.3000e-003	0.0482	0.0405	2.9000e-004		3.6600e-003	3.6600e-003		3.6600e-003	3.6600e-003	0.0000	52.4460	52.4460	1.0100e-003	9.6000e-004	52.7576
Total		**5.3000e-003**	**0.0482**	**0.0405**	**2.9000e-004**		**3.6600e-003**	**3.6600e-003**		**3.6600e-003**	**3.6600e-003**	**0.0000**	**52.4460**	**52.4460**	**1.0100e-003**	**9.6000e-004**	**52.7576**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	297200	27.4981	4.4500e-003	5.4000e-004	27.7700
Total		**27.4981**	**4.4500e-003**	**5.4000e-004**	**27.7700**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
General Light Industry	297200	27.4981	4.4500e-003	5.4000e-004	27.7700
Total		**27.4981**	**4.4500e-003**	**5.4000e-004**	**27.7700**

6.0 Area Detail

6.1 Mitigation Measures Area

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	ROG	NOx	CO	SO2	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	0.1771	0.0000	3.7000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	7.1000e-004	7.1000e-004	0.0000	0.0000	7.6000e-004
Unmitigated	0.1771	0.0000	3.7000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	7.1000e-004	7.1000e-004	0.0000	0.0000	7.6000e-004

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	0.0209					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1562					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.0000e-005	0.0000	3.7000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	7.1000e-004	7.1000e-004	0.0000	0.0000	7.6000e-004
Total	**0.1771**	**0.0000**	**3.7000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**7.1000e-004**	**7.1000e-004**	**0.0000**	**0.0000**	**7.6000e-004**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

6.2 Area by SubCategory

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	0.0209					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.1562					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	3.0000e-005	0.0000	3.7000e-004	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	7.1000e-004	7.1000e-004	0.0000	0.0000	7.6000e-004
Total	**0.1771**	**0.0000**	**3.7000e-004**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**7.1000e-004**	**7.1000e-004**	**0.0000**	**0.0000**	**7.6000e-004**

7.0 Water Detail

7.1 Mitigation Measures Water

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	7.5656	0.3022	7.2100e-003	17.2675
Unmitigated	7.5656	0.3022	7.2100e-003	17.2675

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	9.25 / 0	7.5656	0.3022	7.2100e-003	17.2675
Total		**7.5656**	**0.3022**	**7.2100e-003**	**17.2675**

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
General Light Industry	9.25 / 0	7.5656	0.3022	7.2100e-003	17.2675
Total		**7.5656**	**0.3022**	**7.2100e-003**	**17.2675**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	10.0684	0.5950	0.0000	24.9439
Unmitigated	10.0684	0.5950	0.0000	24.9439

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	49.6	10.0684	0.5950	0.0000	24.9439
Total		**10.0684**	**0.5950**	**0.0000**	**24.9439**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
General Light Industry	49.6	10.0684	0.5950	0.0000	24.9439
Total		**10.0684**	**0.5950**	**0.0000**	**24.9439**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type
Rubber Tired Loaders	1	24.00	365	203	0.36	Diesel

EMFAC Off-Model Adjustment Factors for Gasoline Light Duty Vehicle to Account for the SAFE Vehicle Rule Not Applied

UnMitigated/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
Equipment Type	tons/yr										MT/yr					
Rubber Tired Loaders	0.1481	1.4534	0.8266	3.4300e-003		0.0487	0.0487		0.0448	0.0448	0.0000	300.7720	300.7720	0.0973	0.0000	303.2039
Total	**0.1481**	**1.4534**	**0.8266**	**3.4300e-003**		**0.0487**	**0.0487**		**0.0448**	**0.0448**	**0.0000**	**300.7720**	**300.7720**	**0.0973**	**0.0000**	**303.2039**

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type
Emergency Generator	1	0	50	0	0.73	

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

A.2-1 Updated Air Quality and Greenhouse Gas Assessment Technical Memo

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MEMO

Date	**February 27, 2023**
Project name	**Raven SR**
Project no.	**1690025248**
To	**Richmond Planning and Building Service Department** **Richmond, California**
From	**Steven Branoff** **Tony Wang, PhD**
Subject	**Raven SR Project Air Quality and Greenhouse Gas Assessment**

1 INTRODUCTION

Ramboll US Consulting, Inc. (Ramboll) conducted a criteria air pollutant (CAP)_and greenhouse gas (GHG) assessment for the proposed construction and operation of a new bioenergy facility in Richmond, CA (referred to hereafter as "Project"). The project would be constructed at the West Contra Costa Sanitary Landfill, which is located at 1 Parr Blvd, Richmond, CA 94801. This analysis has been performed to support the California Environmental Quality Act (CEQA) documentation at the request of the City of Richmond's Planning and Building Service Department. The Project location and boundary are shown in **Figure 1**, attached.

Details on the methodology and assumptions used in this technical report are summarized in **Section 2, Methodology** and the results are summarized in **Section 3, Results**. This analysis has been performed to support the CEQA documentation at the request of the City of Richmond's Planning and Building Service Department. The Project location and boundary are shown in **Figure 1**, attached.

2 METHODOLOGY

The purpose of this air quality and GHG analysis is to assess potential criteria pollutant and GHG emissions that would result from the construction and operation of the Proposed Project, consistent with guidelines and methodologies from air quality regulatory agencies, specifically, the BAAQMD, the California Air Resources Board (ARB), and the US Environmental Protection Agency (USEPA).

This analysis will follow the BAAQMD's 2017 CEQA Guidelines and 2022 updated CEQA Thresholds of Significance for Climate Impacts, where appropriate. All CAP and GHG emissions during Project construction and operation were quantified for this Project. In this analysis, Ramboll analyzed CAP and GHG net emission changes associated with the Proposed Project including both direct Project emissions and emissions reductions from the landfill flare due to the biogas engine operation. This document summarizes the assumptions and calculation methodologies Ramboll used to estimate CAP and GHG emissions.

Throughout this report, GHG emissions are reported in units of metric tons of carbon dioxide equivalents (MT CO_2e). Carbon dioxide equivalents are emissions of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), weighted by the global warming potentials (GWP) of 1, 25, and 298, respectively, from Title 40 of the Code of Federal Regulations (CFR), Part 98, Table A-1,

as referenced by the California Mandatory Reporting Rule for GHG (Title 17 of the California Code of Regulations, §§95100- 95158).

2.1 Construction Sources

Construction emission calculation methodologies cover diesel-fueled off-road construction equipment and on-road mobile sources, i.e., hauling, vendor, and worker trips. Ramboll relied on project-specific data provided by the Project Sponsor, including a construction schedule and construction equipment list, as presented in the AQTM. Where project-specific construction data was not available, California Emissions Estimator Model (CalEEMod®) defaults were used. Emissions were estimated using methods consistent with CalEEMod® to estimate emissions, as summarized in **Table 1**.

2.1.1 Off-Road Equipment

For diesel-powered off-road construction equipment, Ramboll used CalEEMod and methodologies consistent with CalEEMod to estimate emissions. The CalEEMod emissions methodology for off-road construction equipment relies on the ARB In-Use Off-Road Equipment model (OFFROAD2017), which incorporates statewide survey data to develop emission factors based on the fleet average for each year of construction. The OFFROAD2017 model also identifies average horsepower and load factor for each type of equipment; Ramboll used these default values since project specific information was not available. The methodology to be used to calculate emissions from off-road equipment is presented in **Table 1**.

2.1.2 Construction On-Road Mobile Sources

On-road mobile sources include vehicle trips associated with workers, vendors, and demolition hauling trips. Construction worker, vendor, and hauling trips were provided by the Project Sponsor. Ramboll used CalEEMod default trip lengths for Contra Costa County to calculate total vehicle miles travelled (VMT).

The emission factors for running emissions of criteria pollutants are from EMFAC2021, the latest version of ARB's EMission FACtors Model for on-road emissions. Emission factors vary by vehicle type, fuel type, and calendar year. Consistent with CalEEMod methodology, Ramboll assumed that worker trips are 25% Light-Duty Auto (LDA), 50% Light-Duty Truck 1 (LDT1), and 25% LDT2 vehicle classes; vendor trips are 100% diesel Medium-Heavy Duty Trucks (MHDT); and haul trips are 100% diesel Heavy-Heavy Duty Trucks (HHDT) unless additional information is known. EMFAC2021 incorporates both idling and running emissions, and the running emissions include exhaust as well as brake wear and tire wear. EMFAC2021 also incorporates the Pavley Clean Car Standards and the Advanced Clean Cars program. The emission factors used for construction of the Project were provided for Contra Costa County from EMFAC2021 for 2023 and 2024.

In addition to the idling and running emissions discussed above, emissions from construction on-road mobile sources also include resuspended road dust. Resuspended road dust emissions were calculated following ARB methodology and are described below.

The methodology used to calculate emissions from on-road sources is presented in **Table 1**.

2.2 Project Operational Emissions

The Project's operational emission sources include three biogas engines, one green waste storage pile, one backup flare, and one fire pump engine. The green waste storage pile is excluded from the Project CAP and GHG emissions analysis as the source would already be emitting at the landfill. Additionally, the operation of biogas engines in the Project site will use landfill gas (LFG) from the adjacent landfill site. Therefore, the Project operation would reduce the amount of LFG sent to a flare for venting or evacuation and reduce emissions from the flare-based emissions from the landfill flare.

2.2.1 Criterial Air Pollutants

To support the Project's air permit application, Ramboll has analyzed the operational CAP and GHG emissions for all sources. CAP emissions from the biogas engines, flare, flare pilot, and fire pump are provided in **Tables 2**-**5**.

Since the operation of biogas engines in the Project site can either use 100% landfill gas (LFG) or a blended gas consisting of up to 45% tailgas, the Project would reduce the amount of LFG at the landfill site and reduce CAP emissions from the landfill flare. To be conservative, this analysis assumed that the biogas engines would use a blended gas with 55% LFG as an emission reduction measure. The amount of LFG reduction was estimated based on the LFG flow rate of the biogas engine and the annual landfill flare operational hours. The CAP emission reductions from the existing landfill flare are provided in **Table 6.**

The operational CAP emissions from mobile sources were also estimated using project specific information, and on-road operational vehicle trip lengths derived from CalEEMod. On-road mobile emissions were quantified for employee passenger vehicles and haul trucks. Trip rates and distances were provided by the Project Sponsor and are shown in **Table 7**, and the fleet specifications are presented in **Table 8**. **Table 9** provides a summary of operational mobile sources CAP emissions.

2.2.2 Greenhouse Gas

The operational GHG emissions for the Project's stationary sources were estimated using project specific information. The GHG emission factors for the stationary sources were obtained from 40 CFR Part 98 for various fuel types. GHG emissions from the biogas engines, flare, fire pump, and existing landfill flare reductions are provided in **Table 10**-**13**. Since the operation of biogas engines in the Project site can either use 100% landfill gas (LFG) or a blended gas consisting of up to 45% tailgas, the Project would reduce the amount of LFG at the landfill site and reduce GHG emissions from the landfill flare. Therefore, this analysis has quantified GHG reductions in both scenarios and provided the range of Project GHG impacts.

3 RESULTS FROM PROJECT ANALYSIS

3.1 Project Construction CAP and GHG Emissions

Project construction CAP and GHG emissions are summarized in **Table 14**. It also shows that the Project construction emissions of all CAPs are below the BAAQMD thresholds of significance. The project is estimated to generate approximately 186 MT CO_2e over a construction period of two years.

3.2 Project Operational CAP and GHG Emissions

Project operational CAP and GHG emissions along with the landfill gas flaring reductions are summarized in **Table 15-16**. Project CAP emission sources include three biogas engines, one flare, one fire pump engine, and operational on-road mobile emissions. By using LFG from the adjacent landfill site in the biogas engines to reduce landfill flare emissions, the Project operational ROG, NOx, PM_{10}, and $PM_{2.5}$ emissions are all below the BAAQMD thresholds of significance.

For GHG, the BAAQMD 2017 CEQA guidelines specify a 10,000 MT/yr threshold for stationary sources. Maximum Project net annual GHG emissions incorporating the existing landfill flare reductions are estimated to be 7,586 MT CO_2e per year, with the conservative assumption that the biogas engines operate using a blended gas consisting of 55% LFG. When the biogas engines operate using 100% LFG, the net annual GHG emissions incorporating the existing landfill flare reductions are estimated to be 207 MT CO_2e per year. In both cases, the Project GHG emissions are below the BAAQMD threshold.

4 REFERENCES

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TABLES

FIGURES

TABLES

Table 1
Emission Calculation Methodology
Raven SR
Richmond, CA

Type	Source	Methodology and Formula	Reference
Construction Equipment	Off-Road Equipment[1]	$Ec = \Sigma(EFc * HP * LF * Hr * U_F * C)$	OFFROAD2017 and ARB/USEPA Engine Standards
Construction Fugitive Dust	Mechanical Dismemberment, Grading, Truck Loading	CalEEMod	CalEEMod
Construction and Operational On-Road Mobile Sources[2]	Exhaust – Running	$E_R = \Sigma(EF_R * VMT * C)$, where VMT = Trip Length * Trip Number	EMFAC2021
	Brake Wear and Tire Wear	$E_{BW,TW} = \Sigma(EF_{BW,TW} * VMT * C)$, where VMT = Trip Length * Trip Number	EMFAC2021
	Exhaust - Idling	$E_I = \Sigma(EF_I * Trip\ Number * T_I * C)$	EMFAC2021
	Entrained Road Dust	$E_{RD} = \Sigma(EF_{RD} * VMT * C)$, where VMT = Trip Length * Trip Number	ARB 2021 Miscellaneous Process Methodology 7.9

Notes:

1. E_c: off-road equipment exhaust emissions (lb)
   - EF_c: emission factor (g/hp-hr). CalEEMod default emission factors used
   - HP: equipment horsepower. From CalEEMod defaults
   - LF: equipment load factor. From OFFROAD2017
   - Hr: equipment hours
   - U_F: Utilization factor
   - C: unit conversion factor

2. On-road mobile sources include truck and passenger vehicle trips. Emissions associated with mobile sources were calculated using the following formulas.
   - E_R: running exhaust and running losses emissions (lb)
     - EF_R: running emission factor (g/mile). From EMFAC2021
     - VMT: vehicle miles traveled
     - C: unit conversion factor
     - The calculation involves the following assumptions:
       a. All material transporting and soil hauling trucks are heavy-heavy duty trucks.
       b. Trip Length: The one-way trip length as calculated based on CalEEMod Appendix G defaults for Contra Costa County or provided by the Project Sponsor
       c. Trip Number: Worker, vendor and hauling trip rates were provided by the Project Sponsor.
   - E_I: vehicle idling emissions (lb).
     - EF_I: vehicle idling emission factor (g/hr-trip). From EMFAC2021
     - T_I: idling time
     - C: unit conversion factor
   - E_{RD}: entrained road dust emissions (lb)
     - EF_{RD}: annual average emission factor (lb/VMT) = k*(sL)^0.91 * (W)^1.02 * (1-P/4N)
       - k: particle size multiplier for particle size range
       - sL: roadway silt loading [grams per square meter - g/m^2]
       - W: average weight of vehicles traveling the road [tons]
       - P = number of "wet" days in county with at least 0.01 in of precipitation during the annual averaging period
       - N = number of days in the averaging period
     - VMT: vehicle miles traveled
     - C: unit conversion factor

Abbreviations:

ARB: California Air Resources Board
BW: Brake Wear
EF: Emission Factor
EMFAC: EMission FACtor Model
g: gram
HP: horsepower
lb: pound
LF: Load Factor
mi: mile
USEPA: United States Environmental Protection Agency
RL: Running Losses
VMT: vehicle miles traveled

References:

ARB/USEPA. 2013. Table 1: ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards. Available online at: http://www.arb.ca.gov/msprog/ordiesel/documents/Off-Road_Diesel_Stds.xls

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Table 2
Biogas Engine CAP Emissions
Raven SR
Richmond, CA

Input Data		
Horsepower rating (per engine)	1,966	bhp
Fuel Gas Volumetric Flow	30,886	SCFH

Pollutant	**Emission Factor[1]**	**Emissions, 1 Engine[3]**	**Emissions, 1 Engine[3]**	**Emissions, 3 Engines[3]**
	(g/bhp-hr)	*(lb/day)*	*(tons/yr)*	*(tons/yr)*
NOx (normal)[2]	0.12	13	2.3	7.0
NOx (startup, upset)[2]	1.1	4.8	0.048	0.14
CO	0.89	93	17	51
VOC	0.12	12	2.3	6.8
$PM/PM_{10}/PM_{2.5}$	0.090	9.4	1.7	5.1
	(ppmv)	*(lb/day)*	*(tons/yr)*	*(tons/yr)*
SO_2	100	12	2.2	6.6

Notes:

1. Emission factors represent BACT for biogas-fired engines, except PM emissions set at a level below the BACT threshold.
2. NOx during startup and upset are presented for operation of engine without SCR, for up to 1 hour/day and 20 hours/year.
3. These engines can be fired on landfill gas, process tail gas, or a combination of these. Emissions shown here represent a worst-case for any operating scenario.

Abbreviations:

BACT - Best Available Control Technology
bhp - brake horsepower
CAP - criteria air pollutant
CO - carbon monoxide
g - grams
hr - hour
lb - pounds
NOx - nitrogen oxides
PM - particulate matter
ppmv - parts per million volume
scfh - standard cubic foot per hour
SO_2 - sulfur dioxide
VOC - volatile organic compound
yr - year

Table 3
Flare CAP Emissions
Raven SR
Richmond, CA

Input Data		
Hydrogen gas heating value	670	Btu/scf
Flare heat input capacity	23	MMBtu/hr
Flare operating hours	100	hours/yr
	2.0	hours/day

Emission Factors

Pollutant	Factor	Units	Source
NOx	0.060	lb/MMBtu	BAAQMD BACT, flare
CO	2.8	lb/MMScf	AP-42 Table 2.4-4, adjusted for 6% methane
PM	0.90	lb/MMScf	AP-42 Table 2.4-4, adjusted for 6% methane
VOC	0.0012	lb/MMBtu	AP-42 Table 13.5-1
SO_2	1.0	ppmv	Low sulfur content of H2 gas

Total Flare Emissions

	NOx	CO	VOC	PM	SO_2
Emission Factor (lb/MMScf biogas)	40	2.8	0.80	0.90	0.16
Hourly Emission Rate (lb/hr)	1.4	0.095	0.028	0.031	0.0056
Daily Emission Rate (lb/day)	2.8	0.19	0.055	0.062	0.011
Annual Potential to Emit (lb/year)	138	9.5	2.8	3.1	0.56
Annual Potential to Emit (TPY)	0.069	0.0047	0.0014	0.0015	2.8E-04

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
BACT - Best Available Control Technology
BTU - British Thermal Unit
CAP - criteria air pollutant
CO - carbon monoxide
hr - hour
lb - pounds
NOx - nitrogen oxides
PM - particulate matter
ppmv - parts per million volume
scf - standard cubic foot
SO_2 - sulfur dioxide
TPY - tons per year
VOC - volatile organic compound
yr - year

Table 4
Flare Pilot CAP Emissions
Raven SR
Richmond, CA

Input Data		
Propane gas flowrate	50	scfh
Propane density	36	scf/gal
Flare pilot propane use	1.4	gal/hr
Flare operating hours	8,760	hours/yr
	24	hours/day

Emission Factors

Pollutant	Factor	Units	Source
NOx	13	lb/10^3 gal	AP-42, Chapter 1.5, Table 1.5-1.
CO	7.5	lb/10^3 gal	AP-42, Chapter 1.5, Table 1.5-1.
PM	0.70	lb/10^3 gal	AP-42, Chapter 1.5, Table 1.5-1.
VOC	0.80	lb/10^3 gal	AP-42, Chapter 1.5, Table 1.5-1.
SO_2	0.016	lb/10^3 gal	AP-42, Chapter 1.5, Table 1.5-1.

Total Flare Emissions

	NOx	CO	VOC	PM	SO_2
Emission Factor (lb/10^3 gal)	13	7.5	0.80	0.70	0.016
Hourly Emission Rate (lb/hr)	0.018	0.011	0.0011	0.0010	2.2E-05
Daily Emission Rate (lb/day)	0.44	0.25	0.027	0.024	5.4E-04
Annual Potential to Emit (lb/year)	160	92	10	8.6	0.20
Annual Potential to Emit (TPY)	0.080	0.046	0.0049	0.0043	9.8E-05

Abbreviations:

CAP - criteria air pollutant
CO - carbon monoxide
gal - gallon
hr - hour
lb - pounds
NOx - nitrogen oxides
PM - particulate matter
scf - standard cubic foot
SO_2 - sulfur dioxide
TPY - tons per year
VOC - volatile organic compound
yr - year

Table 5
Fire Pump Engine CAP Emissions
Raven SR
Richmond, CA

Input Data		
Horsepower rating	104	bhp
Diesel fuel use rate	8	gal/hr
Daily operating hours	24	hr/day
Annual operating hours (testing)	30	hr/yr
Annual operating hours (emergency)	100	hr/yr

Pollutant	Emission Factor[1]	Hourly Emissions	Daily Emissions[3]	Annual Emissions (Testing Only)[4]	Annual Emissions (Testing + Emergency)[4]
	(g/bhp-hr)	*(lb/hr)*	*(lb/day)*	*(tons/yr)*	*(tons/yr)*
NOx^2	2.9	0.65	16	0.010	0.042
CO	3.7	0.85	20	0.013	0.055
VOC^2	0.15	0.034	0.83	5.2E-04	0.0022
$PM/PM_{10}/PM_{2.5}$	0.22	0.050	1.2	7.6E-04	0.0033
SO_2	0.0059	0.0014	0.032	2.0E-05	8.8E-05

Notes:

1. Emission factors presented for Tier 3 engine, as required by the CA Diesel Engine ATCM
2. NOx and VOC apportioned from the combined NOx/NMHC limit assuming 95% NOx, 5% VOC.
3. Daily emissions assume operation 24 hr/day for regulatory applicability purposes only
4. Calculations of annual emissions are shown with and without emergency hours, as per BAAQMD guidance.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
bhp - brake horsepower
CAP - criteria air pollutant
CO - carbon monoxide
g - grams
gal - gallon
hr - hour
lb - pounds
NOx - nitrogen oxides
PM - particulate matter
scf - standard cubic foot
SO_2 - sulfur dioxide
TPY - tons per year
VOC - volatile organic compound
yr - year

Table 6
Landfill Flare CAP Emission Reductions
Raven SR
Richmond, CA

Input Data[1]		
LFG gas heating value	386	Btu/scf
LFG gas volume	50,962	SCFH
Flare heat input capacity	20	MMBtu/hr
Flare operating hours	8,760	hours/yr
	24	hours/day

Emission Factors

Pollutant	Factor	Units	Source
NOx	39	lb/MMScf	AP-42 Table 2.4-4
CO	46	lb/MMScf	AP-42 Table 2.4-4
PM	15	lb/MMScf	AP-42 Table 2.4-4
VOC	0.0012	lb/MMBtu	AP-42 Table 13.5-1
SO_2	1.0	ppmv	Low sulfur content of H2 gas

Landfill Flare Emission Reductions

	NOx	CO	VOC	PM	SO_2
Emission Factor (lb/MMScf biogas)	39	46	0.46	15	0.16
Hourly Emission Rate (lb/hr)	2.0	2.3	0.024	0.8	0.008
Daily Emission Rate (lb/day)	48	56	0.6	18	0.20
Annual Potential to Emit (lb/year)	17,411	20,536	207	6,696	73
Annual Potential to Emit (TPY)	8.7	10	0.10	3.3	0.036

Notes:

1. To be conservative, the landfill flare emission reductions were estimated using the scenario that the Project biogas engines operate using a blended gas consisting of 55% landfill gas.

Abbreviations:

BTU - British Thermal Unit
CAP - criteria air pollutant
CO - carbon monoxide
hr - hour
lb - pounds
NOx - nitrogen oxides
PM - particulate matter
ppmv - parts per million volume
scf - standard cubic foot
SO_2 - sulfur dioxide
TPY - tons per year
VOC - volatile organic compound
yr - year

Table 7
Trip Rates for Project Operations
Raven SR
Richmond, CA

Fleet Type[1]	Average Trip Rate	Average Trip Length	Annual Activity	Annual Trips[2]	Annual VMT[2]
	round trips/day	mi/round trip	days/year	round trips/yr	mi/yr
Employees	15	14.5	260	3,900	56,550
Trucks	50	80	260	13,000	1,040,000

Notes:

1. Average trip rate and trip length were provided by Project sponsor.
2. The annual trips and annual VMT were calculated assuming 5 days per week or 260 days per year for operations.

Abbreviations:

mi - mile(s)
VMT - vehicle miles travelled
yr - year

Table 8
On-Road Fleet Mix for Project Operations
Raven SR
Richmond, CA

Fleet Mix Assumption[1]	Vehicle Type	Percentage of Fleet Mix	% by Fuel Type				
			Gas	Diesel	Natural Gas	Electric	Plug-in Hybrid
Employees[2]	LDA	65%	90.33%	0.28%	--	6.45%	2.94%
	LDT1	5.3%	99.55%	0.02%	--	0.28%	0.16%
	LDT2	29.7%	98.28%	0.42%	--	0.45%	0.85%
Trucks[3]	HHDT	100%	--	100.00%	--	--	--

Notes:

1. Fleet mixes and percentages by fuel type are calculated based on EMFAC2021 v1.0.2 vehicle miles traveled projections for Contra Costa County. EMFAC2021 was run in Emission Rates mode for calendar year 2024 in the annual season with EMFAC2007 vehicle categories and data aggregated across vehicle model year and speed. Per the Project sponsor, operations are expected to begin in 2024. For the purposes of this analysis, maximum operational emissions were conservatively calculated assuming one full year of 2024 operations rather than partial. This is conservative because on average, vehicle emission factors are expected to decrease with time as a higher percentage of the fleet is electrified.
2. The hydrogen delivery truck fleet is assumed to be all HHDT and diesel fueled.
3. The employee fleet is assumed to have the default EMFAC vehicle type distribution of passenger vehicles and default fuel distribution.

Abbreviations:

EMFAC2021 - California Air Resources Board EMission FACtor model

References:

California Air Resources Board (ARB) 2021. EMFAC2021. Available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools

Table 9
Mobile CAP Emissions from Project Operations
Raven SR
Richmond, CA

Trip Type	Emissions from Mobile Sources					
	ROG	NOx	PM_{10}	$PM_{2.5}$	CO	SOx
	(tons/yr)					
Employees	0.0050	0.0044	0.0011	3.7E-04	0.061	1.8E-04
Trucks	0.025	2.3	0.16	0.072	0.17	0.018
Total	0.030	2.3	0.16	0.072	0.23	0.018

Notes:

1. Trip generation rates and fleet mix details, and emission factors used in emissions calculations are shown in Tables 7 and 8 respectively. Emission factors are derived from EMFAC 2021

Abbreviations:

CO - carbon monoxide
CO_2e - carbon dioxide equivalents
MT - metric ton(s)
NOx - nitrogen oxides
PM - particulate matter
ROG - reactive organic gases
SOx - sulfur oxides
yr - year

Table 10
Biogas Engine GHG Emissions
Raven SR
Richmond, CA

Input[1]	Value	Unit
Heat Content - Biogas	386	BTU/scf
Operating Hours	8,760	hr/yr
Biogas Usage, 3 Engines	92,658	scf/hr
	313,310	MMBTU/yr

GHG Emissions

Pollutant	Landfill Gas Emission Factors[2]	Biogas Engine Emissions
	kg/MMBtu	MT/yr
CO_2	52	16,314
CH_4	0.0032	1.0
N_2O	6.3E-04	0.20
CO_2e	52	16,398

Notes:

1. Biogas engine operation inputs were provided by the Project Sponsor.
2. GHG emissions factors were based on 40 CFR Part 98 for landfill gas fuel type. Emission factors for CO_2e were estimated by multiplying the CH_4 and N_2O emission factors by their global warming potentials from the 40 CFR Part 98 Subpart A, Table A-1.

Abbreviations:

BTU - British Thermal Unit
CH_4 - methane
CO_2 - Carbon dioxide
CO_2e - carbon dioxide equialent
GHG - green house gases
hr - hour
kg - kilogram
MMBtu - million British thermal units
MT- Metric tons
N_2O - Nitrous Oxide
scf - standard cubic foot
yr - year

References:

Federal Register EPA; 40 CFR Part 98 Subpart C, Available at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98/subpart-C

Federal Register EPA; 40 CFR Part 98 Subpart A, Table A-1, Available at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98/subpart-A/appendix-Table%20A-1%20to%20Subpart%20A%20of%20Part%2098

Table 11
Flare GHG Emissions
Raven SR
Richmond, CA

Input[1]	Value	Unit
Heat Content - Hydrogen Gas	670	BTU/scf
Heat Content - Propane Gas	2,420	BTU/scf
Flare Operating Hours	100	hr/yr
Flare Pilot Operating Hours	8,760	hr/yr
Biogas Usage	23	MMBTU/hr
	2,300	MMBTU/yr
Propane Gas Usage	50	scf/hr
	1,060	MMBTU/yr

GHG Emissions

Pollutant	Landfill Gas Emission Factors[2]	Propane Gas Emission Factors[2]	Flare Emissions
	kg/MMBtu		MT/yr
CO_2	52	61	185
CH_4	0.0032	0.0030	0.012
N_2O	6.3E-04	6.0E-04	0.0023
CO_2e	52	62	205

Notes:

1. Flare operation inputs were provided by the Project Sponsor.
2. GHG emissions factors were based on 40 CFR Part 98 for landfill gas and propane gas fuel types. Emission factors for CO_2e were estimated by multiplying the CH_4 and N_2O emission factors by their global warming potentials from the 40 CFR Part 98 Subpart A, Table A-1.

Abbreviations:

BTU - British Thermal Unit
CH_4 - methane
CO_2 - Carbon dioxide
CO_2e - carbon dioxide equialent
GHG - green house gases
hr - hour
kg - kilogram
MMBtu - million British thermal units
MT- Metric tons
N_2O - Nitrous Oxide
scf - standard cubic foot
yr - year

References:

Federal Register EPA; 40 CFR Part 98 Subpart C, Available at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98/subpart-C

Federal Register EPA; 40 CFR Part 98 Subpart A, Table A-1, Available at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98/subpart-A/appendix-Table%20A-1%20to%20Subpart%20A%20of%20Part%2098

Table 12
Fire Pump Engine GHG Emissions
Raven SR
Richmond, CA

Input[1]	Value	Unit
Heat Content - Diesel	0.14	MMBTU/gal
Operating Hours	30	hr/yr
Diesel Usage	8.0	gal/hr
	33	MMBTU/yr

GHG Emissions

Pollutant	Diesel Emission Factors[2]	Fire Pump Engine Emissions
	kg/MMBtu	MT/yr
CO_2	74	2.4
CH_4	0.0030	9.9E-05
N_2O	6.0E-04	2.0E-05
CO_2e	74	2.5

Notes:

1. Fire pump engine operation inputs were provided by the Project Sponsor and the heat content of diesel was based on 40 CFR Part 98 defaults.
2. GHG emissions factors were based on 40 CFR Part 98 for distillate fuel oil no.2 fuel type. Emission factors for CO_2e were estimated by multiplying the CH_4 and N_2O emission factors by their global warming potentials from the 40 CFR Part 98 Subpart A, Table A-1.

Abbreviations:

BTU - British Thermal Unit
CH_4 - methane
CO_2 - Carbon dioxide
CO_2e - carbon dioxide equialent
gal - gallon
GHG - green house gases
hr - hour
kg - kilogram
MMBtu - million British thermal units
MT- Metric tons
N_2O - Nitrous Oxide
scf - standard cubic foot
yr - year

References:

Federal Register EPA; 40 CFR Part 98 Subpart C, Available at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98/subpart-C

Federal Register EPA; 40 CFR Part 98 Subpart A, Table A-1, Available at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98/subpart-A/appendix-Table%20A-1%20to%20Subpart%20A%20of%20Part%2098

Table 13
Landfill Flare GHG Emission Reductions
Raven SR
Richmond, CA

Input[1]	Value	Unit
Heat Content - Biogas	386	BTU/scf
Flare Operating Hours	8760	hr/yr
Biogas Usage (55% landfill gas)	50,962	scf/hr
	172,321	MMBTU/yr
Biogas Usage (100% landfill gas)	92,658	scf/hr
	313,310	MMBTU/yr

GHG Emissions

Pollutant	Landfill Gas Combustion Emission Factors[2]	Landfill Flare Emission Reductions (55% landfill gas)	Landfill Flare Emission Reductions (100% landfill gas)
	kg/MMBtu	MT/yr	MT/yr
CO_2	52	8,973	16,314
CH_4	0.0032	0.55	1.0
N_2O	6.3E-04	0.11	0.20
CO_2e	52	9,019	16,398

Notes:

1. Landfill flare operation inputs were estimated based on the amount of landfill flare reductions that would result from the usage of the Project biogas engines, which can operate using a blended gas consisting of at least 55% landfill gas and up to 100% landfill gas.
2. GHG emissions factors were based on 40 CFR Part 98 for landfill gas fuel type. Emission factors for CO_2e were estimated by multiplying the CH_4 and N_2O emission factors by their global warming potentials from the 40 CFR Part 98 Subpart A, Table A-1.

Abbreviations:

BTU - British Thermal Unit
CH_4 - methane
CO_2 - Carbon dioxide
CO_2e - carbon dioxide equialent
GHG - green house gases
hr - hour
kg - kilogram
MMBtu - million British thermal units
MT- Metric tons
N_2O - Nitrous Oxide
scf - standard cubic foot
yr - year

References:

Federal Register EPA; 40 CFR Part 98 Subpart C, Available at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98/subpart-C

Federal Register EPA; 40 CFR Part 98 Subpart A, Table A-1, Available at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98/subpart-A/appendix-Table%20A-1%20to%20Subpart%20A%20of%20Part%2098

Table 14
Construction CAP and GHG Emission Summary
Raven SR
Richmond, CA

Summary of Default Construction Emissions by Source

Construction Activity	Year	Source	Default Construction CAP Emissions[1]				Default Construction GHG Emissions[2]
			ROG	NOx	PM_{10} (Exhaust)	$PM_{2.5}$ (Exhaust)	CO_2e
			lb/yr				MT/yr
Demolition	2023	On-Site Exhaust	172	19	3.5	2.8	1.2
		Mobile Exhaust	0.20	10	0.12	0.12	3.6
Site Preparation	2023	On-Site Exhaust	19	164	6.4	5.9	14
		Mobile Exhaust	0.28	0.22	0.0032	0.0029	0.26
Grading	2023	On-Site Exhaust	23	185	12	11	13
		Mobile Exhaust	0.28	0.22	0.0032	0.0029	0.26
Building Construction	2023	On-Site Exhaust	186	1,622	70	64	140
		Mobile Exhaust	1.7	21	0.22	0.21	7.0
	2024	On-Site Exhaust	8.2	72	2.9	2.7	6.5
		Mobile Exhaust	0.072	0.94	0.0093	0.0089	0.32

Default Construction Emissions by Year

Year	Summary of Construction Emissions by Year[1]				
	ROG	NOx	PM_{10} (Exhaust)	$PM_{2.5}$ (Exhaust)	CO_2e
	ton/yr				MT/yr
2023	0.20	1.0	0.046	0.042	179
2024	0.0041	0.036	0.0015	0.0014	6.8
BAAQMD Threshold	**10**	**10**	**15**	**15**	--
Exceed threshold?	**No**	**No**	**No**	**No**	--

Notes:

1. Emissions were estimated using off-road construction equipment emission factors from CalEEMod and on-road emission factors from EMFAC2021. The emissions above include emissions from offroad equipment, and emissions from worker, vendor, and hauling trucks. Default emissions use the default construction equipment Tier. BAAQMD mass thresholds for PM_{10} and $PM_{2.5}$ evaluate only exhaust emissions.

2. Emission factors for CO_2e were estimated by multiplying the CH_4 and N_2O emission factors by their global warming potentials from the 40 CFR Part 98 Subpart A, Table A-1.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
CalEEMod - California Emissions Estimator Model
CAP - Criteria Air Pollutants
CO_2e - carbon dioxide equivalents
GHG - greenhouse gas
lb - pounds
MT - metric ton
NOx - nitrogen oxides
PM_{10} - particulate matter less than 10 microns
$PM_{2.5}$ - particulate matter less than 2.5 microns
ROG - Reactive Organic Gas
yr - year

References:

The California Emissions Estimator Model (CalEEMod). Available at: http://www.caleemod.com/

California Air Resources Board (ARB) 2021. EMFAC2021. Available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools

Federal Register EPA; 40 CFR Part 98 Subpart A, Table A-1, Available at: https://www.ecfr.gov/current/title-40/chapter-I/subchapter-C/part-98/subpart-A/appendix-Table%20A-1%20to%20Subpart%20A%20of%20Part%2098

Table 15
Operational CAP Emission Summary
Raven SR
Richmond, CA

Emissions Summary[1]

Emissions Source	Operational CAP Emissions			
	ROG	NOx	PM_{10} (Exhaust)	$PM_{2.5}$ (Exhaust)
	tons/yr			
Biogas Engines	6.8	7.2	5.1	5.1
Flare	0.010	0.16	0.0086	0.0086
Fire Pump Engine	0.0022	0.042	0.0033	0.0033
Landfill Flare Reductions[2]	-0.10	-8.7	-3.3	-3.3
On-Road Mobile	0.030	2.3	0.16	0.072
Total	**6.8**	**1.0**	**2.0**	**1.9**
BAAQMD Threshold	**10**	**10**	**15**	**15**
Exceed threshold?	**No**	**No**	**No**	**No**

Notes:

1. Emissions estimated using methods consistent with Project-specific information.
2. To be conservative, the landfill flare reductions assume the biogas engines operate using a blended gas consisting of 55% landfill gas.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
CalEEMod - California Emissions Estimator Model
CAP - Criteria Air Pollutants
CARB - California Air Resources Board
NOx - nitrogen oxides
PM_{10} - particulate matter less than 10 microns
$PM_{2.5}$ - particulate matter less than 2.5 microns
ROG - Reactive Organic Gas
yr - year

References:

BAAQMD. May 2017. California Environmental Quality Act Air Quality Guidelines. Available online at: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en&rev=0d2d971e661d41f28a56953f1776bdde

California Air Resources Board (ARB) 2021. EMFAC2021. Available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools

Table 16
Operational GHG Emission Summary
Raven SR
Richmond, CA

Emissions Summary[1]

Emissions Source	GHG Emissions (55% landfill gas)	GHG Emissions (100% landfill gas)
	CO_2e	CO_2e
	(MT/yr)	(MT/yr)
Biogas Engines	16,398	16,398
Flare	205	205
Fire Pump Engine	2.5	2.5
Landfill Flare Reductions[2]	-9,019	-16,398
Total	**7,586**	**207**
BAAQMD Threshold	**10,000**	**10,000**
Exceed threshold?	**No**	**No**

Notes:

1. Emissions estimated using methods consistent with Project-specific information.
2. Landfill flare reductions were estimated based on the landfill gas usage of the Project biogas engines, which can operate using a blended gas consisting of at least 55% landfill gas and up to 100% landfill gas.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
CalEEMod - California Emissions Estimator Model
CARB - California Air Resources Board
CO_2e - carbon dioxide equivalents
GHG - greenhouse gas
MT - metric ton
yr - year

References:

BAAQMD. May 2017. California Environmental Quality Act Air Quality Guidelines. Available online at: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en&rev=0d2d971e661d41f28a56953f1776bdde

California Air Resources Board (ARB) 2021. EMFAC2021. Available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools

FIGURES

PROJECT: 1690025248 | DATED: 1/20/2023 | DESIGNER: ANSHI

- Project Boundary
- Onsite Buildings
- Leachate Tanks
- Green Waste Storage Pile
- Fire Pump Engine Housing
- Biogas Engine
- Fire Pump Engine
- Flare
- Existing Landfill Flare

0 500 1,000 Feet

MODELED SOURCES AND BUILDINGS

Raven SR
1 Parr Blvd.
Richmond, CA

FIGURE 01

RAMBOLL US CONSULTING, INC.
A RAMBOLL COMPANY

RAMBOLL

A.2-2 Updated Air Quality and New Health Risk Assessment Technical Memo

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MEMO

Date	**March 7, 2023**
Project name	**Raven SR**
Project no.	**1690025248**
To	**Richmond Planning and Building Service Department** **Richmond, California**
From	**Steven Branoff** **Tony Wang, PhD**
Subject	**Raven SR CEQA Air Quality and Health Risk Assessment**

1 INTRODUCTION

Ramboll US Consulting, Inc. (Ramboll) conducted a health risk assessment (HRA) for the proposed construction and operation of a new bioenergy facility in Richmond, CA (referred to hereafter as "Project"). The project would be constructed at the West Contra Costa Sanitary Landfill, which is located at 1 Parr Blvd, Richmond, CA 94801. The Project location and boundary are shown in **Figure 1**, attached.

Details on the methodology and assumptions used in this technical report are summarized in **Section 2, Methodology** and the results are summarized in **Section 3, Results**. . Typically, an HRA will be performed if a project will generate substantial emissions of toxic air contaminants (TACs). Although the proposed Project's Initial Study prepared pursuant to the California Environmental Quality Act (CEQA) did not indicate the Project would generate substantial emissions and was well below the TAC thresholds, the City of Richmond's Planning and Building Service Department requested this analysis to further quantify estimated risks. As further described below, the proposed Project provides an overall reduction of cancer risk, chronic hazard index, acute hazard index, and particulate matter concentrations as compared to the portions of the existing landfill flare operation it would be replacing.

2 METHODOLOGY

The purpose of this HRA is to assess potential health risks and hazards that could result from the construction and operation of the proposed Project. Potential health risks and hazards are analyzed consistent with the guidelines and methodologies from air quality agencies, specifically: Bay Area Air Quality Management District (BAAQMD), California Air Resources Board (CARB), California Office of Environmental Health Hazard Assessment (OEHHA), and United States Environmental Protection Agency (USEPA).

The steps conducted in performing this health risk analysis are as follows:

1. Prepare toxic air contaminants (TACs) emissions from Project construction and operation.
2. Calculate TAC emission reductions from the existing landfill flare operation.
3. Perform air dispersion modeling for pollutant concentrations for area sources and point sources of TAC emissions.

4. Calculate resulting cancer risk, non-cancer chronic hazard index (HI), acute hazard index (HI), and fine particulate matter ($PM_{2.5}$) concentrations resulting from construction and operational sources of TACs.
5. Evaluate the cumulative health risk impacts resulting from existing stationary and mobile emissions.

2.1 Construction Sources

Construction emission calculation methodologies cover diesel-fuelled off-road construction equipment and on-road mobile sources, i.e., hauling, vendor, and worker trips. Ramboll relied on project-specific data provided by the Project Sponsor, including a construction schedule (**Table 1**) and construction equipment list (**Table 2**). Where project-specific construction data was not available, California Emissions Estimator Model (CalEEMod®) defaults were used. For the purposes of this analysis, Ramboll assumed that all non-electric off-road construction equipment is diesel powered, and that all off-road equipment emissions of PM with an aerodynamic diameter less than 10 microns (PM_{10}) are diesel particulate matter (DPM), which is a TAC. Emissions will be estimated using CalEEMod® or equivalent methods, as summarized in **Table 3**.

The BAAQMD's numeric mass thresholds for respirable particulate matter (or PM_{10}) and fine particulate matter (or $PM_{2.5}$) address exhaust PM only; therefore, the criteria area pollutant (CAP) emissions do not account for fugitive dust.

2.1.1 Off-Road Equipment

For diesel-powered off-road construction equipment, Ramboll used CalEEMod and methodologies consistent with CalEEMod to estimate emissions. The CalEEMod emissions methodology for off-road construction equipment relies on the ARB In-Use Off-Road Equipment model (OFFROAD2017), which incorporates state-wide survey data to develop emission factors based on the fleet average for each year of construction. The OFFROAD2017 model also identifies average horsepower and load factor for each type of equipment; Ramboll used these default values since project specific information was not available. The methodology used to calculate emissions from off-road equipment is presented in **Table 3**.

2.1.2 Construction On-Road Mobile Sources

On-road mobile sources include vehicle trips associated with workers, vendors, and demolition hauling trips. Construction worker, vendor, and hauling trips were provided by the Project Sponsor. Ramboll used CalEEMod default trip lengths for Contra Costa County to calculate total vehicle miles travelled (VMT). Fleet mix and fuel assumptions are summarized in **Table 4**.

The emission factors for running emissions of criteria pollutants are from EMFAC2021, the latest version of ARB's EMission FACtors Model for on-road emissions. Emission factors vary by vehicle type, fuel type, and calendar year. Consistent with CalEEMod methodology, Ramboll assumed that worker trips are 25 percent Light-Duty Auto (LDA), 50 percent Light-Duty Truck 1 (LDT1), and 25% LDT2 vehicle classes; vendor trips are 100 d percent iesel Medium-Heavy Duty Trucks (MHDT); and haul trips are 100% diesel Heavy-Heavy Duty Trucks (HHDT) unless additional information is known. EMFAC2021 incorporates both idling and running emissions, and the running emissions include exhaust as well as brake wear and tire wear. EMFAC2021 also incorporates the Pavley Clean Car Standards and the Advanced Clean Cars program. The emission factors used for construction of the Project were provided for Contra Costa County from EMFAC2021 for 2023 and 2024.

For HRA purposes, Ramboll will only consider DPM and $PM_{2.5}$ emissions from vendor and hauling trucks because construction worker vehicle trips from construction required for the Project is not expected to

exceed an average of 5,000 worker trips per day. Ramboll assumed a truck travel distance of 1,000 feet to evaluate localized impacts. Further distances would have diminishing impacts on receptors close to the project site. BAAQMD recommends a traffic screening criteria of 10,000 vehicles per day for lifetime cancer risk exposure analyses (BAAQMD 2011). To be conservative, Ramboll has established a revised screening criteria of 5,000 vehicles per day, consistent with a 100 percent increase in lifetime exposure. This is especially conservative for construction analyses as the actual exposure period would be much shorter. Construction worker vehicle trips from the Project are not expected to exceed an average of 5,000 worker trips per day. Therefore, construction worker vehicle emissions were not included in the health risk assessment.

In addition to the idling and running emissions discussed above, emissions from construction on-road mobile sources also include resuspended road dust. Resuspended road dust emissions were calculated following ARB methodology and are described below.

The methodology used to calculate emissions from on-road sources is presented in **Table 3**.

2.1.3 On-Road Fugitive Dust

CalEEMod default methods and parameters were used to calculate the annual average emission factors for fugitive $PM_{2.5}$ emissions from on-road trucks and vendor and passenger vehicles using the equations in **Table 3**. The weighted average Contra Costa-specific silt loading factor was calculated based on travel fraction by roadway category and silt loading parameters obtained from ARB's Entrained Road Travel Emission Inventory Source Methodology document. The average silt loading factor was then used in conjunction with parameters from the ARB Miscellaneous Process Methodology 7.9 for Entrained Road Travel, Paved Road Dust to calculate a fugitive $PM_{2.5}$ emission factor.

Detailed emission calculations for resuspended roadway dust are provided in **Tables 5-7**.

2.1.4 Off-Road Fugitive Dust

Fugitive dust contributes to $PM_{2.5}$ emissions and is generated by the various activities occurring at the Project site. The following subsections describe the methodology used to calculate fugitive dust emissions from Project off-road construction activities. To be conservative, fugitive dust emissions were included in the estimation of $PM_{2.5}$ concentration resulting from construction.

Fugitive dust emissions from demolition and debris loading during demolition were estimated using CalEEMod methodology and assumptions. The emission factor is calculated on a per-ton of building waste weight. Building waste weight was estimated based on the building area to be demolished, provided by the Project Sponsor.

Fugitive dust emissions from grading were estimated based on CalEEMod default methodologies and the construction equipment list in **Table 2**. Fugitive dust from material loading activities includes the unloading of construction materials and loading of soil onto haul trucks during all construction phases. Material loading fugitive dust emissions were estimated using CalEEMod methodology and assumptions. The emission factor for material loading is calculated on a per-ton basis. Material loaded in cubic yards is based on Project-specific data. More specifically, material loaded during the Demolition phase was based on the building waste weight calculated from the building area to be demolished. According to the Project Sponsor, there will be no material imported or exported from the site during construction.

Fugitive dust emissions from demolition activity, grading, and truck loading activity are provided in **Table 8-10**.

2.2 Project Operational Emissions

The Project's operational emission sources include three biogas engines, one green waste storage pile, one backup flare, and one fire pump engine. These emissions will be transported outside of the physical boundaries of the Project site, potentially impacting nearby sensitive receptors such as worksites and residential areas. To support the Project's air permit application, Ramboll has analyzed the operational emissions for all sources, which are also used for this HRA.

Since the operation of biogas engines in the Project site can either use 100 percent landfill gas (LFG) or a blended gas consisting of up to 45 percent tailgas, the Project would reduce the amount of LFG at the landfill site and reduce TAC emissions from the landfill flare. To be conservative, this analysis assumed that the biogas engines would use a blended gas with 55 percent LFG as an emission reduction measure. The amount of LFG reduction was estimated based on the LFG flow rate of the biogas engine and the annual landfill flare operational hours. The TAC emission reductions were calculated based on the LFG reduction and the emission rates consistent with EPA and BAAQMD Guidelines.

As stated above, BAAQMD establishes a screening criteria of 10,000 vehicles per day for lifetime cancer risk exposure analyses, and Ramboll has adopted a conservative threshold of 5,000 vehicles/day. According to the Project Sponsor, the maximum traffic volume the Project adds to any roadway is 130 vehicles per day. Therefore, health impacts from on-road mobile emissions were not included in the operational HRA.

2.3 Estimated Air Concentrations

Consistent with the most recent BAAQMD CEQA Guidelines (BAAQMD 2017), BAAQMD Health Risk Assessment Modeling Protocol (BAAQMD 2020), and the most recent Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA 2015), the HRA evaluated health risks and $PM_{2.5}$ concentrations resulting from the Project upon the surrounding community. For the Project, Ramboll modeled the surrounding community's TAC concentrations contributed by the Project's emission sources.

2.3.1 Chemical Selection

The cancer risk analysis in the construction HRA for the Project is based on DPM. Diesel exhaust, a complex mixture that includes hundreds of individual constituents (California Environmental Protection Agency [Cal/EPA] 1998), is identified by the State of California as a known carcinogen (Cal/EPA 2016). Under California regulatory guidelines, DPM is used as a surrogate measure of exposure for the mixture of chemicals that make up diesel exhaust as a whole. Cal/EPA and other proponents of using the surrogate approach to quantifying cancer risks associated with the diesel mixture indicate that this method is preferable to use of a component-based approach. A component-based approach involves estimating risks for each of the individual components of a mixture. Critics of the component-based approach believe it will underestimate the risks associated with diesel as a whole mixture because the identity of all chemicals in the mixture may not be known and/or exposure and health effects information for all chemicals identified within the mixture may not be available. Furthermore, Cal/EPA has concluded that "potential cancer risk from inhalation exposure to whole diesel exhaust will outweigh the multi-pathway cancer risk from the speciated components" (OEHHA 2003).

The Project has conducted operational emission analyses for BAAQMD air permit application. Therefore, the same TAC emission data are used for the HRA, except for emissions from biogas engines, which were estimated using concentrations and speciation from facility data. These calculations are included in the attached Table 12. The cancer risk, chronic, acute, and $PM_{2.5}$ impacts in the HRA for the Project were based on the expected TAC emissions from the modeled sources.

2.3.2 Sources

As discussed above, this HRA included the Project construction and operational sources and resulting emission reductions from the existing landfill flare. The construction sources include construction off-road equipment and on-road mobile sources. The operational sources include three biogas engines, one green waste storage pile, one backup flare, and one fire pump engine.

2.3.3 AERMOD Modeling

Ramboll used the most recent version of the American Meteorological Society/Environmental Protection Agency regulatory air dispersion model (AERMOD Version 22112) to evaluate ambient air concentrations of TACs, and $PM_{2.5}$ at receptors (USEPA 2021). For each receptor location, the model generates air concentrations (or air dispersion factors as unit emissions will be modeled) that result from emissions from multiple sources.

Air dispersion models such as AERMOD require a variety of inputs such as source parameters, meteorological data, topographical data, and receptor parameters. When site-specific information was unknown, Ramboll used default parameter sets that are designed to produce conservative (i.e., overestimates of) air concentrations (USEPA 2021).

2.3.3.1 Meteorological Data

Air dispersion modeling applications require the use of meteorological data that ideally are spatially and temporally representative of conditions in the immediate vicinity of the site under consideration.

Consistent with BAAQMD recommended methodology, Ramboll used the meteorological data from the Chevron Refinery onsite station, which is the nearest station to the Project site. Meteorological data for 2017 was the most recent available data and were processed by BAAQMD using AERMET (version 18081).

2.3.3.2 Terrain and Land Use Considerations

Elevations for all emissions sources were imported from the National Elevation Dataset maintained by the United States Geological Survey ([USGS] 2013). An important consideration in an air dispersion modeling analysis is whether to model an area as urban. Here the model assumes an urban land use as has been done for similar projects in the area. Population data for the urban land use setting was obtained from the US Census Bureau, which lists the 2020 population of Richmond, CA as 110,051.

2.3.3.3 Building Downwash

The direction-specific building downwash dimensions that were used as inputs was determined by the latest version (04274) of the Building Profile Input Program, PRIME (BPIP PRIME). Onsite and nearby offsite buildings were evaluated for downwash effects on each modeled point source. One onsite power generation building, one onsite Republic Maintenance Shop, four leachate tanks, and one fire pump engine generator enclosure were included. The buildings modeled in BPIP are shown in **Figure 1**.

2.3.3.4 Emission Rates

Emissions were modeled using the χ/Q ("chi over q") method, such that each source had a unit emission rate (i.e., 1 gram per second [g/s]), and the model estimated dispersion factors (with units of [µg/m^3]/[g/s]). Actual emission rates were multiplied by the dispersion factors to obtain concentrations.

For annual average ambient air concentrations, the estimated annual average dispersion factors were multiplied by the annual average emission rates. Actual emission rates will vary day to day (e.g., weekday vs. weekend), with some days having no emissions, however the model assumed a constant emission rate during the entire year.

Ramboll estimated the incremental TAC emissions associated with the Project's operation as part of the permit application. The emission rates used in modeling are summarized in **Table 11-12**. Ramboll also estimated the landfill flare emission reductions as a result of the Project's operation. The emission rates used in modeling of the existing landfill flare reductions are summarized in **Table 13**.

2.3.3.5 Source Parameters

Source location and parameters are necessary to model the dispersion of air emissions. Modeled source parameters for the Project and for the existing landfill sources are summarized in **Table 14**.

For the Project operational emissions, Ramboll modeled the biogas engines, flare, and fire pump engines as point sources and the green waste storage pile as an area source. The sources were modeled at the appropriate location based on information from the Project Sponsor. The source parameters (i.e., stack height and exit diameter) were also provided by the Project Sponsor. The project boundary and the modeled sources are shown in **Figure 1**.

2.3.3.6 Receptors

To evaluate health impacts to sensitive receptors, Ramboll conservatively modeled annual and hourly average dispersion factors at receptors within 1,000 feet of the Project. A receptor grid with 20-m spacing was created to cover all potential worker receptors within 1,000 feet of the Project site and all potential residential receptors within 4,500 feet of the Project site. There were no residential receptors within 1000ft of the Project. Additionally, Ramboll included an elementary school around 5,800 feet from the Project site and a health clinic around 6,000 feet from the Project site. The clinic receptors were conservatively assessed as residential receptors. All receptors were modeled at a height of 1.5 meters above terrain height, consistent with BAAQMD guidance for breathing height (BAAQMD 2020).

2.3.3.7 Modeling Adjustment Factors

OEHHA (2003) recommends applying an adjustment factor to the annual average concentration modeled assuming continuous emissions (i.e., 24 hours per day, 7 days per week), when the actual emissions are less than 24 hours per day and exposures are concurrent with operational activities occurring as part of the Project. The modeling adjustment factors are discussed below.

Residents are assumed to be exposed to site emissions 24 hours per day, seven days per week. This assumption is consistent with the modeled annual average air concentration (24 hours per day, 7 days per week). Thus, the annual average concentration need not be adjusted for residential receptors.

Consistent with past guidance from BAAQMD, the emissions associated with worker and school activities are conservatively assumed to occur during the working hours and on the workdays only while the offsite workers are present and children are expected to be at school. Thus, a modeling adjustment factor (MAF) of 4.2 was applied to the annual average concentration used in the evaluation of the offsite worker and school receptors to account for an emissions schedule equivalent to a worker's schedule of 8 hours per day, 245 days per year ([24 hours/8 hours]*[365 days/245 days]). These concentrations represent the theoretical maximum average concentrations over the operating period to which the offsite worker and school receptors might be exposed.

2.4 Risk Characterization Methods

In February 2015, OEHHA released the updated Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (OEHHA 2015), which combines information from previously released and adopted technical support documents to delineate OEHHA's revised risk assessment methodologies based on current science. This updated Guidance Manual supersedes the 2003 Hot Spots Guidance Manual (OEHHA 2003) that previously provided methodologies for conducting HRAs under the Air Toxics Hot Spots Program (AB2588). BAAQMD has issued guidelines on adopting the OEHHA 2015 Guidance Manual as well as additional guidance published in December 2020 (BAAQMD 2020). This evaluation utilized the 2015 OEHHA methodology following BAAQMD guidance, as discussed below.

2.4.1 Project Sources Evaluated

Ramboll evaluated excess lifetime cancer risk, non-cancer chronic HI, non-cancer acute HI, and $PM_{2.5}$ concentrations for nearby sensitive receptor exposure to emissions from the construction and operation of the Project. The HRA was conducted using the methodology explained in the following sections.

2.4.1.1 Exposure Assessment

Potentially Exposed Populations: This assessment evaluated off-site receptors potentially exposed to Project emissions from construction and operational activities. These exposed populations include resident, worker, and school receptors. Health impacts (cancer risk, chronic HI, acute HI, and $PM_{2.5}$ concentration) were evaluated for the resident, worker, and school receptor locations.

Exposure Assumptions: The exposure parameters used to estimate excess lifetime cancer risks for all potentially exposed populations from construction and operational emissions were obtained using risk assessment guidelines from OEHHA (2015) and BAAQMD (2016, 2020). **Table 15** summarizes the exposure parameters used in the HRA.

For offsite residential receptors, Ramboll selected conservative exposure parameters assuming that exposure would begin during the third trimester of a residential child's life. Ramboll used 95th percentile breathing rates up to age 2, and 80th percentile breathing rates above age 2, consistent with BAAQMD guidance. For operation, off-site residents were assumed to be present at one location for a 30-year period, beginning with exposure in the third trimester.

For offsite school receptors, Ramboll selected exposure parameters using the conservative assumption that a child would be at the school starting at age 5 until 13 years. For construction and operations, the child was assumed to be present at the location for 8 hours a day, for 5 days a week. Operational exposures used the 95th percentile 8-hour moderate intensity breathing rate from the OEHHA guidelines.

Operational exposure for a worker used the 95th percentile 8–hour breathing rate from the OEHHA guidelines. A 25-year exposure duration for workers is assumed based on the OEHHA recommended exposure duration period and an exposure frequency of 250 days in a year is used in the analysis.

Calculation of Intake: The dose estimated for each exposure pathway is a function of the concentration of a chemical and the intake of that chemical. The intake factor for inhalation, IF_{inh}, can be calculated as follows:

$$IF_{inh} = \frac{DBR * FAH * EF * ED * CF}{}$$

AT

Where:

IF_{inh}	=	Intake Factor for Inhalation (m^3/kg-day)
DBR	=	Daily Breathing Rate (L/kg-day)
FAH	=	Frequency of Time at Home (unitless)
EF	=	Exposure Frequency (days/year)
ED	=	Exposure Duration (years)
AT	=	Averaging Time (days)
CF	=	Conversion Factor, 0.001 (m^3/L)

The chemical intake or dose is estimated by multiplying the inhalation intake factor, IF_{inh}, by the chemical concentration in air, C_i. When coupled with the chemical concentration, this calculation is mathematically equivalent to the dose algorithm given in the current OEHHA Hot Spots guidance (OEHHA 2015).

2.4.1.2 Toxicity Assessment

The toxicity assessment characterizes the relationship between the magnitude of exposure and the nature and magnitude of adverse health effects that may result from such exposure. For purposes of calculating exposure criteria to be used in risk assessments, adverse health effects are classified into two broad categories – cancer and non-cancer endpoints. Toxicity values that are used to estimate the likelihood of adverse effects occurring in humans at different exposure levels are identified as part of the toxicity assessment component of a risk assessment.

This analysis utilizes available toxicity values including inhalation cancer potency factors (CPFs), acute inhalation reference exposure levels (aRELs), and chronic inhalation reference exposure levels (cRELs). Toxicity values are summarized in **Table 16**.

2.4.1.3 Age Sensitivity Factors

The estimated excess lifetime cancer risks for a resident were adjusted using age sensitivity factors (ASFs) that account for an "anticipated special sensitivity to carcinogens" of infants and children as recommended in the OEHHA Technical Support Document (OEHHA 2009) and OEHHA 2015 Guidance (2015). Cancer risk estimates were weighted by a factor of 10 for exposures that occur from the third trimester of pregnancy to two years of age and by a factor of three for exposures that occur from two years through 15 years of age. No weighting factor (i.e., an ASF of one, which is equivalent to no adjustment) was applied to ages 16 and older.

2.4.1.4 Estimation of Cancer Risk

Excess lifetime cancer risks are estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens. The estimated risk is expressed as a unitless probability. The cancer risk attributed to a chemical is calculated by multiplying the chemical intake or dose at the human exchange boundaries (e.g., lungs) by the chemical specific CPF.

The equation used to calculate the potential excess lifetime cancer risk for the inhalation pathway is as follows:

$$Risk_{inh} = C_i \times CF \times IF_{inh} \times CPF \times ASF$$

Where:

$Risk_{inh}$	=	Cancer risk; the incremental probability of an individual developing cancer as a result of inhalation exposure to a particular potential carcinogen (unitless)
C_i	=	Annual average air concentration for $chemical_i$ ($\mu g/m^3$)
CF	=	Conversion factor (mg/µg)
IF_{inh}	=	Intake factor for inhalation (m^3/kg-day)
CPF_i	=	Cancer potency factor for $chemical_i$ $(mg\ chemical/kg\ body\ weight\text{-}day)^{-1}$
ASF	=	Age sensitivity factor (unitless)

2.4.1.5 Estimation of Chronic HI

The potential for exposure to result in adverse chronic noncancer effects is evaluated by comparing the estimated annual average air concentration (which is equivalent to the average daily air concentration) to the noncancer chronic reference exposure level (cREL) for each chemical. When calculated for a single chemical, the comparison yields a ratio termed a hazard quotient (HQ). To evaluate the potential for adverse chronic noncancer health effects from simultaneous exposure to multiple chemicals, the chronic HQs for all chemicals are summed, yielding a chronic HI.

$$HQ_i = C_i / cREL$$

Where:

HQ_i	=	Chronic hazard quotient for chemical i
HI	=	Hazard index
C_i	=	Annual average concentration of chemical i ($\mu g/m^3$)
$cREL_i$	=	Chronic noncancer reference exposure level for chemical i ($\mu g/m^3$)

2.4.1.6 Estimation of Acute HI

The potential for exposure to result in adverse acute effects is evaluated by comparing the estimated one-hour maximum air concentration of chemical to the acute reference exposure level (aREL) for each chemical evaluated in this analysis. When calculated for a single chemical, the comparison yields an HQ. To evaluate the potential for adverse acute health effects from simultaneous exposure to multiple chemicals, the acute HQs for all chemicals are summed, yielding an acute HI.

$$HQ_i = C_i / aREL$$

Where:

HQ_i	=	Acute hazard quotient for chemical i
HI	=	Hazard index
C_i	=	One-hour maximum concentration of chemical i ($\mu g/m^3$)
$aREL_i$	=	Acute reference exposure level for chemical i ($\mu g/m^3$)

2.4.1.7 Estimation of Project Health Risks

For all receptor types including off-site residents and off-site workers, results for cancer risk, chronic HI, acute HI, and $PM_{2.5}$ concentrations are presented in **Section 3** for the maximally exposed individual receptor (MEIR), which are the locations where the maximum health impacts are estimated to occur.

2.4.2 Cumulative Analysis

The cumulative analysis includes Project impacts added to background risk and risk from nearby existing stationary sources. Background risks are available through BAAQMD Roadway Screening Analysis Calculator, and stationary sources are available through the BAAQMD Stationary Source Screening Tool (BAAQMD 2020).

Ramboll used the BAAQMD Stationary Source Screening Tool to identify existing permitted stationary sources within 1,000 feet of the Maximally Exposed Individual Receptor (MEIR) locations. Ramboll submitted a stationary source inquiry form to the BAAQMD to request confirmation or revisions to the data obtained from the Stationary Source Screening Tool, but BAAQMD did not provide any new information. As such, Ramboll assumed that the data available through the Stationary Source Screening Tool is the best available data., and there are no stationary sources within 1,000 feet of the Project. Considering that the Project will utilize LFG from the landfill site, we have added the background risks from the landfill to the MEIRs in this cumulative analysis to ensure comprehensiveness and conservativeness. The risks at each MIER are calculated based on on-site risks listed in BAAQMD's Screening Tool and a distance multiplier. We calculated the distance multiplier using the BAAQMD Distance Multiplier table and an exponential extrapolation. This is because all distances to the MEIRs are over 1,000 ft so multipliers and not directly available from the BAAQMD table.

The BAAQMD Roadway Screening Analysis Calculator from 2015 was used to find the cancer risk and PM2.5 concentrations at the MEIRs.[1] These estimated health impacts were added to the total project health impacts. The screening calculator does not provide estimates of chronic HI because chronic HI is expected to be minor for traffic sources. Therefore, the impact from vehicles on chronic HI is not included in the cumulative analysis.

3 RESULTS FROM PROJECT ANALYSIS

3.1 Project Health Impacts

The purpose of this HRA is to analyze potential health impacts that would result from construction and operation of the Project. This HRA includes quantification of the estimated cancer risk, chronic HI, acute HI, and $PM_{2.5}$ concentration associated with operation of the Project.

As described above, Ramboll performed air dispersion modeling using the American Meteorological Society/USEPA Regulatory Model (AERMOD) (version 22112), with representative meteorological data to determine diesel particulate matter (DPM) and $PM_{2.5}$ concentrations for potentially exposed individuals. These concentrations were used to assess the potential human health risk. The estimated Project health risks account for impacts from both construction and operations.

[1] The Roadway Screening Analysis Calculator is an older tool developed by BAAQMD to estimate screening level health impacts from roadways. This calculator is out of date since it uses emissions estimates that have been superseded and assumes fleet emission factors from 2014. Since the development of this tool, emissions from vehicles have been reduced due to regulations and increased penetration of electric vehicles. Therefore, this estimate of approximate health impacts from the Project traffic is conservative (i.e., overpredicts impacts).

The maximum Proposed Project health impacts by population type along with reductions from landfill flaring, as discussed in **Section 2.4**, are summarized in **Table A**. The locations of the MEIRs for cancer risk, chronic HI, acute HI, and $PM_{2.5}$ concentration are shown in **Figure 2.** Project health impacts from construction and operational sources as well as land fill flare reductions are summarized in **Table 17**.

Table A. Project Health Impacts from Construction and Operations

	Excess Lifetime Cancer Risk (in a million)	**Non-Cancer Hazard Index (unitless)**	**Acute Hazard Index (unitless)**	**$PM_{2.5}$ Concentration ($\mu g/m^3$)**
Construction + Operations				
Worker	3.0	0.058	0.22	0.57
Resident	0.70	0.0086	0.0039	0.024
School	0.49	0.011	0.036	0.030
Clinic	0.46	0.0058	0.032	0.016
Landfill Reductions				
Worker	-5.7	-0.21	-0.49	-0.84
Resident	-1.3	-0.018	-0.10	-0.042
School	-0.81	-0.019	-0.091	-0.044
Clinic	-0.79	-0.011	-0.077	-0.026
Project Construction + Operations with Landfill Reductions				
Worker	-2.7	-0.16	-0.27	-0.27
Resident	-0.57	-0.009	-0.064	-0.018
School	-0.32	-0.0084	-0.055	-0.014
Clinic	-0.33	-0.0056	-0.045	-0.010
Source: Table 17				

3.2 Cumulative Analysis

The cumulative analysis includes Project impacts added to background risk, sourced from BAAQMD's Roadway Screening Tool. Cumulative health risks are shown in **Table 18**. The cumulative cancer and non-cancer risks, and the $PM_{2.5}$ concentrations from the cumulative analysis are all below BAAQMD significance thresholds. It should be noted that the cumulative risks are predominantly from the background risks (i.e., the landfill), and the Project itself has a negative calculated risk, meaning the Project would reduce health risks at the worker MEIR. It should also be noted that the actual cumulative risks are likely to be even lower when considering the indoor ventilation at all MEIR sites. We also note that the calculated risk for the landfill listed in BAAQMD's Screening Tool is likely an overestimate. This risk would have included the existing landfill flare as well as the existing LFG-fired engines at the landfill. With this project, some portion of the LFG will be diverted to be used by the new biogas engines (meaning a reduction in LFG flaring), and the old landfill engines will be shut down.

Additionally, Section 15355 of the State CEQA Guidelines defines a cumulative impact as the condition under which "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts... The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects." (California Code of Regulations [C.C.R.] Section 15355). In other words, the purpose of cumulative analysis is to understand the incremental impacts of the Project on the neighboring areas. Given that this Project will reduce health risks to all MEIRs as shown in Table A, the incremental impact of the Project is expected to be beneficial to the neighboring areas. Therefore, a quantitative cumulative health impact analysis may have been unnecessary.

4 REFERENCES

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TABLES

FIGURES

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Table 1
Construction Schedule
Raven SR
Richmond, CA

Construction Subphase[1]	Start Date	End Date	Year	Number of Work Days	Days per Week
Demolition	4/1/2023	4/7/2023	2023	5	5
Site Preparation	4/10/2023	5/19/2023	2023	30	5
Grading	5/22/2023	6/30/2023	2023	30	5
Building Construction	7/3/2023	1/8/2024	2024	136	5

Notes:

1. All construction phasing information was provided by the Project Sponsor. The April 1, 2023 construction start date was selected based on a projected start date in the First Quarter of 2023. This date is conservative in terms of estimating air emissions, although the date of actual construction is likely to be later, based on the expected dates of project permits and entitlements.

Table 2
Construction Equipment
Raven SR
Richmond, CA

Anticipated Construction Start Date:	4/1/2023

Construction Subphase(s)	Equipment Name[1]	Fuel[1]	Number[1]	Horsepower[2]	Days Per Phase[1]	Daily Usage (hours/day)[1]	Utilization[1]	Uncontrolled Engine Tier[3]
Demolition	Air Compressors	Diesel	1	37	5	8	100%	No Specific Tier
	Crushing/Proc. Equipment	Gasoline	1	12	5	8	100%	No Specific Tier
	Excavators	Diesel	1	36	5	8	100%	No Specific Tier
	Dumpers/Tenders	Diesel	2	16	5	8	100%	No Specific Tier
Site Preparation	Excavators	Diesel	3	36	30	8	100%	No Specific Tier
	Tractors/Loaders/Backhoes	Diesel	1	84	30	8	100%	No Specific Tier
	Rough Terrain Forklifts	Diesel	1	96	30	4	100%	No Specific Tier
	Dumpers/Tenders	Diesel	1	16	30	8	100%	No Specific Tier
	Plate Compactors	Diesel	2	8	30	8	100%	No Specific Tier
Grading	Crawler Tractors	Diesel	1	87	30	8	100%	No Specific Tier
	Rollers	Diesel	1	36	30	8	100%	No Specific Tier
	Tractors/Loaders/Backhoes	Diesel	1	84	30	8	100%	No Specific Tier
	Excavators	Diesel	1	36	30	8	100%	No Specific Tier
Building Construction	Cranes	Diesel	1	367	136	8	100%	No Specific Tier
	Rough Terrain Forklifts	Diesel	1	96	136	8	100%	No Specific Tier
	Air Compressors	Diesel	1	37	136	8	100%	No Specific Tier
	Generator Sets	Diesel	1	14	136	8	100%	No Specific Tier
	Welders	Diesel	2	46	136	8	100%	No Specific Tier
	Other Construction Equipment	Diesel	1	82	136	8	100%	No Specific Tier

Notes:

1. Construction equipment information was provided by the Project Sponsor or based on CalEEMod defaults if not given.
2. Equipment horsepower is based on CalEEMod Appendix G defaults.
3. Equipment engine tiers are based on CalEEMod fleet averages.

Abbreviations:

ARB - California Air Resources Board
CalEEMod - California Emissions Estimator Model

References:

The California Emissions Estimator Model (CalEEMod). Available at: http://www.caleemod.com/

Table 3
Emission Calculation Methodology
Raven SR
Richmond, CA

Type	Source	Methodology and Formula	Reference
Construction Equipment	Off-Road Equipment[1]	$Ec = \Sigma(EFc * HP * LF * Hr * U_F * C)$	OFFROAD2017 and ARB/USEPA Engine Standards
Construction Fugitive Dust	Mechanical Dismemberment, Grading, Truck Loading	CalEEMod	CalEEMod
Construction and Operational On-Road Mobile Sources[2]	Exhaust – Running	$E_R = \Sigma(EF_R * VMT * C)$, where VMT = Trip Length * Trip Number	EMFAC2021
	Brake Wear and Tire Wear	$E_{BW,TW} = \Sigma(EF_{BW,TW} * VMT * C)$, where VMT = Trip Length * Trip Number	EMFAC2021
	Exhaust - Idling	$E_I = \Sigma(EF_I * \text{Trip Number} * T_I * C)$	EMFAC2021
	Entrained Road Dust	$E_{RD} = \Sigma(EF_{RD} * VMT * C)$, where VMT = Trip Length * Trip Number	ARB 2021 Miscellaneous Process Methodology 7.9

Notes:

1. E_c: off-road equipment exhaust emissions (lb)
   EF_c: emission factor (g/hp-hr). CalEEMod default emission factors used
   HP: equipment horsepower. From CalEEMod defaults
   LF: equipment load factor. From OFFROAD2017
   Hr: equipment hours
   U_F: Utilization factor
   C: unit conversion factor

2. On-road mobile sources include truck and passenger vehicle trips. Emissions associated with mobile sources were calculated using the following formulas.
   E_R: running exhaust and running losses emissions (lb)
   EF_R: running emission factor (g/mile). From EMFAC2021
   VMT: vehicle miles traveled
   C: unit conversion factor
   The calculation involves the following assumptions:
   a. All material transporting and soil hauling trucks are heavy-heavy duty trucks.
   b. Trip Length: The one-way trip length as calculated based on CalEEMod Appendix G defaults for Contra Costa County or provided by the Project Sponsor
   c. Trip Number: Worker, vendor and hauling trip rates were provided by the Project Sponsor.
   E_I: vehicle idling emissions (lb).
   EF_I: vehicle idling emission factor (g/hr-trip). From EMFAC2021
   T_I: idling time
   C: unit conversion factor
   E_{RD}: entrained road dust emissions (lb)
   EF_{RD}: annual average emission factor (lb/VMT) = k*(sL)^0.91 * (W)^1.02 * (1-P/4N)
   k: particle size multiplier for particle size range
   sL: roadway silt loading [grams per square meter - g/m^2]
   W: average weight of vehicles traveling the road [tons]
   P = number of "wet" days in county with at least 0.01 in of precipitation during the annual averaging period
   N = number of days in the averaging period
   VMT: vehicle miles traveled
   C: unit conversion factor

Abbreviations:

ARB: California Air Resources Board
BW: Brake Wear
EF: Emission Factor
EMFAC: EMission FACtor Model
g: gram
HP: horsepower
lb: pound
LF: Load Factor
mi: mile
USEPA: United States Environmental Protection Agency
RL: Running Losses
VMT: vehicle miles traveled

References:

ARB/USEPA. 2013. Table 1: ARB and USEPA Off-Road Compression-Ignition (Diesel) Engine Standards. Available online at: http://www.arb.ca.gov/msprog/ordiesel/documents/Off-Road_Diesel_Stds.xls

The California Emissions Estimator Model (CalEEMod). Available at: http://www.caleemod.com/

California Air Resources Board (ARB) 2021. EMFAC2021. Available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools

Table 4
Construction Trips
Raven SR
Richmond, CA

Trip Data

Construction Phase	Construction Subphase	Year	Construction Days	Trip Rates[1] (trips/day)		Trip Rates[1] (one-way trips/subphase)	Trip Lengths[2] (miles/one-way trip)		
				Worker Trips	Vendor Trips	Hauling Trips	Worker Trips	Vendor Trips	Hauling Trips
Construction	Demolition	2023	5	2	0	100	12.9	7.4	20
	Site Preparation	2023	30	2	0	0	12.9	7.4	20
	Grading	2023	30	2	0	0	12.9	7.4	20
	Building Construction	2023	131	2	4	0	12.9	7.4	20
	Building Construction	2024	5	2	4	0	12.9	7.4	20

EMFAC Data[4]

Trip Type	EMFAC Settings	Fleet Mix	Fuel Type
Worker	Contra Costa County Calendar Years 2023-2024 Annual Season Aggregated Model Year EMFAC2007 Vehicle Categories	25% LDA, 50% LDT1, 25% LDT2	Gasoline
Vendor		50% MHDT, 50% HHDT	Diesel
Hauling		100% HHDT	Diesel

Notes:

1. Worker, vendor, and hauling trip rates were provided by the Project Sponsor.
2. Worker, vendor, and hauling trip lengths are based on CalEEMod Appendix G defaults for Contra Costa County.
3. Emissions were calculated using emission factors from EMFAC2021 with the specified settings and fleet and fuel assumptions.

Abbreviations:

CalEEMod - California Emissions Estimator Model
EMFAC2021 - California Air Resources Board EMission FACtor model
LDA - light-duty automobiles
LDT - light-duty trucks
HHDT - heavy-heavy duty trucks
sqft - square feet

References:

The California Emissions Estimator Model (CalEEMod). Available at: http://www.caleemod.com/
California Air Resources Board (ARB) 2021. EMFAC2021. Available at: https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools

Table 5
Silt Loading Emission Factors
Raven SR
Richmond, CA

Entrained Roadway Dust Constants for Contra Costa County		
Roadway Category	**Silt Loading[1] (g/m^2)**	**Travel Fraction[1]**
Freeway	0.015	50%
Major	0.032	37%
Collector	0.032	9%
Local - Urban	0.32	4%
Weighted Silt Loading Factor	0.035	100%

Notes:

1. Travel fraction by roadway category and silt loading are based on ARB's Entrained Road Travel Emission Inventory Source Methodology Tables 2 and 4, respectively.

Abbreviations:

ARB - Air Resources Board

g - gram(s)

m - meter

References:

California Air Resources Board (ARB). 2021. Miscellaneous Process Methodology 7.9, Entrained Road Travel, Paved Road Dust. March. Available online at: https://ww3.arb.ca.gov/ei/areasrc/fullpdf/2021_paved_roads_7_9.pdf

Table 6
Emission Factors for Entrained Roadway Dust
Raven SR
Richmond, CA

Road Dust Equation[1]

E [lb/VMT] = [k*(sL)^0.91 * (W)^1.02]*(1-P/4N)

Parameters[2,3]	Value
E = annual average emission factor in the same units as k	[calculated]
k = particle size multiplier for particle size range	
$PM_{2.5}$ (lb/VMT)	3.3E-04
sL = roadway silt loading [grams per square meter - g/m^2]	0.035
W = average weight of vehicles traveling the road [tons]	2.4
P = number of "wet" days in county with at least 0.01 in of precipitation during the annual averaging period[3]	30
N = number of days in the averaging period	365

Entrained Road Dust Emission Factors	
$PM_{2.5}$ Emission Factor [lb/VMT]	3.74E-05

Notes:

1. Road dust equation and parameters are from the California Air Resources Board's (ARB) 2021 Miscellaneous Process Methodology 7.9 for Entrained Road Travel, Paved Road Dust.
2. The silt loading emission factor assumes Contra Costa County default roadway fractions and silt loading levels from ARB 2021. Other parameters (average weight of vehicles, size multipliers) are from ARB 2021. $PM_{2.5}$ is assumed to be 15% of PM_{10} based on paved road dust sampling in California (ARB Speciation Profile #471), which is a more representative fraction than provided in the older AP-42 fugitive dust methodology as discussed in ARB 2021 (page 17).
3. The number of "wet" days for Richmond, CA is from CalEEMod Appendix G Table G-2 (30 days).

Abbreviations:

ARB - California Air Resources Board
CalEEMod - California Emissions Estimator Model
EMFAC - EMission FACtor Model
g - gram
lb - pound
$PM_{2.5}$ - particulate matter less than 2.5 microns
VMT - vehicle miles traveled

References:

California Air Resources Board (ARB). 2021. Miscellaneous Process Methodology 7.9, Entrained Road Travel, Paved Road Dust. March. Available online at: https://ww3.arb.ca.gov/ei/areasrc/fullpdf/2021_paved_roads_7_9.pdf

The California Emissions Estimator Model (CalEEMod). Available at: http://www.caleemod.com/

Table 7
Emission Calculation for Entrained Roadway Dust
Raven SR
Richmond, CA

Inputs		
Trip Length[1]		
Worker Trip length (miles/trip)	0.189	1000 feet
Vendor Trip Length (miles/trip)	0.189	1000 feet
Hauling Trip Length (miles/trip)	0.189	1000 feet
Entrained Road Dust Emission Factors[2]		
$PM_{2.5}$ Emission Factor [lb/VMT]	3.74E-05	Calculated

Construction Area	Subphase	Year	Construction Days	Worker Trips (trips/day)	Vendor Trips (trips/day)	Hauling Trips (trips/subphase)	Worker VMT (miles)	Vendor VMT (miles)	Hauling VMT (miles)	Total VMT (miles)	Total Emissions (lb)
											$PM_{2.5}$
Construction	Demolition	2023	5	2	0	100	2	0	19	21	7.8E-04
	Site Preparation	2023	30	2	0	0	11	0	0	11	4.2E-04
	Grading	2023	30	2	0	0	11	0	0	11	4.2E-04
	Building Construction	2023	131	2	4	0	50	99	0	149	0.0056
	Building Construction	2024	5	2	4	0	2	4	0	6	0.0002

Notes:

1. VMTs for worker, vendor, and hauling are obtained from Table 4.
2. Entrained road dust emission factors were obtained from Table 6.

Abbreviations:

CalEEMod - California Emissions Estimator Model
$PM_{2.5}$ - particulate matter less than 2.5 microns
lb - pound
VMT - vehicle miles traveled

Table 8
Fugitive Dust Emissions from Demolition Activity
Raven SR
Richmond, CA

Construction Area	Year	Number of Days	Building Waste[1]	Emission Factor - Mechanical or Explosive Dismemberment[2]	Emission Factor - Debris Loading[3]	Uncontrolled Emissions[4]	
				$PM_{2.5}$	$PM_{2.5}$	$PM_{2.5}$	
		days	ton	lb/ton	lb/ton	lb/day	ton/yr
Construction	2023	5.0	828	3.5E-04	0.0031	0.57	0.0014

Notes:

1. Building square footage was provided by the Project Sponsor. Conversion of building waste to tons assumes an average soil density of 1.5 grams per cubic centimeter, per the CalEEMod User's Guide, Appendix C Truck Loading.
2. Emission factor calculated following guidance in the CalEEMod User's Guide, Appendix C Mechanical or Explosive Dismemberment, which is based of AP 42 Section 13.2.4.3 for batch drop operations. The equation is:
   $EF = k*(0.0032)*(U/5)^{1.3}/(M/2)^{1.4}$ (lb/ton of debris)

   0.053 = k, $PM_{2.5}$ particle size multiplier (dimensionless)
   3.90 = mean wind speed (U), meters per second, Oakland International Airport
   8.7 = U, mean wind speed (mph)
   2 = M, material moisture content (%)
3. Emission factor calculated following guidance in the CalEEMod User's Guide, Appendix C Debris Loading, which is based of AP 42 Section 13.2. The equation is:
   $EF = k*EF_{L\text{-}TSP}$

   0.053 = k, $PM_{2.5}$ particle size multiplier (dimensionless)
   0.058 = $EF_{L\text{-}TSP}$, lb/ton
4. Emissions were estimated conservatively assuming no fugitive dust control measures.

Abbreviations:

CalEEMod - California Emissions Estimator Model
cy - cubic yards
EF - emission factor
lb - pounds
$PM_{2.5}$ - particulate matter less than 2.5 microns
VMT - vehicle miles traveled
yr - years

Table 9
Fugitive Dust Emissions from Off-Road Grading Activity
Raven SR
Richmond, CA

Construction Area	Construction Subphase[1]	Year	Total Work Days (per year)	Equipment	Quantity	Utilization %	CalEEMod Grading rate[2]	Maximum Area Disturbed[1]	Grading VMT[2]	Uncontrolled $PM_{2.5}$ Emission Factor[3]	Uncontrolled Emissions $PM_{2.5}$
							acre/8hr-day	acre/day	mile/day	lb/VMT	lb/yr
Construction	Grading	2023	30	Crawler Tractors	1	100%	0.5	0.50	0.34	0.17	1.72

Notes:

1. Maximum graded area calculated following guidance in the CalEEMod® User's Guide, Appendix C.
2. Based on CalEEMod® default daily acres graded by equipment type, Table G-14, below.

Equipment	Acres Graded per 8 Hour Day
Crawler Tractors	0.5
Graders	0.5
Rubber Tired Dozers	0.5
Scrapers	1

3. VMT per day calculated following guidance in the CalEEMod® User's Guide, Appendix C, which is based on AP-42, Section 11.9 for grading equipment. The equation is:

A_S = A_S, acres graded per day (varies by sub-activity); in this case using maximum estimated disturbed acres/day

12 = W_b, blade width of grading equipment (CalEEMod® default) in ft

3. Emission factors calculated following guidance in the CalEEMod® User's Guide, Appendix C, which is based on AP-42, Section 11.9 for grading equipment. The equations are:

7.1 = S, mean vehicle speed (mph) (AP-42 default)

0.6 = F_{PM10}, PM_{10} scaling factor (AP-42 default)

0.031 = $F_{PM2.5}$, $PM_{2.5}$ scaling factor (AP-42 default)

Abbreviations:

CalEEMod® - California Emissions Estimator Model
EF - emission factor
ft - feet
lb - pounds
mph - miles per hour
$PM_{2.5}$ - particulate matter less than 2.5 microns
VMT - vehicle miles traveled
yr - year

Table 10
Fugitive Dust Emissions from Truck Loading Activity
Raven SR
Richmond, CA

Construction Area	Construction Subphase	Year	Number of Days	Haul Trips	Total Material Loaded[1]	Material Loaded	Uncontrolled Emission Factor[2]	Uncontrolled Emissions	
							$PM_{2.5}$	$PM_{2.5}$	
			days	# trips	ton	ton	lb/ton	lb/day	ton/yr
Construction	Demolition	2023	5	100	828	828	2.85E-05	4.7E-03	1.2E-05

Notes:

1. Total materials loaded for demolition phase were the building waste converted from square feet to tons assuming an average soil density of 1.5 grams per cubic centimeter, per the CalEEMod User's Guide, Appendix C Truck Loading. Total exported materials for other phases is assumed to be zero, as provided by the Project Sponsor.

2. Emission factor calculated following guidance in the CalEEMod User's Guide, Appendix C, which is based on AP-42, Section 13.2.4 for aggregate handling. The equation is:
   $EF = k \times (0.0032) \times (U/5)^{1.3} / (M/2)^{1.4}$, where the following default values are used:

   0.053 = $k_{PM2.5}$, $PM_{2.5}$ particle size multiplier
   3.9 = mean wind speed (U), meters per second, Oakland International Airport
   8.7 = mean wind speed (U), miles per hour
   12 = material moisture content (M), %

Abbreviations:

CalEEMod - California Emissions Estimator Model
EF - emission factor
lbs - pounds
$PM_{2.5}$ - particulate matter less than 2.5 microns

Table 11
Modeled Emission Rates - Project Construction Sources
Raven SR
Richmond, CA

Year	Construction Emissions[1] [g/s]			
	Offroad		Onroad	
	DPM	$PM_{2.5}$	DPM	$PM_{2.5}$
2023	0.0026	0.0025	3.0E-07	5.9E-07
2024	8.4E-05	7.7E-05	1.0E-08	2.1E-08
Total	0.0027	0.0026	3.1E-07	6.1E-07

Notes:

1. Construction TAC emissions were estimated from on-site off-road emissions, where all PM_{10} tailpipe emissions are assumed to be DPM (although a portion of this is likely not from diesel sources). On-road emissions from hauling, vendor and worker vehicles were estimated using a modeled trip length of 1000 ft. The inclusion of on-road emissions is conservative as the estimated traffic volumes do not exceed the screening levels recommended by BAAQMD (i.e., more than 10,000 vehicles per day and 100 trucks per day) and can be considered minor sources (BAAQMD 2011).

Abbreviations:

BAAQMD - Bay Area Air Quality Management District

CalEEMod® - California Emissions Estimator Model®

DPM - diesel particulate matter

$PM_{2.5}$ - particulate matter less than 2.5 microns

References:

The California Emissions Estimator Model (CalEEMod). Available at: http://www.caleemod.com/

California Environmental Quality Act (CEQA) Guidelines. 2017. Bay Area Air Quality Management District (BAAQMD). May. Available online at: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en

Recommended Methods for Screening and Modeling Local Risks and Hazards. 2012. BAAQMD. May. Available online at: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/risk-modeling-approach-may-2012.pdf?la=en

Table 12
Modeled Emission Rates - Project Operational Sources
Raven SR
Richmond, CA

Pollutant	Acute				Chronic			
	Biogas Engines[1]	Green Waste Offgas[2]	Flare[2]	Fire Pump Engine[2]	Biogas Engines[1]	Green Waste Offgas[2]	Flare[2]	Fire Pump Engine[2]
	(g/s)	*(g/s)*	*(g/s)*	*(g/s)*	*(g/s)*	*(g/s)*	*(g/s)*	*(g/s)*
1,1,1-Trichloroethane (Methyl chloroform)	3.3E-05	--	--	--	3.3E-05	--	--	--
1,1,2,2-Tetrachloroethane	1.2E-05	--	--	--	1.2E-05	--	--	--
1,1,2-Trichloroethane (Vinyl trichloride)	9.7E-06	--	--	--	9.8E-06	--	--	--
1,1-Dichloroethane (Ethylidene dichloride)	0.0017	--	--	--	0.0017	--	--	--
1,1-Dichloroethene (Vinylidene chloride)	7.3E-05	--	--	--	7.3E-05	--	--	--
1,3-Butadiene	4.2E-05	--	--	--	4.2E-05	--	--	--
1,4-Dichlorobenzene	1.7E-04	--	--	--	1.7E-04	--	--	--
1,4-Dioxane (1,4-Diethylene dioxide)	6.4E-06	--	--	--	6.4E-06	--	--	--
Acetaldehyde	0.0062	1.3E-04	1.2E-05	--	0.0062	8.7E-05	2.0E-07	--
Acetone	3.1E-07	--	--	--	3.1E-07	--	--	--
Acrolein	8.0E-04	--	7.7E-06	--	8.0E-04	--	1.3E-07	--
Acrylonitrile	7.8E-06	--	--	--	7.8E-06	--	--	--
Allyl Chloride (3-Chloropropene)	5.6E-06	1.6E-06	--	--	5.6E-06	1.0E-06	--	--
Aluminum (Al)	7.5E-08	--	--	--	7.5E-08	--	--	--
Ammonia	1.5E-05	2.3E-04	--	--	0.48	1.5E-04	--	--
Arsenic	--	--	5.7E-07	--	--	--	9.5E-09	--
Benzene	0.044	--	2.3E-05	--	0.044	--	3.8E-07	--
Benzyl Chloride	7.3E-06	--	--	--	7.3E-06	--	--	--
Beryllium	--	--	1.7E-08	--	--	--	2.8E-10	--
Bromine (Br)	1.5E-08	--	--	--	1.5E-08	--	--	--
Cadmium (Cd)	4.4E-08	--	3.1E-06	--	4.4E-08	--	5.2E-08	--
Carbon Disulfide	5.6E-06	1.8E-06	--	--	5.6E-06	1.2E-06	--	--
Carbon Tetrachloride	1.1E-05	--	--	--	1.1E-05	--	--	--
Chlorine (Cl)	1.1E-08	--	--	--	1.1E-08	--	--	--
Chlorobenzene	4.2E-05	--	--	--	4.2E-05	--	--	--
Chloroform	6.9E-05	--	--	--	6.9E-05	--	--	--
Chromium (Cr)	5.0E-10	--	--	--	5.0E-10	--	--	--
Cobalt (Co)	--	--	--	--	--	--	--	--
Copper (Cu)	2.2E-09	--	2.4E-06	--	2.2E-09	--	4.0E-08	--
Diesel particulate matter	--	--	--	0.83	--	--	--	9.4E-05
Dioxins PCDDs	3.6E-09	--	--	--	3.6E-09	--	--	--
Ethene	0.026	--	--	--	0.026	--	--	--
Ethyl Chloride (Chloroethane)	8.7E-05	--	--	--	8.7E-05	--	--	--
Ethylbenzene	6.0E-04	7.3E-06	2.7E-05	--	6.0E-04	4.9E-06	4.5E-07	--
Ethylene Dibromide (1,2-dibromoethane)	1.4E-05	--	--	--	1.4E-05	--	--	--
Ethylene Dichloride (1,2-dichloroethane)	2.9E-04	3.3E-06	--	--	2.9E-04	2.2E-06	--	--
Formaldehyde	0.031	--	6.3E-04	--	0.031	--	1.0E-05	--
Furan	7.9E-07	--	--	--	7.9E-07	--	--	--
Hydrochloric Acid (Hydrogen Chloride)	0.48	--	--	--	0.26	--	--	--
Hydrofluoric Acid (Hydrogen Fluoride)	0.015	--	--	--	0.0084	--	--	--
Hydrogen Sulfide (H2S)	2.1E-06	--	--	--	2.1E-06	--	--	--
Isopropyl alcohol (IPA, 2-Propanol)	6.9E-05	1.4E-05	--	--	6.9E-05	9.1E-06	--	--
Lead (Pb)	3.5E-07	--	1.4E-06	--	3.5E-07	--	2.4E-08	--
Manganese (Mn)	8.4E-10	--	1.1E-06	--	8.4E-10	--	1.8E-08	--
Mercury	3.3E-08	--	7.4E-07	--	3.3E-08	--	1.2E-08	--
Methanol (Methyl alcohol)	2.3E-05	0.0073	--	--	2.4E-05	0.0049	--	--
Methyl Bromide (Bromomethane)	6.9E-06	--	--	--	6.9E-06	--	--	--
Methyl Ethyl Ketone (2-butanone)	1.1E-05	2.7E-04	--	--	1.1E-05	1.8E-04	--	--
Methyl tert-Butyl Ether	6.4E-06	--	--	--	6.4E-06	--	--	--
Methylene Chloride (dichloromethane)	0.0074	--	--	--	0.0074	--	--	--
Naphthalene	5.2E-04	4.6E-07	1.7E-06	--	5.2E-04	3.1E-07	2.9E-08	--
n-Butyraldehyde	2.6E-09	--	--	--	2.6E-09	--	--	--
n-Hexane	0.0027	--	1.8E-05	--	0.0027	--	2.9E-08	--
Nickel (Ni)	3.2E-10	--	6.0E-06	--	3.2E-10	--	1.0E-07	--
PAH Equivalents as Benzo(a)pyrene	1.0E-05	--	1.9E-08	--	1.0E-05	--	3.2E-10	--
Perchloroethylene (tetrachloroethylene)	0.0040	--	--	--	0.0040	--	--	--
Propene (Propylene)	6.8E-04	1.0E-05	0.0021	--	6.8E-04	6.6E-06	3.5E-05	--
Propionaldehyde	2.3E-08	--	--	--	2.3E-08	--	--	--
Selenium	--	--	3.4E-08	--	--	--	5.7E-10	--
Silver (Ag)	4.7E-08	--	--	--	4.7E-08	--	--	--
Styrene	1.9E-05	1.8E-05	--	--	1.9E-05	1.2E-05	--	--
Thallium (Tl)	--	--	--	--	--	--	--	--
Toluene	9.4E-04	1.3E-05	1.0E-04	--	9.4E-04	8.4E-06	1.7E-06	--
Trichloroethylene	8.4E-04	--	--	--	8.5E-04	--	--	--
Vanadium	--	--	6.5E-06	--	--	--	1.1E-07	--
Vinyl Acetate	1.3E-05	7.9E-05	--	--	1.3E-05	5.2E-05	--	--
Vinyl Chloride (chloroethylene)	0.0011	--	--	--	0.0011	--	--	--
Xylene (Total)	7.5E-04	7.6E-06	7.7E-05	--	7.5E-04	2.7E-06	1.3E-06	--
Zinc (Zn)	1.2E-08	--	--	--	1.2E-08	--	--	--

Notes:

1. According to the Project Sponsor, the biogas engines can operate using 100% landfill gas or a blended gas consisting of 55% landfill gas and 45% tailgas. To be conservative, the biogas engine TAC emissions were estimated using the higher emission rate between the two scenarios for each pollutant, and assuming 85% abatement efficiency. Landfill gas emission rates were estimated by BAAQMD using concentrations and speciation from facility data. Tailgas emission rates were estimated using concentrations and speciation from published syngas research data (Hoekman et al. 2013).

2. Estimated TAC emissions were consistent with previous operational emission analyses for BAAQMD air permit application.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
g - gram
s - second

Table 13
Modeled Emission Rates - Existing Landfill Flare Reductions
Raven SR
Richmond, CA

Pollutant	CAS	Acute[1]	Chronic[1]
		Landfill Flare	Landfill Flare
		(g/s)	*(g/s)*
1,1-Dichloroethane (Ethylidene dichloride)	75-34-3	0.0062	0.0062
1,1-Dichloroethene (Vinylidene chloride)	75-35-4	2.7E-04	2.7E-04
1,1,1-Trichloroethane (Methyl chloroform)	71-55-6	1.2E-04	1.2E-04
1,1,2-Trichloroethane (Vinyl trichloride)	79-00-5	3.6E-05	3.6E-05
1,1,2,2-Tetrachloroethane	79-34-5	4.5E-05	4.5E-05
1,3-Butadiene	106-99-0	1.4E-05	1.5E-05
1,4-Dichlorobenzene	106-46-7	6.2E-04	6.2E-04
1,4-Dioxane (1,4-Diethylene dioxide)	123-91-1	2.4E-05	2.4E-05
Acetaldehyde	75-07-0	0.023	0.023
Acrolein	107-02-8	0.0029	0.0029
Acrylonitrile	107-13-1	2.9E-05	2.9E-05
Allyl Chloride (3-Chloropropene)	107-05-1	2.0E-05	2.1E-05
Ammonia	7664-41-7	5.6E-05	1.7
Benzene	71-43-2	0.015	0.015
Benzyl Chloride	100-44-7	2.7E-05	2.7E-05
Carbon Disulfide	75-15-0	2.0E-05	2.0E-05
Carbon Tetrachloride	56-23-5	4.1E-05	4.1E-05
Chlorobenzene	108-90-7	1.5E-04	1.5E-04
Ethyl Chloride (Chloroethane)	75-00-3	3.2E-04	3.2E-04
Chloroform	67-66-3	2.5E-04	2.5E-04
Dioxins PCDDs	1-08-6	1.3E-08	1.3E-08
Ethylbenzene	100-41-4	0.0022	0.0022
Ethylene Dibromide (1,2-dibromoethane)	106-93-4	5.0E-05	5.0E-05
Ethylene Dichloride (1,2-dichloroethane)	107-06-2	0.0011	0.0011
Formaldehyde	50-00-0	0.11	0.11
n-Hexane	110-54-3	0.010	0.010
Hydrochloric Acid (Hydrogen Chloride)	7647-01-0	1.7	0.35
Hydrofluoric Acid (Hydrogen Fluoride)	7664-39-3	0.056	0.011
Hydrogen Sulfide (H2S)	2148-87-8	7.7E-06	7.7E-06
Isopropyl alcohol (IPA, 2-Propanol)	67-63-0	2.5E-04	2.5E-04
Mercury	7439-97-6	1.8E-08	1.8E-08
Methanol (Methyl alcohol)	67-56-1	8.6E-05	8.6E-05
Methyl Bromide (Bromomethane)	74-83-9	2.5E-05	2.5E-05
Methyl Ethyl Ketone (2-butanone)	78-93-3	3.9E-05	3.9E-05
Methyl tert-Butyl Ether	1634-04-4	2.4E-05	2.4E-05
Methylene Chloride (dichloromethane)	75-09-2	0.027	0.027
Naphthalene	91-20-3	0.0019	0.0019
PAH Equivalents as Benzo(a)pyrene	1150/1151	3.7E-05	3.7E-05
Perchloroethylene (tetrachloroethylene)	127-18-4	0.015	0.015
Propene (Propylene)	115-07-1	0.0025	0.0025
Styrene	100-42-5	6.4E-05	6.4E-05
Toluene	108-88-3	0.0034	0.0034
Trichloroethylene	79-01-6	0.0031	0.0031
Vinyl Acetate	108-05-4	4.6E-05	4.6E-05
Vinyl Chloride (chloroethylene)	75-01-4	0.0040	0.0040
Xylene (Total)	1330-20-7	0.0027	0.0027

Notes:

1. Existing landfill flare TAC emission reductions were calculated based on BAAQMD estimates for biogas engines TAC emissions and assuming no abatement efficiency. To be conservative, the emission reductions were estimated assuming that biogas engines operate using a blended gas consisting of 55% landfill gas and 45% tailgas.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District

g - gram

s - second

Table 14
Modeling Parameters
Raven SR
Richmond, CA

Construction Sources

Source	Source Type	Number of Sources	Source Dimension	Release Height	Initial Vertical Dimension	Initial Lateral Dimension
			[m]	[m]	[m]	[m]
Construction Equipment[1]	Area	1	Approximate Equipment Area	5.0	1.16	--
Fugitive Dust[2]	Area	1	Approximate Equipment Area	0.0	1	--

Operational Sources[3]

Source	Source Type	Number of Sources	Release Height
			[m]
Green Waste Offgas	Area	1	4.97

Source	Source Type	Number of Sources	Stack Height	Stack Velocity	Exit Diameter	Stack Temperature
			[m]	[m/s]	[m]	°F
Biogas Engines	Point	3	7.92	52.39	0.20	850
Flare	Point	1	12.19	0.18	2.24	1,500
Fire Pump Engine	Point	1	1.83	13.17	0.20	869

Existing Landfill Sources[4]

Source	Source Type	Number of Sources	Stack Height	Stack Velocity	Exit Diameter	Stack Temperature
			[m]	[m/s]	[m]	°F
Flare	Point	2	12.19	0.15	2.51	1,502

Notes:

1. Construction off-road equipment was modeled as one area source covering the parcel under construction. According to the CRRP-HRA methodology, release height of a modeled area source representing construction equipment was set to 5 meters and the initial vertical dimension is set to the release height divided by 4.3.

2. Construction fugitive dust will be modeled as one area source covering the parcel under construction. According to the 2012 San Francisco Community HRA methodology, the initial vertical dimension of the modeled fugitive dust area source will be set to 1 meter and the release height will be set to 0 meters consistent with SCAQMD LST methods.

3. For Project operation, the biogas engines, flare, and fire pump engine are modeled as point sources. The green waste storage pile is modeled as an area source. Source parameters were provided by the Project Sponsor.

4. The existing landfill flare stack parameters were estimated by POWER Engineers and obtained from the Semi-Annual Monitoring Report 2021 submitted by West Contra Costa Sanitary Landfill to BAAQMD, available at: https://www.baaqmd.gov/~/media/files/engineering/title-v-permits/a1840/a1840_wccc_landfill_053122_2021_a-pdf.pdf?la=en&rev=af45f67469484d85b592e41dd6866b23

Abbreviations:

°F - Fahrenheit
BAAQMD - Bay Area Air Quality Management District
CRRP - Community Risk Reduction Plan
HRA - Health risk assessment
m - meter
s - second
USEPA - United States Environmental Protection Agency

References:

Bay Area Air Quality Management District (BAAQMD). 2012. The San Francisco Community Risk Reduction Plan: Technical Support Documentation. December. Available at: https://www.gsweventcenter.com/Appeal_Response_References/2012_1201_BAAQMD.pdf.

Bay Area Air Quality Management District (BAAQMD). 2020. Health Risk Assessment Modeling Protocol. December. Available online at: https://www.baaqmd.gov/~/media/files/ab617-community-health/facility-risk-reduction/documents/baaqmd_hra_modeling_protocol-pdf.pdf?la=en

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South Coast Air Quality Management District (SCAQMD). 2008. Final Localized Significance Threshold Methodology. July. Available at: http://www.aqmd.gov/docs/default-source/ceqa/handbook/localized-significance-thresholds/final-lst-methodology-document.pdf?sfvrsn=2

Table 15
Exposure Parameters
Raven SR
Richmond, CA

Construction+Operation

Population	Project Phase	Year	Receptor Age Group	Exposure Parameters						
				Daily Breathing Rate (DBR)[1] [L/kg-day]	Exposure Duration (ED)[2] [years]	Fraction of Time at Home (FAH)[3] [unitless]	Exposure Frequency (EF)[4] [days/year]	Averaging Time (AT) [days]	Modeling Adjustment Factor[5] [unitless]	Intake Factor, Inhalation (IF_{inh}) [m^3/kg-day]
Resident	Construction	2023	3rd Trimester	361	0.75	1	350	25,550	1.0	0.0037
		2023	Age 0-<2 Years	1,090	0.25	1	350	25,550	1.0	0.0037
		2024	Age 0-<2 Years	1,090	0.02	1	350	25,550	1.0	0.0003
	Operation	All	Age 0-<2 Years	1,090	1.73	1	350	25,550	1.0	0.0259
			Age 2-<16 Years	572	14	1	350	25,550	1.0	0.11
			Age 16-30 Years	261	14	0.73	350	25,550	1.0	0.037
Worker	Construction	2023	16-70 years	230	1	--	250	25,550	4.2	0.0023
		2024	16-70 years	230	0.02	--	250	25,550	4.2	0.0000
	Operation	All	16-70 years	230	23.98	--	250	25,550	4.2	0.054
School	Construction	2023	Age 2-<9 Years	640	1	--	180	25,550	4.2	0.0045
		2024	Age 2-<9 Years	640	0.02	--	180	25,550	4.2	0.0001
	Operation	All	Age 2-<9 Years	640	2.98	--	180	25,550	4.2	0.0134
			Age 2-<16 Years	520	4	--	180	25,550	4.2	0.015

Operation-Only

Population	Project Phase	Year	Receptor Age Group	Exposure Parameters						
				Daily Breathing Rate (DBR)[1] [L/kg-day]	Exposure Duration (ED)[6] [years]	Fraction of Time at Home (FAH)[3] [unitless]	Exposure Frequency (EF)[4] [days/year]	Averaging Time (AT) [days]	Modeling Adjustment Factor[5] [unitless]	Intake Factor, Inhalation (IF_{inh}) [m^3/kg-day]
Resident	Operation	All	3rd Trimester	361	0.25	1	350	25,550	1.0	0.0012
			Age 0-<2 Years	1,090	2	1	350	25,550	1.0	0.030
			Age 2-<16 Years	572	14	1	350	25,550	1.0	0.11
			Age 16-30 Years	261	14	0.73	350	25,550	1.0	0.037
Worker	Operation	All	16-70 years	230	25	--	250	25,550	4.2	0.056
School	Operation	All	Age 2-<9 Years	640	4	--	180	25,550	4.2	0.018
			Age 2-<16 Years	520	4	--	180	25,550	4.2	0.015

Notes:

1. Daily breathing rates for residents reflect default breathing rates from OEHHA 2015 and BAAQMD 2016 as follows: 95th percentile 24-hour daily breathing rate for 3rd trimester and age 0-<2 years; 80th percentile for ages 2 years and older (per BAAQMD 2016 and 2020 Health Risk Assessment (HRA) Modeling Guidelines). Daily breathing rates for workers assume 230 L/kg-8 hours, which represents the 95th percentile 8-hour breathing rate based on moderate activity of 16-70 years-old age range, per BAAQMD 2016 and 2020 Health Risk Assessment (HRA) Modeling Guidelines. Daily breathing rates for school receptors reflect 95th percentile 8-hour daily breathing rates for Moderate Intensity Activity for all ages.

2. Exposure duration for residents is assumed to begin at the start of construction and continue for 30 years of operation. Exposure duration for workers is assumed to begin at the start of construction and continue for 25 years of operation. Exposure duration for school receptors was assumed to include ages 5-13 for children attending Kindergarten through 8th Grade.

3. Fraction of time spent at home is conservatively assumed to be 1 (i.e., 24 hours/day) for age groups from the third trimester to less than 16 years old based on the recommendation from BAAQMD (BAAQMD 2016 and 2020) and OEHHA (OEHHA 2015). The fraction of time at home for adults age 16-30 reflects default OEHHA guidance (OEHHA 2015) as recommended by BAAQMD (2016 and 2020).

4. Exposure frequency reflects default resident, worker, and school receptor exposure frequencies from OEHHA 2015 and BAAQMD 2016.

5. Modeling adjustment factors are calculated based on the methodology from OEHHA's Guidance Manual for Preparation of Health Risk Assessments (2015). The MAF for the worker and school receptors is calculated to adjust from 24 hours/day to 8 hours/day and from 7 days/week to 5 days/week ([24 hours/8 hours] * [7 days/5 days] = 4.20). Resident types are expected to be exposed 24 hours/day and 7 days/week; as a result, the MAF is 1.

6. Exposure duration for residents is assumed for 30 years of operation and for workers is assumed for 25 years of operation. Exposure duration for school receptors was assumed to include ages 5-13 for children attending Kindergarten through 8th Grade.

Calculation:

IF_{inh} = DBR * FAH * EF * ED * CF / AT

CF = 0.001 (m^3/L)

Abbreviations:

AT - averaging time
BAAQMD - Bay Area Air Quality Management District
DBR - daily breathing rate
ED - exposure duration
EF - exposure frequency
IF_{inh} - intake factor
kg - kilogram
L - liter
m^3 - cubic meter
OEHHA - Office of Environmental Health Hazard Assessment

References:

BAAQMD. 2016. Air Toxics NSR Program Health Risk Assessment (HRA) Guidelines. January.

BAAQMD. 2020. Health Risk Assessment (HRA) Modeling Protocol. December.

OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

Table 16
Toxicity Values
Raven SR
Richmond, CA

Chemical[1]	CAS Number	Cancer Potency Factor	Acute Noncancer Reference Exposure Level	Chronic Noncancer Reference Exposure Level
		$(mg/kg\text{-}day)^{-1}$	$(\mu g/m^3)$	$(\mu g/m^3)$
1,1,1-Trichloroethane (Methyl chloroform)	71-55-6	--	68000	1000
1,1,2,2-Tetrachloroethane	79-34-5	0.2	--	--
1,1,2-Trichloroethane (Vinyl trichloride)	79-00-5	0.057	--	--
1,1-Dichloroethane (Ethylidene dichloride)	75-34-3	0.0057	--	--
1,1-Dichloroethene (Vinylidene chloride)	75-35-4	--	--	70
1,3-Butadiene	106-99-0	0.6	660	2
1,4-Dichlorobenzene	106-46-7	0.04	--	800
1,4-Dioxane (1,4-Diethylene dioxide)	123-91-1	0.027	3000	3000
Acetaldehyde	75-07-0	0.01	470	140
Acetone	67-64-1	--	--	--
Acrolein	107-02-8	--	2.5	0.35
Acrylonitrile	107-13-1	1	--	5
Allyl Chloride (3-Chloropropene)	107-05-1	0.021	--	--
Aluminum (Al)	7429-90-5	--	--	--
Ammonia	7664-41-7	--	3200	200
Arsenic	7440-38-2	12	0.2	0.015
Benzene	71-43-2	0.1	27	3
Benzyl Chloride	100-44-7	0.17	240	--
Beryllium	7440-41-7	8.4	--	0.007
Bromine (Br)	7726-95-6	--	--	--
Cadmium (Cd)	7440-43-9	15	--	0.02
Carbon Disulfide	75-15-0	--	6200	800
Carbon Tetrachloride	56-23-5	0.15	1900	40
Chlorine (Cl)	7782-50-5	--	210	0.2
Chlorobenzene	108-90-7	--	--	1000
Chloroform	67-66-3	0.019	150	300
Chromium (Cr)	7440-47-3	--	--	--
Cobalt (Co)	7440-48-4	27	--	--
Copper (Cu)	7440-50-8	--	100	--
Diesel particulate matter	9-90-1	1.1	--	5
Dioxins PCDDs	1-08-6	130000	--	0.00004
Ethene	74-85-1	--	--	--
Ethyl Chloride (Chloroethane)	75-00-3	--	--	30000
Ethylbenzene	100-41-4	0.0087	--	2000
Ethylene Dibromide (1,2-dibromoethane)	106-93-4	0.25	--	0.8
Ethylene Dichloride (1,2-dichloroethane)	107-06-2	0.072	--	400
Formaldehyde	50-00-0	0.021	55	9
Furan	110-00-9	--	--	--
Hydrochloric Acid (Hydrogen Chloride)	7647-01-0	--	2100	9
Hydrofluoric Acid (Hydrogen Fluoride)	7664-39-3	--	240	14
Hydrogen Sulfide (H2S)	7783-06-4	--	42	10
Isopropyl alcohol (IPA, 2-Propanol)	67-63-0	--	3200	7000
Lead (Pb)	7439-92-1	0.042	--	--
Manganese (Mn)	7439-96-5	--	--	0.09
Mercury	7439-97-6	--	0.6	0.03
Methanol (Methyl alcohol)	67-56-1	--	28000	4000
Methyl Bromide (Bromomethane)	74-83-9	--	3900	5
Methyl Ethyl Ketone (2-butanone)	78-93-3	--	13000	--
Methyl tert-Butyl Ether	1634-04-4	0.0018	--	8000
Methylene Chloride (dichloromethane)	75-09-2	0.0035	14000	400
Naphthalene	91-20-3	0.12	--	9
n-Butyraldehyde	123-72-8	--	--	--
n-Hexane	110-54-3	--	--	7000
Nickel (Ni)	7440-02-0	0.91	0.2	0.014
PAH Equivalents as Benzo(a)pyrene	1-15-0	--	--	--
Perchloroethylene (tetrachloroethylene)	127-18-4	0.021	20000	35
Propene (Propylene)	115-07-1	--	--	3000
Propionaldehyde	123-38-6	--	--	--
Selenium	7782-49-2	--	--	20
Silver (Ag)	7440-22-4	--	--	--
Styrene	100-42-5	--	21000	900
Thallium (Tl)	7440-28-0	--	--	--
Toluene	108-88-3	--	5000	420
Trichloroethylene	79-01-6	0.007	--	600
Vanadium	7440-62-2	--	30	--
Vinyl Acetate	108-05-4	--	--	200
Vinyl Chloride (chloroethylene)	75-01-4	0.27	180000	--
Xylene (Total)	1330-20-7	--	22000	700
Zinc (Zn)	7440-66-6	--	--	--

Notes:

1. Toxicity values are taken from ARB's Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values.

Abbreviations:

-- - not available or not applicable
ARB - Air Resources Board
Cal/EPA - California Environmental Protection Agency
CAS - chemical abstract services
mg/kg-day - milligrams per kilogram per day
OEHHA - Office of Environmental Health Hazard Assessment
$\mu g/m^3$ - micrograms per cubic meter

Reference:

Cal/EPA. 2022. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. September. Available at: http://www.arb.ca.gov/toxics/healthval/contable.pdf.

Table 17
Project Health Impacts
Raven SR
Richmond, CA

Source	Worker				Resident			
	Excess Lifetime Cancer Risk (in a million)[1]	Non-Cancer Hazard Index (unitless)[2,3]	Acute Hazard Index (unitless)[4]	$PM_{2.5}$ Concentration ($\mu g/m^3$, Annual Average)[3]	Excess Lifetime Cancer Risk (in a million)[1]	Non-Cancer Hazard Index (unitless)[2,3]	Acute Hazard Index (unitless)[4]	$PM_{2.5}$ Concentration ($\mu g/m^3$, Annual Average)[3]
Project Construction + Operations	3.0	0.058	0.22	0.57	0.70	0.0086	0.039	0.024
Project Operations	2.2	0.058	0.22	0.57	0.69	0.0086	0.039	0.024
Landfill Reductions	-5.7	-0.21	-0.49	-0.84	-1.3	-0.018	-0.10	-0.042
Project Construction + Operations with Landfill Reductions[5]	-2.7	-0.16	-0.27	-0.27	-0.57	-0.009	-0.064	-0.018
Project Operations with Landfill Reductions	-3.5	-0.16	-0.27	-0.27	-0.57	-0.0095	-0.064	-0.018
BAAQMD CEQA Significance Threshold[6]	10	1.0	1.0	0.30	10	1.0	1.0	0.30

Source	School				Clinic			
	Excess Lifetime Cancer Risk (in a million)[1]	Non-Cancer Hazard Index (unitless)[2,3]	Acute Hazard Index (unitless)[4]	$PM_{2.5}$ Concentration ($\mu g/m^3$, Annual Average)[3]	Excess Lifetime Cancer Risk (in a million)[1]	Non-Cancer Hazard Index (unitless)[2,3]	Acute Hazard Index (unitless)[4]	$PM_{2.5}$ Concentration ($\mu g/m^3$, Annual Average)[3]
Project Construction + Operations	0.49	0.011	0.036	0.030	0.46	0.0058	0.032	0.016
Project Operations	0.52	0.011	0.036	0.030	0.46	0.0058	0.032	0.016
Landfill Reductions	-0.81	-0.019	-0.091	-0.044	-0.79	-0.011	-0.077	-0.026
Project Construction + Operations with Landfill Reductions[5]	-0.32	-0.0084	-0.055	-0.014	-0.33	-0.0056	-0.045	-0.010
Project Operations with Landfill Reductions	-0.29	-0.0084	-0.055	-0.014	-0.33	-0.0056	-0.045	-0.010
BAAQMD CEQA Significance Threshold[6]	10	1.0	1.0	0.30	10	1.0	1.0	0.30

Notes:

1. Excess lifetime cancer risks are estimated as the upper-bound incremental probability that an individual will develop cancer over a lifetime as a direct result of exposure to potential carcinogens. The estimated risk is expressed as a unitless probability. The cancer risk attributed to the emissions associated with the Project was calculated based on the modeled annual average concentration, the intake factor for a resident child, the Cancer Potency Factors (CPF) for the TACs, and the Age Sensitivity Factors (ASF).
2. The potential for exposure to result in adverse chronic noncancer effects is evaluated by comparing the estimated annual average air concentration to the noncancer chronic Reference Exposure Level (REL) for each chemical. When calculated for a single chemical, the comparison yields a ratio termed a chronic hazard quotient (HQ). To evaluate the potential for adverse chronic noncancer health effects from simultaneous exposure to multiple chemicals, the chronic hazard quotients for all chemicals are summed, yielding a hazard index (HI).
3. $PM_{2.5}$ concentration and Non-Cancer Hazard Index represent annual values.
4. The acute non-cancer HI analysis assumes that all sources are operating in any one hour time period, which is a conservative assumption.
5. Project MEIs are identified at the locations with maximum health impacts from the Project construction + operations scenario with landfill reductions.
6. Thresholds from BAAQMD California Environmental Quality Act (CEQA) 2017 Guidelines.

Abbreviations:

ASF - Age Sensitivity Factors
CPF - Cancer Potency Factor
HI - hazard index
HQ - hazard quotient
m - meter
MEI - maximally exposed individual
$PM_{2.5}$ - particulate matter 2.5 microns or less
REL - Reference Exposure Level
TAC - Toxic Air Contaminant
ug - microgram
UTM - Universal Transverse Mercator

References:

California Environmental Quality Act (CEQA) 2017 Guidelines. Available at: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf

BAAQMD. Regulation 2 Permits Rule 5 New Source Review of Toxic Air Contaminants. Available at: https://www.baaqmd.gov/~/media/dotgov/files/rules/reg-2-permits/2021-amendments/documents/20211215_rg0205-pdf.pdf?la=en&rev=c403a2e96fde4799b1aa950cd4367aa2

Table 18
Cumulative Health Impacts
Raven SR
Richmond, CA

Scenario	Receptor Type	Source	Lifetime Excess Cancer Risk[1] (in a million)	Noncancer Chronic HI[1]	$PM_{2.5}$ Concentration[1] ($\mu g/m^3$)
Construction + Operation	Worker	Existing Stationary Sources[2]	45	0.52	1.02
		Highway[3]	1.3	--	0.026
		Major Streets[3]	0.46	--	0.014
		Roadway Total	1.8	--	0.040
		Railways[3]	3.7	--	0.0049
		Existing Total	50	0.518	1.07
		Project Construction + Operations with Landfill Reductions	-2.7	-0.16	-0.272
		Total	**47.6**	**0.36**	**0.797**
		Exceeds Threshold?	**NO**	**NO**	**NO**
	Resident	Existing Stationary Sources[2]	0.0041	4.7E-05	0.0010
		Highway[3]	1.3	--	0.026
		Major Streets[3]	5.3	--	0.17
		Roadway Total	6.6	--	0.19
		Railways[3]	4.3	--	0.0059
		Existing Total	11	4.7E-05	0.20
		Project Construction + Operations with Landfill Reductions	-0.57	-0.009	-0.018
		Total	**10**	**-0.009**	**0.18**
		Exceeds Threshold?	**NO**	**NO**	**NO**
	School	Existing Stationary Sources[2]	7.1E-05	8.2E-07	1.8E-05
		Highway[3]	2.1	--	0.042
		Major Streets[3]	1.1	--	0.032
		Roadway Total	3.2	--	0.074
		Railways[3]	15	--	0.020
		Existing Total	18	8.2E-07	0.094
		Project Construction + Operations with Landfill Reductions	-0.32	-0.008	-0.014
		Total	**18**	**-0.0084**	**0.080**
		Exceeds Threshold?	**NO**	**NO**	**NO**
	Clinic	Existing Stationary Sources[2]	5.7E-05	6.6E-07	1.4E-05
		Highway[3]	1.4	--	0.029
		Major Streets[3]	1.4	--	0.039
		Roadway Total	2.8	--	0.067
		Railways[3]	5.6	--	0.0077
		Existing Total	8.4	6.6E-07	0.075
		Project Construction + Operations with Landfill Reductions	-0.33	-0.006	-0.010
		Total	**8.1**	**-0.0056**	**0.065**
		Exceeds Threshold?	**NO**	**NO**	**NO**
Operation	Worker	Existing Stationary Sources[2]	45	0.52	1.02
		Highway[3]	1.3	--	0.026
		Major Streets[3]	0.46	--	0.014
		Roadway Total	1.8	--	0.040
		Railways[3]	3.7	--	0.0049
		Existing Total	50	0.518	1.07
		Project Operations with Landfill Reductions	-3.5	-0.16	-0.272
		Total	**46.9**	**0.36**	**0.797**
		Exceeds Threshold?	**NO**	**NO**	**NO**
	Resident	Existing Stationary Sources[2]	0.0041	4.7E-05	0.0010
		Highway[3]	1.3	--	0.026
		Major Streets[3]	5.3	--	0.17
		Roadway Total	6.6	--	0.19
		Railways[3]	4.3	--	0.0059
		Existing Total	11	4.7E-05	0.20
		Project Operations with Landfill Reductions	-0.57	-0.009	-0.018
		Total	**10**	**-0.009**	**0.18**
		Exceeds Threshold?	**NO**	**NO**	**NO**
	School	Existing Stationary Sources[2]	7.1E-05	8.2E-07	1.8E-05
		Highway[3]	2.1	--	0.042
		Major Streets[3]	1.1	--	0.032
		Roadway Total	3.2	--	0.074
		Railways[3]	15	--	0.020
		Existing Total	18	8.2E-07	0.094
		Project Operations with Landfill Reductions	-0.29	-0.008	-0.014
		Total	**18**	**-0.0084**	**0.080**
		Exceeds Threshold?	**NO**	**NO**	**NO**
	Clinic	Existing Stationary Sources[2]	5.7E-05	6.6E-07	1.4E-05
		Highway[3]	1.4	--	0.029
		Major Streets[3]	1.4	--	0.039
		Roadway Total	2.8	--	0.067
		Railways[3]	5.6	--	0.0077
		Existing Total	8.4	6.6E-07	0.075
		Project Operations with Landfill Reductions	-0.33	-0.006	-0.010
		Total	**8.1**	**-0.0056**	**0.065**
		Exceeds Threshold?	**NO**	**NO**	**NO**
		Threshold	**100**	**10**	**0.80**

Table 18
Cumulative Health Impacts
Raven SR
Richmond, CA

Notes:

[1] For roadways, the chronic HI is not calculated in the BAAQMD screening tool.

[2] The Existing Stationary Sources include the background risks from the West Contra Costa County Landfill, although it is over 1,000 ft away from all MEIRs. The risks at each MEIR are calculated based on on-site risks and a distance multiplier. The distance multipliers for individual MEIRs are calculated using the BAAQMD Distance Multipiler table and exponential extrapolation, as all distances are over 1,000 ft so health risk multipliers are not directly available from BAAQMD.

[3] Cancer risk and $PM_{2.5}$ concentration values were determined using BAAQMD screening tools and are based on the maximum impact of a raster cell located on the MEIR.

Abbreviations:

HI - hazard index
m^3 - cubic meter
MEIR - maximum exposed individual receptor
$PM_{2.5}$ - particulate matter less than 2.5 microns
µg - microgram

References:

Bay Area Air Quality Management District (BAAQMD). 2020. Permitted Sources Risk and Hazards Map. June. Available at: https://baaqmd.maps.arcgis.com/apps/webappviewer/index.html?id=2387ae674013413f987b1071715daa65

Bay Area Air Quality Management District (BAAQMD). 2020. Health Risk Calculator Beta 4.0. March. Available at: https://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/tools/baaqmd-health-risk-calculator-beta-4-0-xlsx.xlsx?la=en&rev=dab7d85a772d45caa9c99e59395bf12d\

FIGURES

PROJECT: 1690025248 | DATED: 1/20/2023 | DESIGNER: ANSHI

- Project Boundary
- Onsite Buildings
- Leachate Tanks
- Green Waste Storage Pile
- Fire Pump Engine Housing
- Biogas Engine
- Fire Pump Engine
- Flare
- Existing Landfill Flare

0 500 1,000 Feet

MODELED SOURCES AND BUILDINGS

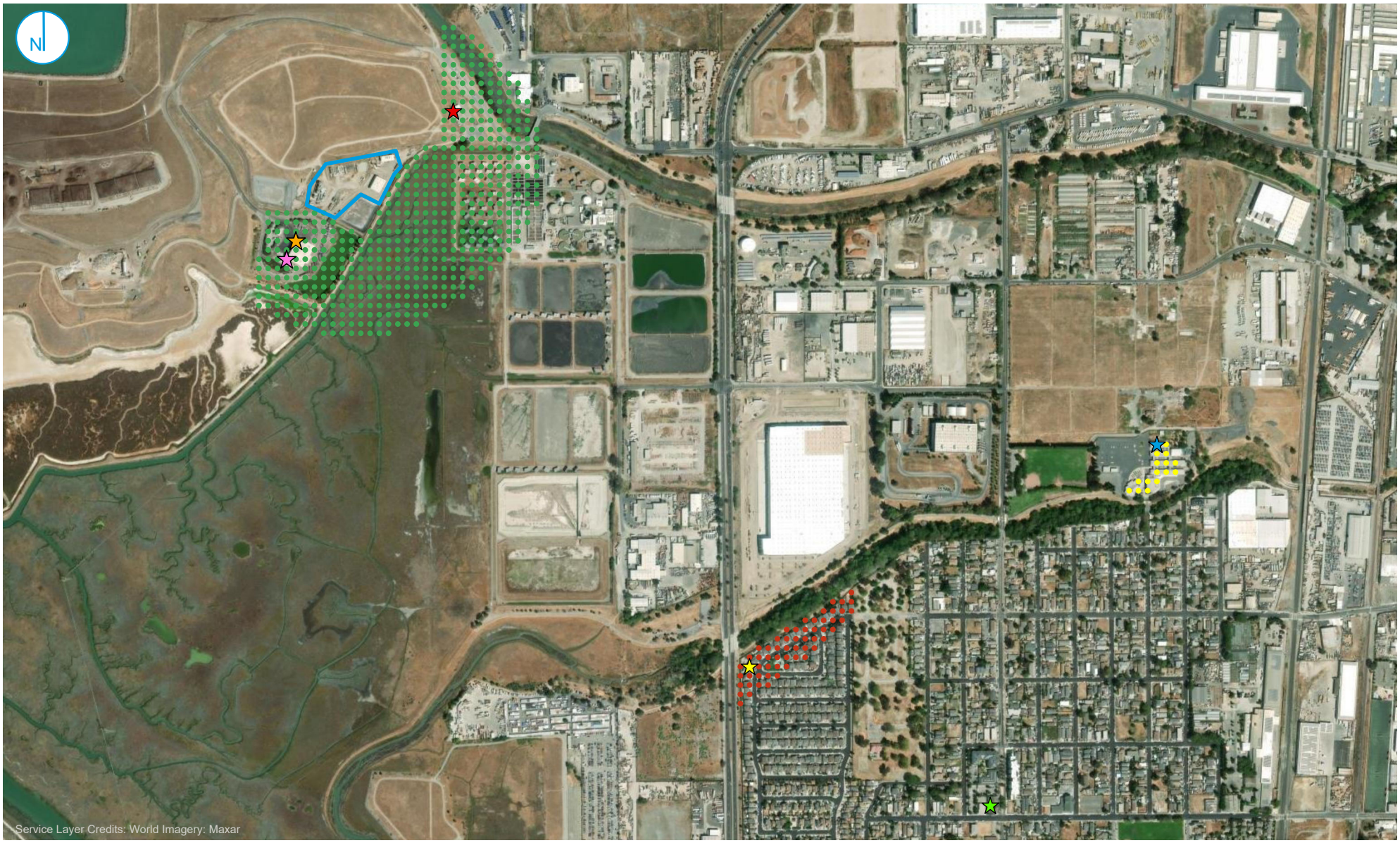
Raven SR
1 Parr Blvd.
Richmond, CA

FIGURE 01

RAMBOLL US CONSULTING, INC.
A RAMBOLL COMPANY

RAMBOLL

PROJECT: 1690025248 | DATED: 3/7/2023 | DESIGNER: ANSHI



- Maximally Exposed Residential Receptor
- Maximally Exposed Worker Receptor (PM2.5)
- Maximally Exposed Worker Receptor (Chronic HI)
- Maximally Exposed Worker Receptor (Cancer & Acute HI)
- Maximally Exposed School Receptor
- Maximally Exposed Clinic Receptor

- Project Boundary
- Resident
- Worker
- School
- Clinic

Feet

MODELED RECEPTORS AND MAXIMALLY EXPOSED INDIVIDUAL RECEPTOR LOCATIONS

Raven SR
1 Parr Blvd.
Richmond, CA

FIGURE 02

RAMBOLL US CONSULTING, INC.
A RAMBOLL COMPANY

RAMBOLL

APPENDIX B

Special Status Species Lists

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
Phone: (916) 414-6600 Fax: (916) 414-6713

In Reply Refer To:
Project Code: 2022-0054185
Project Name: Raven SR Bioenergy Project

June 14, 2022

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)

(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts see https://www.fws.gov/birds/policies-and-regulations.php.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures see https://www.fws.gov/birds/bird-enthusiasts/threats-to-birds.php.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/birds/policies-and-regulations/executive-orders/e0-13186.php.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

Official Species List

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Sacramento Fish And Wildlife Office
Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846
(916) 414-6600

Project Summary

Project Code: 2022-0054185
Event Code: None
Project Name: Raven SR Bioenergy Project
Project Type: Commercial Development
Project Description: The proposed Raven SR Bioenergy Project (project) proposes to construct and operate a bioenergy system composed of the Raven SR multi-patented Steam/CO2 Reformation process at the project site. The non-combustible process would convert blended green waste and food waste obtained from the existing BMPC operation adjacent to the project site into renewable, transportation grade hydrogen that would be exported offsite for various renewable energy products. No hydrogen storage would occur onsite. The project would involve the erection of a modular structure and industrial canopy and would not add vehicle trips or other substantial traffic to the property.

Project Location:

Approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@37.967288499999995,-122.38296104113344,14z

Counties: Contra Costa County, California

Endangered Species Act Species

There is a total of 14 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

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1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

Mammals

NAME	STATUS
Salt Marsh Harvest Mouse *Reithrodontomys raviventris* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/613	Endangered

Birds

NAME	STATUS
California Clapper Rail *Rallus longirostris obsoletus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4240	Endangered
California Least Tern *Sterna antillarum browni* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/8104	Endangered
Western Snowy Plover *Charadrius nivosus nivosus* Population: Pacific Coast population DPS-U.S.A. (CA, OR, WA), Mexico (within 50 miles of Pacific coast) There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/8035	Threatened

Reptiles

NAME	STATUS
Green Sea Turtle *Chelonia mydas* Population: East Pacific DPS No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6199	Threatened

Amphibians

NAME	STATUS
California Red-legged Frog *Rana draytonii* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/2891	Threatened

Fishes

NAME	STATUS
Delta Smelt *Hypomesus transpacificus* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/321	Threatened
Tidewater Goby *Eucyclogobius newberryi* There is **final** critical habitat for this species. The location of the critical habitat is not available. Species profile: https://ecos.fws.gov/ecp/species/57	Endangered

Flowering Plants

NAME	STATUS
Marin Dwarf-flax *Hesperolinon congestum* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5363	Threatened
Showy Indian Clover *Trifolium amoenum* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/6459	Endangered
Tiburon Jewelflower *Streptanthus niger* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4187	Endangered
Tiburon Mariposa Lily *Calochortus tiburonensis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2858	Threatened
Tiburon Paintbrush *Castilleja affinis ssp. neglecta* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/2687	Endangered
White-rayed Pentachaeta *Pentachaeta bellidiflora* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/7782	Endangered

Critical habitats

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

IPaC User Contact Information

Agency:	Environmental Science Associates
Name:	Sharon Dulava
Address:	787 The Alameda
Address Line 2:	Suite 250
City:	San Jose
State:	CA
Zip:	95126
Email	sdulava@esassoc.com
Phone:	9252859473

Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: BIOS selection

Raven SR Bioenergy Project Initial Study: 5 Mile Study Area

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Accipiter cooperii Cooper's hawk	ABNKC12040	None	None	G5	S4	WL
Acipenser medirostris pop. 1 green sturgeon - southern DPS	AFCAA01031	Threatened	None	G2T1	S1	
Antrozous pallidus pallid bat	AMACC10010	None	None	G4	S3	SSC
Ardea alba great egret	ABNGA04040	None	None	G5	S4	
Asio flammeus short-eared owl	ABNSB13040	None	None	G5	S3	SSC
Astragalus tener var. tener alkali milk-vetch	PDFAB0F8R1	None	None	G2T1	S1	1B.2
Athene cunicularia burrowing owl	ABNSB10010	None	None	G4	S3	SSC
Bombus caliginosus obscure bumble bee	IIHYM24380	None	None	G2G3	S1S2	
Bombus occidentalis western bumble bee	IIHYM24250	None	None	G2G3	S1	
Calystegia purpurata ssp. saxicola coastal bluff morning-glory	PDCON040D2	None	None	G4T2T3	S2S3	1B.2
Chloropyron maritimum ssp. palustre Point Reyes salty bird's-beak	PDSCR0J0C3	None	None	G4?T2	S2	1B.2
Chloropyron molle ssp. molle soft salty bird's-beak	PDSCR0J0D2	Endangered	Rare	G2T1	S1	1B.2
Circus hudsonius northern harrier	ABNKC11011	None	None	G5	S3	SSC
Danaus plexippus pop. 1 monarch - California overwintering population	IILEPP2012	Candidate	None	G4T2T3	S2S3	
Dirca occidentalis western leatherwood	PDTHY03010	None	None	G2	S2	1B.2
Egretta thula snowy egret	ABNGA06030	None	None	G5	S4	
Elanus leucurus white-tailed kite	ABNKC06010	None	None	G5	S3S4	FP
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Fritillaria liliacea fragrant fritillary	PMLIL0V0C0	None	None	G2	S2	1B.2
Helminthoglypta nickliniana bridgesi Bridges' coast range shoulderband	IMGASC2362	None	None	G3T1	S1S2	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Hoita strobilina Loma Prieta hoita	PDFAB5Z030	None	None	G2?	S2?	1B.1
Holocarpha macradenia Santa Cruz tarplant	PDAST4X020	Threatened	Endangered	G1	S1	1B.1
Hydroprogne caspia Caspian tern	ABNNM08020	None	None	G5	S4	
Lasiurus cinereus hoary bat	AMACC05030	None	None	G3G4	S4	
Laterallus jamaicensis coturniculus California black rail	ABNME03041	None	Threatened	G3T1	S1	FP
Melospiza melodia pusillula Alameda song sparrow	ABPBXA301S	None	None	G5T2T3	S2S3	SSC
Melospiza melodia samuelis San Pablo song sparrow	ABPBXA301W	None	None	G5T2	S2	SSC
Microtus californicus sanpabloensis San Pablo vole	AMAFF11034	None	None	G5T1T2	S1S2	SSC
Nannopterum auritum double-crested cormorant	ABNFD01020	None	None	G5	S4	WL
Northern Coastal Salt Marsh Northern Coastal Salt Marsh	CTT52110CA	None	None	G3	S3.2	
Nycticorax nycticorax black-crowned night heron	ABNGA11010	None	None	G5	S4	
Pandion haliaetus osprey	ABNKC01010	None	None	G5	S4	WL
Rallus obsoletus obsoletus California Ridgway's rail	ABNME05011	Endangered	Endangered	G3T1	S1	FP
Rana draytonii California red-legged frog	AAABH01022	Threatened	None	G2G3	S2S3	SSC
Reithrodontomys raviventris salt-marsh harvest mouse	AMAFF02040	Endangered	Endangered	G1G2	S1S2	FP
Sorex vagrans halicoetes salt-marsh wandering shrew	AMABA01071	None	None	G5T1	S1	SSC
Spergularia macrotheca var. longistyla long-styled sand-spurrey	PDCAR0W062	None	None	G5T2	S2	1B.2
Spirinchus thaleichthys longfin smelt	AFCHB03010	Candidate	Threatened	G5	S1	
Symphyotrichum lentum Suisun Marsh aster	PDASTE8470	None	None	G2	S2	1B.2
Thaleichthys pacificus eulachon	AFCHB04010	Threatened	None	G5	S2	
Trifolium hydrophilum saline clover	PDFAB400R5	None	None	G2	S2	1B.2

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Tryonia imitator	IMGASJ7040	None	None	G2	S2	
mimic tryonia (=California brackishwater snail)						
Valley Needlegrass Grassland	CTT42110CA	None	None	G3	S3.1	
Valley Needlegrass Grassland						
Xanthocephalus xanthocephalus	ABPBXB3010	None	None	G5	S3	SSC
yellow-headed blackbird						

Record Count: 44

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CNPS Rare Plant Inventory

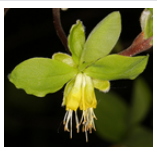
California Native Plant Society

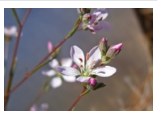
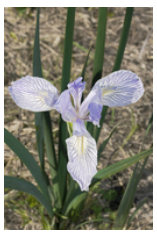
Search Results

45 matches found. Click on scientific name for details

Search Criteria: Quad is one of [**3712284:3712283:3812214:3812213**]

▲ SCIENTIFIC NAME	COMMON NAME	FAMILY	LIFEFORM	BLOOMING PERIOD	FED LIST	STATE LIST	GLOBAL RANK	STATE RANK	CA RARE PLANT RANK	PHOTO
Amorpha californica var. *napensis*	Napa false indigo	Fabaceae	perennial deciduous shrub	Apr-Jul	None	None	G4T2	S2	1B.2	 © 2016 John Doyen
Amsinckia lunaris	bent-flowered fiddleneck	Boraginaceae	annual herb	Mar-Jun	None	None	G3	S3	1B.2	 © 2011 Neal Kramer
Arabis blepharophylla	coast rockcress	Brassicaceae	perennial herb	Feb-May	None	None	G4	S4	4.3	 © 2011 Neal Kramer
Arctostaphylos pallida	pallid manzanita	Ericaceae	perennial evergreen shrub	Dec-Mar	FT	CE	G1	S1	1B.1	No Photo Available
Aspidotis carlotta-halliae	Carlotta Hall's lace fern	Pteridaceae	perennial rhizomatous herb	Jan-Dec	None	None	G3	S3	4.2	No Photo Available
Astragalus tener var. *tener*	alkali milk-vetch	Fabaceae	annual herb	Mar-Jun	None	None	G2T1	S1	1B.2	No Photo Available
Calamagrostis ophitidis	serpentine reed grass	Poaceae	perennial herb	Apr-Jul	None	None	G3	S3	4.3	No Photo Available
Calochortus tiburonensis	Tiburon mariposa-lily	Liliaceae	perennial bulbiferous herb	Mar-Jun	FT	CT	G1	S1	1B.1	No Photo Available
Calochortus umbellatus	Oakland star-tulip	Liliaceae	perennial bulbiferous herb	Mar-May	None	None	G3?	S3?	4.2	No Photo Available
Calystegia purpurata ssp. *saxicola*	coastal bluff morning-glory	Convolvulaceae	perennial herb	(Mar)Apr-Sep	None	None	G4T2T3	S2S3	1B.2	No Photo Available
Castilleja affinis var. *neglecta*	Tiburon paintbrush	Orobanchaceae	perennial herb (hemiparasitic)	Apr-Jun	FE	CT	G4G5T1T2	S1S2	1B.2	No Photo

										Available
Castilleja ambigua var. *ambigua*	johnny-nip	Orobanchaceae	annual herb (hemiparasitic)	Mar-Aug	None	None	G4T4	S3S4	4.2	 ©2011 Dylan Neubauer
Chloropyron maritimum ssp. *palustre*	Point Reyes salty bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	Jun-Oct	None	None	G4?T2	S2	1B.2	 ©2017 John Doyen
Chloropyron molle ssp. *molle*	soft salty bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	Jun-Nov	FE	CR	G2T1	S1	1B.2	No Photo Available
Collomia diversifolia	serpentine collomia	Polemoniaceae	annual herb	May-Jun	None	None	G4	S4	4.3	 ©2019 Zoya Akulova
Dirca occidentalis	western leatherwood	Thymelaeaceae	perennial deciduous shrub	Jan-Mar(Apr)	None	None	G2	S2	1B.2	 © 2017 Steve Matson
Eleocharis parvula	small spikerush	Cyperaceae	perennial herb	(Apr)Jun-Aug(Sep)	None	None	G5	S3	4.3	 ©2018 Ron Vanderhoff
Eriogonum luteolum var. *caninum*	Tiburon buckwheat	Polygonaceae	annual herb	May-Sep	None	None	G5T2	S2	1B.2	No Photo Available
Erythranthe laciniata	cut-leaved monkeyflower	Phrymaceae	annual herb	Apr-Jul	None	None	G4	S4	4.3	 © 2017 Steven Perry
Erythranthe nudata	bare monkeyflower	Phrymaceae	annual herb	May-Jun	None	None	G4	S4	4.3	 John Doyen 2015
Fritillaria liliacea	fragrant fritillary	Liliaceae	perennial bulbiferous herb	Feb-Apr	None	None	G2	S2	1B.2	 © 2004 Carol W. Witham
Helianthella castanea	Diablo helianthella	Asteraceae	perennial herb	Mar-Jun	None	None	G2	S2	1B.2	

										© 2013 Christopher Bronny
Hesperolinon congestum	Marin western flax	Linaceae	annual herb	Apr-Jul	FT	CT	G1	S1	1B.1	 © 2009 Neal Kramer
Hoita strobilina	Loma Prieta hoita	Fabaceae	perennial herb	May-Jul(Aug-Oct)	None	None	G2?	S2?	1B.1	 © 2004 Janell Hillman
Holocarpha macradenia	Santa Cruz tarplant	Asteraceae	annual herb	Jun-Oct	FT	CE	G1	S1	1B.1	 © 2011 Dylan Neubauer
Iris longipetala	coast iris	Iridaceae	perennial rhizomatous herb	Mar-May(Jun)	None	None	G3	S3	4.2	 © 2014 Aaron Schusteff
Isocoma arguta	Carquinez goldenbush	Asteraceae	perennial shrub	Aug-Dec	None	None	G1	S1	1B.1	No Photo Available
Lathyrus jepsonii var. *jepsonii*	Delta tule pea	Fabaceae	perennial herb	May-Jul(Aug-Sep)	None	None	G5T2	S2	1B.2	 © 2003 Mark Fogiel
Leptosiphon acicularis	bristly leptosiphon	Polemoniaceae	annual herb	Apr-Jul	None	None	G4?	S4?	4.2	 © 2007 Len Blumin
Leptosiphon grandiflorus	large-flowered leptosiphon	Polemoniaceae	annual herb	Apr-Aug	None	None	G3G4	S3S4	4.2	 © 2003 Doreen L. Smith
Lessingia hololeuca	woolly-headed lessingia	Asteraceae	annual herb	Jun-Oct	None	None	G2G3	S2S3	3	 © 2015 Aaron Schusteff
Lilaeopsis masonii	Mason's lilaeopsis	Apiaceae	perennial rhizomatous	Apr-Nov	None	CR	G2	S2	1B.1	No Photo

			herb							Available
Pentachaeta bellidiflora	white-rayed pentachaeta	Asteraceae	annual herb	Mar-May	FE	CE	G1	S1	1B.1	No Photo Available
Piperia michaelii	Michael's rein orchid	Orchidaceae	perennial herb	Apr-Aug	None	None	G3	S3	4.2	No Photo Available
Plagiobothrys glaber	hairless popcornflower	Boraginaceae	annual herb	Mar-May	None	None	GX	SX	1A	No Photo Available
Polygonum marinense	Marin knotweed	Polygonaceae	annual herb	(Apr)May-Aug(Oct)	None	None	G2Q	S2	3.1	No Photo Available
Ranunculus lobbii	Lobb's aquatic buttercup	Ranunculaceae	annual herb (aquatic)	Feb-May	None	None	G4	S3	4.2	No Photo Available
Senecio aphanactis	chaparral ragwort	Asteraceae	annual herb	Jan-Apr(May)	None	None	G3	S2	2B.2	No Photo Available
Spergularia macrotheca var. *longistyla*	long-styled sand-spurrey	Caryophyllaceae	perennial herb	Feb-May	None	None	G5T2	S2	1B.2	No Photo Available
Streptanthus glandulosus ssp. *niger*	Tiburon jewelflower	Brassicaceae	annual herb	May-Jun	FE	CE	G4T1	S1	1B.1	No Photo Available
Suaeda californica	California seablite	Chenopodiaceae	perennial evergreen shrub	Jul-Oct	FE	None	G1	S1	1B.1	No Photo Available
Symphyotrichum lentum	Suisun Marsh aster	Asteraceae	perennial rhizomatous herb	(Apr)May-Nov	None	None	G2	S2	1B.2	No Photo Available
Trifolium amoenum	two-fork clover	Fabaceae	annual herb	Apr-Jun	FE	None	G1	S1	1B.1	No Photo Available
Trifolium hydrophilum	saline clover	Fabaceae	annual herb	Apr-Jun	None	None	G2	S2	1B.2	No Photo Available
Triquetrella californica	coastal triquetrella	Pottiaceae	moss		None	None	G2	S2	1B.2	No Photo Available

Showing 1 to 45 of 45 entries

Suggested Citation:

California Native Plant Society, Rare Plant Program. 2022. Rare Plant Inventory (online edition, v9-01 1.5). Website https://www.rareplants.cnps.org [accessed 14 June 2022].

Send questions and comments to rareplants@cnps.org.

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Developed by
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APPENDIX C

Updated Draft Mitigation Monitoring and Reporting Program (MMRP)

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Project Mitigation Measures	Implemented By	Monitored By	Monitoring and Reporting Action	Monitoring Schedule	
4.1 Aesthetics – None Required					
4.2 Agriculture and Forestry Resources – None Required					
4.3 Air Quality					
~~(Expanded)~~ Mitigation Measure AQ-1: Best Management Practices.[1] • ~~All subsequent projects, regardless of size,~~The project shall implement the following best management practices to reduce construction impacts, particularly fugitive dust, to a less-than-significant level: • All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day, except when not required for dust control. • All haul trucks transporting soil, sand, or other loose material off-site shall be covered. • All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited. • All vehicle speeds on unpaved roads shall be limited to 15 mph. • All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used. • Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points. • All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a	Project Applicant / Construction Contractor	Richmond Building Division and Engineering Services Department	Richmond Engineering Services Department to verify inclusion of BAAQMD BMPs in applicable construction plans and specifications. City of Richmond Building Division to inspect site during construction to ensure compliance with Project construction plans.	Prior to issuance of building permit. Field inspections during construction.	*Verified by:* *Date:*

[1] The additional bulleted items (single underlined) to Mitigation Measure AQ-1 were added as expanded mitigation at the Planning Commission.

Project Mitigation Measures	Implemented By	Monitored By	Monitoring and Reporting Action	Monitoring Schedule	
certified mechanic and determined to be running in proper condition prior to operation. • Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations. • BMP #6: All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph. • BMP #7: All trucks and equipment, including their tires, shall be washed off prior to leaving the site. • BMP #8: Unpaved roads providing access to sites located 100 feet or further from a paved road shall be treated with a 6- to 12-inch layer of compacted layer of wood chips, mulch, or gravel. • Additional BMP: Limit the simultaneous occurrence of excavation, grading, and ground- disturbing construction activities. • Additional BMP: Install wind breaks (e.g., trees, fences) on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity. • Additional BMP: Plant vegetative ground cover (e.g., fast-germinating native grass seed) in disturbed areas as soon as possible and watered appropriately until vegetation is established. • Additional BMP: Install sandbags or other erosion control measures to prevent silt runoff to public roadways from sites with a slope greater than one percent. • Additional BMP: Minimize the amount of excavated material or waste materials stored at the site. • Additional BMP: Hydroseed or apply non-toxic soil stabilizers to construction areas, including previously graded areas, that are inactive for at least 10 calendar days.					

Project Mitigation Measures	Implemented By	Monitored By	Monitoring and Reporting Action	Monitoring Schedule	
• Require zero visible fugitive dust and use fence line air monitoring to demonstrate compliance with this requirement. • Set requirements for when dust generating operations have to be shut down due to dust crossing the property boundary or if dust is contained within the property boundary but not controlled after a specified number of minutes. • Prohibiting grading on days when a Spare the Air is in effect (https://www.sparetheair.org/) Prohibiting grading on days with an Air Quality Index forecast of greater than 100 for particulates for the project area.					
4.4 Biological Resources					
Mitigation Measure BIO-1: Avoid and Minimize Impacts to Nesting Birds, Except Rails. ~~To the extent practicable,~~ Pproject construction activities requiring heavy equipment, or any tree trimming, shall be performed outside of the bird nesting season (February 1st through August 31st) to avoid impacts to nesting birds.	Project Applicant / Construction Contractor Qualified Biologist	Richmond Building Division and Planning Division	City of Richmond Building Division to ensure construction activities are performed between February 1st and August 31st.	Prior to any site alterations or issuance of building permit. Field inspections during construction.	*Verified by:* *Date:*
If these activities must be performed during the nesting bird season, a qualified biologist shall be retained to conduct a pre-construction survey in the project construction and staging areas for nesting birds and verify the presence or absence of nesting birds no more than 14 calendar days prior to construction activities or after any construction breaks of 14 calendar days or more. Surveys shall be performed for the project construction and staging areas and suitable habitat within 250 feet of the project construction and staging areas in order to locate any active passerine (perching bird) nests and within 500 feet of the project construction and staging areas to locate any active raptor (birds of prey) nest, including potential burrowing owl burrows. If nesting birds and raptors do not occur within 250 and 500 feet of the Project area, respectively, then no further action is required if construction begins within 14 calendar days. If active nests are located during the pre-construction bird nesting surveys, no-disturbance buffer zones shall be established around nests, with a buffer size established by the qualified biologist. Typically, these buffer distances are between 50 feet and 250 feet for passerines and between 150 feet and 500 feet for raptors. These distances may be adjusted depending on the level of surrounding ambient activity and if an obstruction, such as a building or structure, is within line-of-sight between the nest and construction. Reduced buffers may be allowed if a full-time qualified biologist is present to	Project Applicant / Construction Contractor Qualified Biologist	Richmond Building Division	City of Richmond Building Division to confirm surveys are conducted pursuant to specified measures, and if warranted, that buffer zone distances are indicated in project plans and adhered to during construction activities. City of Richmond Planning Division to receive and confirm survey report.	Field inspections during construction. Upon completion of surveys.	*Verified by:* *Date:*

Project Mitigation Measures	Implemented By	Monitored By	Monitoring and Reporting Action	Monitoring Schedule	
monitor the nest and has authority to halt construction if bird behavior indicates continued activities could lead to nest failure. Buffered zones shall be avoided during construction-related activities until young have fledged or the nest is otherwise abandoned. If active burrowing owl dens are found within the survey area, the project applicant shall implement measures at least equal to the 2012 (or subsequent applicable) CDFW Staff Report (CDFG, 2012), as determined by the qualified biologist.					
Mitigation Measure BIO-2: Avoid and Minimize Impacts to California Black Rail and California Ridgway's Rail • To minimize or avoid the loss of individual California black rail and Ridgway's rail, construction activities requiring heavy equipment, adjacent to tidal marsh areas (within 500 feet [150 meters] or a distance determined in coordination with U.S. Fish and Wildlife (USFWS) or the California Department of Fish and Wildlife (CDFW)), shall be avoided during the breeding season from February 1 through August 31.	Project Applicant / Construction Contractor Qualified Biologist	Richmond Building Division and Planning Division	City of Richmond Building Division to ensure construction activities are performed between February 1st and August 31st.	Field inspections during construction.	*Verified by:* *Date:*
• If areas within 500 feet of rail habitat cannot be avoided during the breeding season (February 1 through August 31), protocol-level surveys shall be conducted to determine rail nesting locations. The surveys will focus on potential habitat that could be indirectly disturbed by construction activities during the breeding season to ensure that rails are not breeding within 500 feet of project activities. • Survey methods for rails will follow the *Site-Specific Protocol for Monitoring Marsh Birds*, which was developed for use by USFWS and partners (Wood et al. 2017). Surveys are concentrated during the approximate period of peak detectability, January 15 to March 25 and are structured to efficiently sample an area in three rounds of surveys by broadcasting calls of target species during specific periods of each survey round. Call broadcast increase the probability of detection compared to passive surveys when no call broadcasting is employed. This protocol has since been adopted by Invasive Spartina Project (ISP) and Point Blue Conservation Science to survey Ridgway's rails at sites throughout San Francisco Bay Estuary. The survey protocol for Ridgway's rail is summarized below. – Previously used survey locations (points) should be used when available to maintain consistency with past survey results. Adjacent points should be at least 200 meters apart along transects in or adjacent to areas representative of the marsh. Points should be located to	Project Applicant / Construction Contractor Qualified Biologist	Richmond Building Division	City of Richmond Building Division to confirm surveys are conducted pursuant to specified measures. City of Richmond Planning Division to receive and confirm survey report.	Field inspections during construction. Upon completion of surveys.	*Verified by:* *Date:*

Project Mitigation Measures	Implemented By	Monitored By	Monitoring and Reporting Action	Monitoring Schedule	
minimize disturbances to marsh vegetation. Up to 8 points can be located on a transect. – At each transect, three surveys (rounds) are to be conducted, with the first round of surveys initiated between January 15 and February 6, the second round performed February 7 to February 28, and the third round March 1 to March 25. Surveys should be spaced at least one week apart and the period between March 25 to April 15 can be used to complete surveys delayed by logistical or weather issues. A Federal Endangered Species Act Section 10(a)(1)(A) permit is required to conduct active surveys. – Each point on a transect will be surveyed for 10 minutes each round. A recording of calls available from USFWS is broadcast at each point. The recording consists of 5 minutes of silence, followed by a 30-second recording of Ridgway's rail vocalizations, followed by 30 seconds of silence, followed by a 30-second recording of California black rail, followed by 3.5 minutes of silence. • If no breeding Ridgway's rails or black rails are detected during surveys, or if their breeding territories can be avoided by 500 feet (150 meters), then project activities may proceed at that location.					
• If protocol surveys determine that breeding Ridgway's rails or black rails are present in the project area, the following measures would apply to project activities conducted during their breeding season (February 1- August 31): – The applicant shall coordinate with the USFWS- and CDFW, as appropriate depending upon species, to ~~determine~~ verify if project activities can continue during the nesting season based on nest location, natural visual barriers (e.g., levees) between the project and marshlands, and the distance between proposed activities and identified activity centers. If impact cannot be avoided during the rail nesting season, activities would be delayed until after the nesting season.	Project Applicant / Construction Contractor Qualified Biologist	Richmond Building Division	City of Richmond Building Division to ensure construction activities are performed between February 1st and August 31st, based on agency coordination per this measure. City of Richmond Planning Division to verify agency coordination and outcome.	Field inspections during construction. Upon completion of surveys.	*Verified by:* *Date:*

Project Mitigation Measures	Implemented By	Monitored By	Monitoring and Reporting Action	Monitoring Schedule	
4.5 Cultural Resources					
Mitigation Measure CUL-1a: Cultural Resources Awareness Training. Prior to authorization to proceed, the City shall engage a qualified archaeologist, defined as an archaeologist meeting the U.S. Secretary of the Interior's Professional Qualification Standards for Archeology, to conduct a training program for all construction workers involved on site disturbance. On-site personnel shall attend a mandatory pre-project training that outlines the general archaeological sensitivity of the vicinity and the procedures to follow in the event an archaeological resource and/or human remains are inadvertently discovered.	Project Applicant / Construction Contractor Qualified Archaeologist	Richmond Building Division	City of Richmond Building Division to review and confirm documentation of training, required personnel attending, and scope of training.	Prior to commencement of any ground-disturbing activities.	*Verified by:* *Date:*
Mitigation Measure CUL-1b: Inadvertent Discovery of Cultural Materials or Tribal Cultural Resources. If pre-contact or historic-era cultural materials are encountered during project implementation, all construction activities within 100 feet of the find shall halt and the contractor shall notify the City. The City shall notify a qualified archaeologist who will inspect the find within 24 hours of discovery and provide the City of an initial assessment. Pre-contact cultural materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); and battered stone tools, such as hammerstones and pitted stones. Historic-era cultural materials might include building or structure footings and walls, and deposits of metal, glass, and/or ceramic refuse. If the City determines, based on recommendations from a qualified archaeologist and a Native American representative (if the resource is pre-contact), that the resource may qualify as a historical resource or unique archaeological resource (as defined in CEQA Guidelines Section 15064.5) or a tribal cultural resource (as defined in PRC Section 21080.3), the resource shall be avoided if feasible. Consistent with Section 15126.4(b)(3), this may be accomplished through planning construction to avoid the resource, incorporating the resource within open space, capping and covering the resource, or deeding the site into a permanent conservation easement. If avoidance is not feasible, the City shall consult with a qualified archaeologist and a Native American representative (if the resource is pre-contact) to determine treatment measures to avoid, minimize, or mitigate any potential impacts to the resource pursuant to PRC Section 21083.2 and CEQA Guidelines Section 15126.4. This shall	Project Applicant / Construction Contractor	Qualified Archaeologist If applicable, Native American representative	Richmond Building Division to review and approve of archaeologist, of cultural resources monitoring plan and of the construction plan that includes archaeological mitigation. If resources are encountered, Contractor to verify work is suspended as required, review and approve qualified archaeologist and recommendations. If resources encountered are found to be qualifying as described in the measure, the City to ensure preservation measures are implemented or that the ARDTP is completed and submitted to NWIC. City to inspect site during construction to ensure compliance with project construction plans.	Prior to issuance of building permit for, or commencement of, any ground-disturbing activities. Field inspections during construction.	*Verified by:* *Date:*

Project Mitigation Measures	Implemented By	Monitored By	Monitoring and Reporting Action	Monitoring Schedule	
include documentation of the resource and may include data recovery (according to PRC Section 21083.2), if deemed appropriate, or other actions such as treating the resource with culturally appropriate dignity and protecting the cultural character and integrity of the resource (according to PRC Section 21084.3).					
Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains. If human remains are encountered during project implementation, the contractor shall halt all construction activities within 100 feet of the find and notify the City. The City shall contact the Contra Costa County Coroner who will determine that no investigation of the cause of death is required. If it is determined that the remains are Native American, the Coroner shall contact the Native American Heritage Commission within 24 hours. The Commission shall then identify the person or persons it believes to be the Most Likely Descendant from the deceased Native American, who in turn would make recommendations for the appropriate means of treating the human remains and any grave goods.	Project Applicant / Construction Contractor	Qualified Archaeologist	Richmond Building Division verify mitigation measure on construction plans. Inspect site during construction to ensure compliance with project construction plans. If needed, engage County Coroner and ensure NAHC contact.	Prior to issuance of a building permit for, or commencement of, any ground-disturbing activities. Field inspections during construction.	*Verified by:* *Date:*
4.6 Energy – None Required					
4.7 Geology, Soils, and Mineral Resources - MM CUL-1a, CUL-1b, CUL-2 (see 4.5, Cultural Resources)					
4.8 Greenhouse Gas Emissions – None Required					
4.9 Hazards and Hazardous Materials – None Required					
4.10 Hydrology and Water Quality – None Required					
4.11 Land Use and Planning – None Required					
4.12 Noise / Vibration – None Required					
4.13 Population and Housing– None Required					
4.14 Public Services and Recreation – None Required					
4.15 Transportation – None Required					
4.16 Tribal Cultural Resources - MM CUL-1a, CUL-1b, CUL-2 (see 4.5, Cultural Resources)					
4.17 Utilities and Service Systems – None Required					
4.18 Wildfire – None Required					

APPENDIX D

Response to Comments Received on the Raven SR Bioenergy Project Initial Study / Mitigated Negative Declaration (November, 11, 2022)

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ESA

180 Grand Avenue
Suite 1050
Oakland, CA 94612
510.839.5066 phone
510.839.5825 fax

esassoc.com

Memorandum

date	November 30, 2022
to	Lydia Elias, Planner I Lina Velasco, Director
from	Crescentia Brown, Project Director Tim Sturtz, Project Manager
subject	**RESPONSE TO COMMENTS Received on the Raven SR Bioenergy Project Initial Study / Mitigated Negative Declaration**

Background

On October 7, 2022, the City of Richmond (Lead Agency) released for public review a Draft Initial Study (IS) and Mitigated Negative Declaration (MND) pursuant to the California Environmental Quality Act (CEQA) for the proposed Raven SR Bioenergy Project (Project) (SCH# 202201045). The original public review and comment period on the IS/MND was October 7, 2022 through November 7, 2022, and the City extended the comment period to November 22, 2022.

Although not required by CEQA, this document includes the comments received on the IS/MND (see **Table 1**) and responses to each comment.

TABLE 1
COMMENT LETTERS RECEIVED ON THE IS/MND

Letter #	Entity	Author(s) of Comment Letter/e-mail	Comment Date
Agencies – Public / Quasi-Public			
1	Contra Costa Environmental Health	Nicole Soto, REHS	November 22, 2022
2	Berkeley Lab	Vi H. Rapp, PhD, Deputy for Building and Industrial Applications Department	November 21, 2022
3	CalRecycle	Harprit Mattu, Environmental Scientist	November 7, 2022
4	Department of Toxic Substances Control	Rebecca De Pont, Supervising Environmental Planner	November 4, 2022
5	California State Senate	Nancy Skinner, State Senator District 9	October 21, 2022
6	MCE	Dawn Weisz, CEO	October 20, 2022
7	Bay Area Air Quality Management District	Kelly Malinowski, MPA | Senior Environmental Planner	October 19, 2022
8	Republic Services	Ken Lewis, P.E., General Manager	October 13, 2022

continued

TABLE 1 (CONTINUED)
COMMENT LETTERS RECEIVED ON THE IS/MND

Letter #	Entity	Author(s) of Comment Letter/e-mail	Comment Date
Organizations / Individual			
9	Environmental Justice Groups		November 22, 2022
	• Communities for a Better Environment	Connie Cho, Attorney / Tessa Wardle, Staff Researcher	
	• Sierra Club	Teresa Cheng, Senior Campaign Representative	
	• Asian Pacific Environmental Network	Faraz Rizvi, Campaign and Policy Manager	
	• Richmond Our Power Coalition	Katt Ramos, Managing Director - Richmond Our Power Coalition	
	• Urban Tilth	Kiara Pereira, Just Transition Organizer / Rafael Castro, Just Transition Organizer	
	• Natural Resources Defense Council	Ann Alexander, Senior Attorney	
10	Shell Hydrogen	Humberto Orantes, Acting Commercial Head, North America	November 7, 2022
11	Powers Engineers	James P. Hays, Business Unit Director	November 7, 2022
12	Trails for Richmond Action Committee (TRAC)	Bruce Beyaert, TRAC Chair	October 27, 2022
13	Benicia Fabrication & Machine	Carmelo Santiago, CEO & President	October 20, 2022
14	Contra Costa Construction and Building Trades Council	William Whitney	October 17, 2022
15	Watlow	Ashish Bhatnagar, Chief Technology Officer	October 14, 2022
16	Iron Workers Local 378	Jason Gallia, Business Manager, Financial Manager/Treasurer	October 13, 2022
17	Local Union No. 302 International Brotherhood of Electrical Workers	Tom Hansen, Business Manager, Financial Secretary	October 13, 2022
18	Green Hydrogen Coalition	Nicholas Connell, Policy Director	October 10, 2022
19	Not Identified	Christina Strawbridge	October 10, 2022

No "substantial revisions" that would require recirculation of the IS/MND are warranted. Specifically, (1) no new, avoidable significant effect is identified and mitigation measures or project revisions must be added in order to reduce the effect to insignificance, or (2) The lead agency determines that the proposed mitigation measures or project revisions will not reduce potential effects to less than significance and new measures or revisions must be required (CEQA *Guidelines* Section 15073.5). Although a mitigation measure (**AQ-1: Best Management Practices**) is expanded with equal or more effective measures pursuant to Section 15074.1, recirculation of the MND is not required. The updated Mitigation Measure Monitoring and Reporting Program (MMRP) with the expanded mitigation measure is included as **Attachment A** to this memo.

Comments and Responses

Responses focus on comments that pertain to the adequacy of the analysis in the IS/MND or to other aspects pertinent to the potential effects of the proposed Project on the environment pursuant to CEQA. Comments that address topics beyond the purview of the IS/MND or CEQA or that state opinions about the overall merit of the proposed Project are acknowledged for the public record and will be taken into account by City decision-makers. The following pages present each comment letter with each individual comment bracketed with a numeric code, followed by the corresponding response to each individual comment.

LETTER 1

ANNA M. ROTH, RN, MS, MPH
HEALTH SERVICES DIRECTOR
MATTHEW S. KAUFMANN
DEPUTY HEALTH DIRECTOR
JOCELYN STORTZ, MS, REHS
ENVIRONMENTAL HEALTH DIRECTOR

CONTRA COSTA HEALTH SERVICES

CONTRA COSTA ENVIRONMENTAL HEALTH
2120 Diamond Boulevard, Suite 100
Concord, California 94520
Ph (925) 608-5500
Fax (925) 608-5502
www.cchealth.org/eh/

November 22, 2022

City of Richmond Planning Division
Attn: Lydia Elias
450 Civic Center Plaza- 2nd Floor
Richmond, CA 94804
lydia_elias@ci.richmond.ca.us

RE: PLN21-282 – Raven SR Bioenergy Project
1 Parr Boulevard Richmond, CA 94801
APN: 408-140-009
Service Request #: SR0020187
Facility Identification #: FA0047036

Dear Lydia Elias:

Contra Costa Environmental Health (CCEH) has received a request for agency comment regarding the above referenced project. The following are our comments:

1. A permit from CCEH is required for any well or soil boring prior to commencing drilling activities, including those associated with water supply, environmental investigation and cleanup, or geotechnical investigation. 1-1

2. It is recommended that the project be served by public sewer and public water. 1-2

3. The CCEH is designated by the California Department of Resources Recycling and Recovery (CalRecycle) as the Local Enforcement Agency (LEA) for solid waste facilities, including landfills, transfer stations, and waste tire generators and haulers. The prospective operators of Raven SR should be directed to CCEH to submit a Registration Permit application and facility plan for a Transfer/Processing Facility. 1-3

4. In the Raven SR Bioenergy Project Initial Study subsection Odor Control, additional clarification is requested. 1-4

    - What is the time frame for the feedstock to remain on the management area floor?
    - What do the odor control measures consist of?

5. In the Raven SR Bioenergy Project Initial Study section 2.4 Technology, the document lists medical waste as one of the types of organic feedstocks. 1-5

    - Medical waste cannot be accepted at the solid waste facility, unless approved by the appropriate regulatory agency. Contact California Department of Public Health regarding medical waste permitting.

6. The project is adjacent to Class I & II landfills, the operator should ensure the project is compliant with the Post Closure Maintenance Plans of the landfills. 1-6

7. Substantial construction and demolition (C & D) waste could result from this project. Hazardous construction and demolition materials should be separated from those that can be recycled or disposed.

8. Debris from construction or demolition activity must go to a solid waste or recycling facility that complies with the applicable requirements and can lawfully accept the material (e.g., solid waste permit, EA Notification, etc.). The debris must be transported by a hauler that can lawfully transport the material. Debris bins or boxes of one cubic yard or more owned by the collection service operator shall be identified with the name and telephone number of the agent servicing the container. 1-7

9. Non-source-separated waste materials must not be brought back to the contractor's yard unless the facility has the appropriate solid waste permit or EA Notification.

These comments do not limit an applicant's obligation to comply with all applicable laws and regulations. If you should have any questions, please do not hesitate to call me at (925) 608-5550.

Sincerely,

Nicole Soto

Nicole Soto , REHS
Environmental Health Specialist II

CC

Harprit Mattu, California Department of Resources Recycling and Recovery
Harprit.Mattu@calrecycle.ca.gov

Responses to Letter 1 - Contra Costa Environmental Health

1-1 The comment specifies that the project must obtain a permit from Contra Costa Environmental Health (CCEH) for any well or soil boring prior to commencing drilling activities. The project applicant acknowledges this requirement and shall comply.

1-2 The comment recommends that the project be served by public sewer and public water. As specified in Section 4.17, *Utilities and Service Systems*, of the IS/MND, the proposed project will continue to be served by EBMUD and West County Wastewater District, which already serves the site.

1-3 The comment specifies application information that the project applicant/operator must obtain from CCEH as the Local Enforcement Agency (LEA) relevant to the proposed project facility and operation. The project applicant/operator will submit and obtain all required permitting applications for the proposed Transfer/Processing Facility.

1-4 The comment requests clarification of the duration of time for the project's feedstock to remain on the management area floor, and what the odor control measures consist of. The project applicant has clarified that all incoming organic feedstock material shall be received and stored under roof in designated areas and shall be processed within 48 hours of receipt. The project will incorporate control mechanisms to minimize possible additional odors from its operation. Odor control would be both preventative and performance based, triggered "if objectionable odors occur", such as the immediate application of odor neutralizing solutions onsite as needed. Also, as previously mentioned in Response to Comment 1-4, the site shall be cleaned daily to remove loose material and litter. Boxes, bins, and containers shall be cleaned on a regular basis. The site and receiving area shall be swept regularly. Specifically, these will include preparation, implementation, and monitoring and annual evaluation of, and adherence to, the operational Odor Prevention and Management Plan (OPMP) detailed in project Condition No. 19.3 regarding odors and that is consistent with Contra Costa County requirements prior to commissioning and operation of the facility.

> **Condition No. 19.3 - Odor Containment.** During the construction phase of the Project, the operational Odor Prevention and Management Plan (OPMP) shall be developed and implemented upon commissioning of the renewable fuels processes, intended to become an integrated part of daily operations at the Facility and other sites, so as to prevent any objectionable offsite odors and effect diligent identification and remediation of any potential objectionable odors generated by the facility and associated sites. The plan shall outline equipment that is in place and procedures that facility personnel shall use to address odor issues, facility wide. The OPMP shall include continuous evaluation of the overall system performance, identification of trends to provide an opportunity for improvements to the plan, and updating the odor prevention and management strategies, as necessary. This plan shall be retained at the facility for City or any other government agency inspection upon request. The following practices shall be included in the OPMP to reduce the potential of objectionable odors from the storage of renewable feedstocks, operation of the Facility, and any other odor generating activity:

- Develop operating procedures to inspect and evaluate the effectiveness of odor control equipment and operation of the wastewater treatment plant.
- The OPMP shall include guidance for the proactive identification and documentation of odors through routine employee observations, routine operational inspections, and odor compliant investigations.
- Inspections to be conducted on a semi-annual basis.
- If there are fewer than an average of five confirmed complaints per year during the first 3 years of operation, then the inspection frequency can be reduced to an annual basis.
- If there are more than five confirmed complaints in any single year, then the application shall develop additional mitigation strategies in consultation with the BAAQMD.
- All odor complaints received by the facility shall be investigated as soon as is practical within the confines of proper safety protocols and site logistics. The goal of the investigation will be to determine if an odor originates from the facility and, if so, to determine the specific source and cause of the odor, and then to remediate the odor.
- Prepare an annual evaluation report of the overall system performance, identifying any trends to provide an opportunity for improvements to the plan, and updates to the odor management and control strategies, as necessary. The report shall be provided to the City for review and approval.

Also see Response to Comment 9-5 regarding the related environmental impacts of odor.

1-5 In response to the comments statement regarding medical waste as one of the types of organic feedstocks, the project applicant has clarified, as limited by project Condition No. 8.1 regarding eligible feedstocks, that the project shall be prohibited from intentionally accepting industrial or medical waste in the eligible feedstock. The IS/MND is updated as shown below.

- *2.4 Technology (p. 17)*

  Organic feedstocks include biomass, municipal solid waste, bio-solids, industrial waste, sewage, ~~medical waste,~~ or a combination of these, obtained from the existing WCCSL.

1-6 The comment seeks to ensure the project is compliant with the Post Closure Maintenance Plans of the landfills. Project Condition No. 4.5 specifically requires that the project operations shall be consistent with, and shall not conflict with, the Closure/Post Closure Maintenance Plan required by CalRecycle, the SFRWQCB, and the LEA for the existing WCCSL.

1-7 The comment addresses the treatment of hazardous construction and demolition materials, the required management of debris from construction or demolition activity, and states that non-source-separated waste materials must not be brought back to the contractor's yard unless the facility has the appropriate solid waste permit or EA Notification. Each of these requirements are part of standard local, State and federal regulatory requirements and project conditions pertaining to solid waste, water/ stormwater resources, and hazardous site conditions. The project applicant acknowledges this requirement and shall comply.

BERKELEY LAB

Lydia Elias
City of Richmond
Community Development Department
450 Civic Center Plaza, PO Box 4046
Richmond, CA 94804

November 21, 2022

Dear Lydia,

I am writing to support Raven SR's Conditional Use Permit (CUP) application and CEQA Mitigated Negative Declaration (MND) for the construction and operation of a bioenergy facility at Republic Service's West Contra Costa County Sanitary Landfill.

Raven SR's novel system provides a unique opportunity to demonstrate a new hydrogen production technology that could revolutionize waste-to-hydrogen production. In addition to providing clean hydrogen fuel, the technology may also help the City of Richmond further divert waste from landfills to meet California's SB 1383's goal of reducing organic waste disposal by 75% from 2014 levels (up to 27 M tons of organic waste) by 2025.

In addition to reducing methane and short-lived climate pollutants from the landfill, Raven SR will also support and expand jobs in the community, including construction jobs to build their facilities. Raven SR recently signed a Project Labor Agreement with the Contra Costa Building & Construction Trades Council and the I.B.E.W. Local #1245, demonstrating their commitment to using the community's talents.

California has taken a leadership role in the nation for launching the hydrogen economy and Richmond has an opportunity, with Raven SR, to join the state in supporting advancement of hydrogen production, while also reducing emissions and addressing climate change. Because of this opportunity, I hope you will consider approving Raven SR's CUP application and the CEQA MND so they may begin construction this year and start production in early 2023.

2-1

Sincerely,

Vi H. Rapp, PhD
Deputy for Building and Industrial Applications Department | Research Scientist
Lawrence Berkeley National Laboratory
Energy Technologies Area | Building Technologies and Urban Systems Division
Office: 510-495-2035 | Email: vhrapp@lbl.gov

Responses to Letter 2 – Berkeley Lab

2-1 The comment is in support of the proposed Project and notes that the proposed Project will help the City further divert waste from landfills to meet the State's goal of reducing organic waste disposal for target year 2025 (California's SB 1383). The comment also opines that the proposed Project's non-combustion system would reduce methane and short-lived climate pollutants from the landfill, and thus positive reduction in greenhouse gas emission. The comment does not address the adequacy of the analysis contained in the IS/MND. No additional analysis or response is required to this comment, however, it is noted and will be made available to City decision-makers as they consider the Project and whether or not to approve it.

California Environmental Protection Agency

Gavin Newsom
California Governor

Amelia Yana Garcia Gonzalez
Secretary for Environmental Protection

Department of Resources Recycling and Recovery

Rachel Machi Wagoner
CalRecycle Director

November 7, 2022

Lydia Elias, Planner I
City of Richmond Planning and Building Services Department
450 Civic Center Plaza
Richmond, CA 94804
Lydia_Elias@ci.richmond.ca.us

Subject: **SCH No. 2022100145** – Raven SR Bioenergy Project Mitigated Negative Declaration – Contra Costa County

Dear Lydia Elias,

Thank you for allowing the Department of Resources Recycling and Recovery (CalRecycle) staff to provide comments on the proposed project and for your agency's consideration of these comments as part of the California Environmental Quality Act (CEQA) process.

Project Description

The City of Richmond Planning Department, acting as Lead Agency, has prepared and circulated a Notice of Completion (NOC) of a Draft Initial Study/Mitigated Negative Declaration (Draft IS/MND) in order to comply with CEQA and to provide information to, and solicit consultation with, Responsible Agencies in the approval of the proposed project.

The proposed Raven SR Project is located at 1 Parr Boulevard, Richmond, California. The location is within the West Contra Costa Sanitary Landfill (WCCSL) facility located in the northwest area of the City of Richmond, in Contra Costa County, California. For purpose of this environmental document, the project would occur within approximately 2.5 acres of the existing Republic Services Bulk Materials Processing Center (BMPC) within "Area A" of the WCCSL. The property is located approximately 0.25 miles west of Parr Boulevard (approximately 0.25 miles west from Richmond Parkway) via an unpaved access road. The northern boundary of the project site is the City of Richmond / Contra Costa County jurisdiction line; the project site is located wholly within the City of Richmond, except for use of an existing access/egress road located within the County. The project site is located within Assessor's Parcel Number (APN) 408-140-009.

The proposed project would add a bioenergy system at the site. The non-combustion process would convert blended green waste and food waste, obtained from the existing

BMPC operation adjacent to the project site, into renewable, transportation grade hydrogen that would be exported offsite for various renewable energy products. No long-term hydrogen storage would occur onsite. The project would involve the erection of a modular structure and industrial canopy.

The conversion method uses a non-combustion (i.e., anoxic, indirect external heating), low pressure process. The only chemicals added would be carbon dioxide (CO2), calcium carbonate (limestone), and steam (i.e., water heated into a vapor state). No hazardous materials would be used in the process. The conversion occurs in sealed rotating drums that drop out solid matter from the green and food waste feedstock, which would consist largely of biocarbon, along with dirt, glass, grit, rocks, and inorganic salts. The biocarbon materials are inert to the process (i.e., not gasified) and drop out in the first stage. The process also drops out excess water. Neither the biocarbon nor the water would be considered a hazardous material.

Prior to being received at the site, the material will be ground and screened at the WCCSL compost site. Maximum daily tonnage is estimated to be 99.9 wet tons per day of blended green waste and food waste. The Raven SR system may run up to 24 hours per day, seven days per week.

The operation would involve up to approximately 12 hydrogen tube trucks and up to approximately 15 biocarbon trucks (total 37 trucks) per week, each with an average trip of 40 miles after leaving the site. Considering this with other trucks and employees coming to and leaving the project site daily, the project is estimated to generate about 130 vehicle trips on a typical weekday.

Comments

CalRecycle staff's comments on the proposed project are listed below. Where a specific location in the document is noted for the comment, please ensure the comment is addressed throughout all sections of the Draft IS/MND, in addition to the specific location noted.

Comments for the Draft IS/MND are summarized below:

1. Project Description, Daily Quantities and Operations, PDF Page 22 – "The Raven facility would receive up to 99.9 wet tons per day of blended green waste and food waste feedstock…" Receipt of this volume of solid waste for further processing will require a Transfer/Processing Facility Solid Waste Facility Permit. As a reminder, per PRC 40191 a solid waste facility cannot receive hazardous, radioactive, or medical wastes. 3-1

2. Project Description, Odor Control, PDF Page 23 – "Nuisance odor from Raven is unlikely since feedstock material would only be on the feedstock management area floor for relatively short periods of time." The applicant should clarify how long the material will be stored in the storage bunkers or other designated material storage areas prior to being placed in the Raven SR's Reformation Technology system? Given the putrescible nature of the incoming feedstock, what methods will the applicant utilize to control or prevent the propagation, 3-2 CONT.

harborage and attraction of flies, rodents, or other vectors, and animals, and to minimize bird attraction.? Per Title 14 CCR Section 17410.1(a)(2) “facilities shall remove solid waste accepted at the site within 48 hours from the time of receipt.” 3-2 CONT.

Solid Waste Regulatory Oversight

Contra Costa Health Services is the Local Enforcement Agency (LEA) for Contra Costa County and responsible for providing regulatory oversight of solid waste handling activities, including inspections. Please contact Tim Kraus, the LEA, at 925.608.5549 to discuss the regulatory requirements for the proposed project. 3-3

Conclusion

CalRecycle staff thanks the Lead Agency for the opportunity to review and comment on the environmental document and hopes that this comment letter will be useful to the Lead Agency preparing the MND and in carrying out their responsibilities in the CEQA process.

CalRecycle staff requests copies of any subsequent environmental documents, copies of public notices and any Notices of Determination for this proposed project. 3-4
If the environmental document is adopted during a public hearing, CalRecycle staff requests 10 days advance notice of this hearing. If the document is adopted without a public hearing, CalRecycle staff requests 10 days advance notification of the date of the adoption and proposed project approval by the decision making body.
If you have any questions regarding these comments, please contact me at 916.341.6119 or by e-mail at Harprit.Mattu@calrecycle.ca.gov.

Sincerely,

Harprit Mattu

Harprit Mattu, Environmental Scientist
Permitting & Assistance Branch – North
Waste Permitting, Compliance & Mitigation Division
CalRecycle

cc: Eric Kiruja, Supervisor
Permitting & Assistance Branch – North

Tim Kraus, REHS, LEA
Contra Costa Health Services

Responses to Letter 3 - CalRecycle

3-1 The comment states that per PRC 40191 and given the proposed daily volume of a solid waste the proposed facility could receive, receipt of hazardous, radioactive, or medical wastes is not permitted. See Response to Comment 1-5 above regarding eligible feedstock.

3-2 The comment requests clarification of how long the feedstock material will be stored in the storage bunkers or other designated material storage areas prior to being placed in the Raven SR's Reformation Technology system. See Responses to Comments 1-4 and 9-5 regarding potential odor control measures and impacts.

3-3 The comment specifies contact information for the project applicant and City to discuss the regulatory requirements for the proposed project. The project applicant acknowledges this requirement and shall comply.

3-4 The comment requests copies of any subsequent environmental documents, copies of public notices and any Notices of Determination for this proposed project, and specifies noticing timeframes. The Lead Agency will conduct all CEQA-related noticing and distribution of associated documents pursuant to CEQA Guidelines for an MND and City standards. Access to all project notices, documents and City actions on the project are available to the public at https://www.ci.richmond.ca.us/4365/Raven-SR-Bioenergy-Project.

LETTER 4

Department of Toxic Substances Control

Yana Garcia
Secretary for
Environmental Protection

Meredith Williams, Ph.D.
Director
8800 Cal Center Drive
Sacramento, California 95826-3200

Gavin Newsom
Governor

November 4, 2022

Lydia Elias, Planner 1
(Sent electronically to Lydia_Elias@ci.richmond.ca.us)
City of Richmond Planning Division
450 Civic Center Plaza-2nd Floor
Richmond, CA 94804
Phone: (510) 620-5558

Subject: Raven SR Bioenergy Project Draft Initial Study/Mitigated Negative Declaration (SCH 2022100145)

Dear Ms. Elias,

Thank you for the opportunity to review and comment on the draft Mitigated Negative Declaration for the Raven SR Bioenergy Project (SCH 2022100145). The Department of Toxic Substances Control (DTSC) has identified that your project may affect, and in turn be affected by, the West County Landfill Inc. Post-Closure Permit project (CAD041844002). The Post-Closure Project area is surrounded by the Class II portion of the West Contra Costa County Sanitary Landfill. Initial wastes received included demolition debris, municipal solid waste, and industrial waste. In later years, the site was designated to receive hazardous waste. The Project area has operated a corrective action groundwater monitoring program for the Hazardous Waste Management Facility (HWMF) since March 1996. This program consists of measuring leachate and groundwater levels to evaluate inward hydraulic gradients across the HWMF and E-22R slurry walls, and the semiannual sampling and analysis of groundwater from 33 wells to monitor groundwater quality in the surficial, shallow, and medium water-bearing zones (WBZs) beneath the Project area.

Additional information about the permit and groundwater contamination at the site is available here.

DTSC has the following comments on the draft Mitigated Negative Declaration and Initial Study for the Raven SR Bioenergy Project:

1. The proposed Raven SR Bioenergy Project's construction may destabilize the contamination at the West County Landfill Inc. Post-Closure Permit beyond its existing containment system. This may result in, the potential contamination of additional groundwater.
2. The groundwater monitoring system funnels leachate to a treatment area near the proposed Raven SR Bioenergy Project that may be damaged during construction.
3. DTSC believes that City of Richmond must address these concerns to avoid any significant impacts under CEQA that may occur and ensure that the West County Landfill Inc. Post-Closure care is operational during and after construction of the SR Bioenergy Project.

4-1 CONT.

Thank you for your assistance in protecting California's people and environment from the harmful effects of toxic substances. If you have any questions or would like any clarification on DTSC's comments, please contact Rebecca De Pont, Supervising Environmental Planner at (916) 255-3638 or Rebecca.Depont@dtsc.ca.gov.

Sincerely,

Rebecca De Pont

Rebecca De Pont
Supervising Environmental Planner, Permitting Division
Department of Toxic Substances Control

Responses to Letter 4 - Department of Toxic Substances Control

4-1 The comment claims that the project's construction may destabilize the contamination at the West County Landfill Inc. Post-Closure Permit beyond its existing containment system, and that the existing groundwater monitoring system may be damaged during construction, resulting in potential contamination of additional groundwater and significant impacts under CEQA. The analysis understands that the existing systems directs leachate from the landfill to the treatment area located near the proposed project site (IS/MND, Section 2.2 *Surrounding Uses and Conditions*). The Geotechnical Investigation report prepared for the proposed project (Rockridge, 2022) involved investigation to depths of approximately 150 feet on and around the site. The investigation confirmed that the maximum depth of disturbance required for the project, specifically the foundation pads necessary to support the proposed project (up to approximately 30 to 33 feet) would not disturb existing groundwater or monitoring stations of leachate flows or migration. Thus the proposed project would not destabilize the existing containment system or groundwater condition during construction. Further, as indicated in Response to Comment 1-6, the project shall be compliant with the Post Closure Maintenance Plans of the landfills, in accordance with project Condition No. 4.5, the Closure/Post Closure Maintenance Plan required by CalRecycle, the San Francisco Regional Water Quality Control Board (SFRWQCB), and the LEA for the existing WCCSL.

LETTER 5

CAPITOL OFFICE
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SUITE 8630
SACRAMENTO, CA 95814
TEL (916) 651-4009
FAX (916) 651-4909

DISTRICT OFFICE
1515 CLAY STREET
SUITE 2202
OAKLAND, CA 94612
TEL (510) 286-1333
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SENATOR.SKINNER@SENATE.CA.GOV

California State Senate

SENATOR
NANCY SKINNER
NINTH SENATE DISTRICT

CHAIR
BUDGET & FISCAL REVIEW
JOINT LEGISLATIVE BUDGET

VICE CHAIR
CALIFORNIA LEGISLATIVE WOMEN'S CAUCUS

COMMITTEES
ENVIRONMENTAL QUALITY
HOUSING
PUBLIC SAFETY
TRANSPORTATION

October 21, 2022

Lydia Elias
City of Richmond
Community Development Department
450 Civic Center Plaza, PO Box 4046
Richmond, CA 94804

RE: Support for Raven SR's Conditional Use Permit for Clean Hydrogen Facility

Dear Ms. Elias,

I am writing in support of Raven SR's Conditional Use Permit (CUP) application and CEQA Mitigated Negative Declaration (MND) for the construction and operation of a clean hydrogen/bioenergy facility at Republic Service's West Contra Costa County Sanitary Landfill.

As the author of statewide legislation to jumpstart California's use of hydrogen made from renewable sources, I am pleased that Raven is proposing to showcase a new clean hydrogen production technology in Richmond, using a waste-to-hydrogen process. In addition, Raven's innovative project will help the city divert more waste from landfills to meet California's goal of reducing organic waste disposal by 75% from 2014 levels by 2025.

I am also pleased that Raven has signed a Project Labor Agreement with the Contra Costa Building & Construction Trades Council and the I.B.E.W. Local #1245.

California has taken a leadership role in launching a clean hydrogen economy, and Richmond has the opportunity with Raven to advance clean fuels production and emissions reductions, and help our fight against climate change.

As such, I respectfully urge you approve Raven SR's CUP application and the CEQA MND so they may begin construction this year and start production in early 2023.

5-1

Sincerely,

Nancy Skinner

Nancy Skinner
State Senator, District 9

Responses to Letter 5 - California State Senate

5-1 The comment is in support of the proposed Project and notes that the proposed Project will help the City further divert waste from landfills to meet the State's goal of reducing organic waste disposal for target year 2025 (California's SB 1383). The comment also opines that the proposed Project's non-combustion system would reduce methane and short-lived climate pollutants from the landfill, and thus positive reduction in greenhouse gas emission. The comment does not address the adequacy of the analysis contained in the IS/MND. No additional analysis or response is required to this comment, however, it is noted and will be made available to City decision-makers as they consider the Project and whether or not to approve it.

LETTER 6

MCE Empowering Our Clean Energy Future
CONTRA COSTA | MARIN | NAPA | SOLANO

MARIN COUNTY | NAPA COUNTY | UNINCORPORATED CONTRA COSTA COUNTY | UNINCORPORATED SOLANO COUNTY
BENICIA | CONCORD | DANVILLE | EL CERRITO | FAIRFIELD | LAFAYETTE | MARTINEZ | MORAGA | OAKLEY
PINOLE | PITTSBURG | PLEASANT HILL | RICHMOND | SAN PABLO | SAN RAMON | VALLEJO | WALNUT CREEK

Lydia Elias
City of Richmond's Community Development Department
450 Civic Center Plaza, PO Box 4046
Richmond, CA 94804

October 20, 2022

Dear Ms. Elias,

Over the years, we have seen the incredible projects that have come to fruition in the City of Richmond. Keeping in tradition with this innovative, entrepreneurial spirit, we are pleased to watch the development of the Raven SR bioenergy facility at Republic Service's West Contra Costa County Sanitary Landfill.

MCE's mission is to confront the climate crisis by eliminating fossil fuel greenhouse gas emissions, producing renewable energy, and creating equitable community benefits. We understand the incredible impact that clean, green hydrogen offers California as we transition away from fossil fuels and decarbonize our economy. Raven SR's proposed hydrogen production is expected to not only produce a consistent high-value multi-use hydrogen supply, but also reduce our community waste streams *without* incineration. This would help us meet our organic waste diversion goals (Senate Bill 1383) while minimizing existing methane and greenhouse gas emissions, and would avoid contributions to localized criteria air pollutants. We understand Raven SR has a PLA with the Contra Costa Building & Construction Trades Council and IBEW Local 1245, helping to ensure the quality of jobs produced at this site.

6-1

We are excited about this proposed technology, and the engagement with strong partners. In addition, we're encouraged to see the project take root in Richmond as its first location.

In October, we attended an Alliance for Renewable Clean Hydrogen Energy Systems (ARCHES) event to discuss the possibilities that hydrogen offers California and how stakeholders must coordinate to obtain funds from the Department of Energy to create a regional Hydrogen Hub. It is likely that there could soon be strong demand for a limited supply of commercially available hydrogen. Raven's production is poised to take advantage of this growing demand to meet decarbonization goals. Using hydrogen for transportation fuel is especially important to displace the diesel emissions of long-haul vehicles which disproportionally pollute lower-income and communities of color adjacent to transportation corridors.

Thank you for your consideration. We are supportive of these efforts and look forward to this project becoming a key part of California's Northern California Hydrogen Hub in the future.

Sincerely,

Dawn Weisz, CEO

CONCORD OFFICE: 2300 Clayton Road, Suite 1150, Concord, CA 94520
SAN RAFAEL OFFICE: 1125 Tamalpais Avenue, San Rafael, CA 94901
mceCleanEnergy.org

Responses to Letter 6 - MCE

6-1 The comment is in support of the proposed Project and notes that the proposed Project will help the City further divert waste from landfills to meet the State's goal of reducing organic waste disposal for target year 2025 (California's SB 1383). The comment also opines that the proposed Project's non-combustion system would reduce methane and short-lived climate pollutants from the landfill, and thus positive reduction in greenhouse gas emission. The comment does not address the adequacy of the analysis contained in the IS/MND. No additional analysis or response is required to this comment, however, it is noted and will be made available to City decision-makers as they consider the Project and whether or not to approve it.

From: Kelly Malinowski
To: Lydia Elias
Cc: Samuel Garcia; Lily MacIver; Wendy Goodfriend; Alison Kirk
Subject: Raven SR Bioenergy Project
Date: Wednesday, October 19, 2022 2:44:33 PM

Hi Lydia,

We have reviewed the IS/MND for the Raven SR Bioenergy Project. We will not be sending a formal CEQA comment letter, but we did want to provide some additional dust mitigation measures that you could consider for the Construction Dust, related to AQ-1 Best Management Practices, below:

- BMP #6: All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph.
- BMP #7: All trucks and equipment, including their tires, shall be washed off prior to leaving the site.
- BMP #8: Unpaved roads providing access to sites located 100 feet or further from a paved road shall be treated with a 6- to 12-inch layer of compacted layer of wood chips, mulch, or gravel.
- Additional BMP: Limit the simultaneous occurrence of excavation, grading, and ground-disturbing construction activities.
- Additional BMP: Install wind breaks (e.g., trees, fences) on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity.
- Additional BMP: Plant vegetative ground cover (e.g., fast-germinating native grass seed) in disturbed areas as soon as possible and watered appropriately until vegetation is established
- Additional BMP: Install sandbags or other erosion control measures to prevent silt runoff to public roadways from sites with a slope greater than one percent.
- Additional BMP: Minimize the amount of excavated material or waste materials stored at the site.
- Additional BMP: Hydroseed or apply non-toxic soil stabilizers to construction areas, including previously graded areas, that are inactive for at least 10 calendar days.
- Require zero visible fugitive dust and use fence line air monitoring to demonstrate compliance with this requirement.
- Set requirements for when dust generating operations have to be shut down due to dust crossing the property boundary or if dust is contained within the property boundary but not controlled after a specified number of minutes.

7-1 CONT.

- Prohibiting grading on days when a Spare the Air is in effect (https://www.sparetheair.org/)
- Prohibiting grading on days with an Air Quality Index forecast of greater than 100 for particulates for the project area

CONT.

7-1

Please let us know if you have any questions, or would like to discuss!

Best,
Kelly

Kelly Malinowski, MPA | Senior Environmental Planner
Planning and Climate Protection Division
Bay Area Air Quality Management District
Office: 415-749-8673
Pronouns: she/her

Responses to Letter 7 - Bay Area Air Quality Management District

7-1 The comment provides additional dust mitigation measures for consideration, which the City and the project applicant has elected to incorporate in to Mitigation Measure AQ-1, as shown below.

- *Section 4.3, Air Quality, Criterion "b" (p. 39):*

  Mitigation Measures

  AQ-1: Best Management Practices.

  All subsequent projects, regardless of size, shall implement the following best management practices to reduce construction impacts, particularly fugitive dust, to a less-than-significant level:

  - All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day, except when not required for dust control.
  - All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
  - All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
  - All vehicle speeds on unpaved roads shall be limited to 15 mph.
  - All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
  - Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
  - All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.
  - Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.
  - <u>BMP #6: All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph.</u>
  - <u>BMP #7: All trucks and equipment, including their tires, shall be washed off prior to leaving the site.</u>
  - <u>BMP #8: Unpaved roads providing access to sites located 100 feet or further from a paved road shall be treated with a 6- to 12-inch layer of compacted layer of wood chips, mulch, or gravel.</u>

- Additional BMP: Limit the simultaneous occurrence of excavation, grading, and ground-disturbing construction activities.
- Additional BMP: Install wind breaks (e.g., trees, fences) on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity.
- Additional BMP: Plant vegetative ground cover (e.g., fast-germinating native grass seed) in disturbed areas as soon as possible and watered appropriately until vegetation is established.
- Additional BMP: Install sandbags or other erosion control measures to prevent silt runoff to public roadways from sites with a slope greater than one percent.
- Additional BMP: Minimize the amount of excavated material or waste materials stored at the site.
- Additional BMP: Hydroseed or apply non-toxic soil stabilizers to construction areas, including previously graded areas, that are inactive for at least 10 calendar days.
- Require zero visible fugitive dust and use fence line air monitoring to demonstrate compliance with this requirement.
- Set requirements for when dust generating operations have to be shut down due to dust crossing the property boundary or if dust is contained within the property boundary but not controlled after a specified number of minutes.
- Prohibiting grading on days when a Spare the Air is in effect (https://www.sparetheair.org/) Prohibiting grading on days with an Air Quality Index forecast of greater than 100 for particulates for the project area.

These modifications do not change the adequacy of the analysis or impacts identified in the IS/MND, and no further analysis is warranted, pursuant to the findings enumerated in Section 1 of this memo.

REPUBLIC SERVICES

LETTER 8

October 13, 2022

Lydia Elias
City of Richmond
Community Development Department
450 Civic Center Plaza, PO Box 4046
Richmond, CA 94804

Dear Lydia:

I am writing to provide our company's support of Raven SR's Conditional Use Permit (CUP) application and CEQA Mitigated Negative Declaration (MND) for the construction and operation of a bioenergy facility at Republic Service's West Contra Costa County Sanitary Landfill (WCCSL).

Raven SR has developed a new hydrogen production technology that will revolutionize waste-to-hydrogen production. The Richmond location will be the first project of its type and the community has a significant opportunity to receive recognition for being the host location for this innovative project from the pro-hydrogen focused State of California and US Department of Energy. This project will be recognized nationally as an industry shifting and innovative approach to clean green hydrogen production.

The Raven project will also develop an additional local, reliable, and compliant outlet for organic wastes to complement the current composting operation on site. In addition to providing a new source of clean, green hydrogen fuel, the Raven project will also help the City of Richmond further divert organic waste from landfills to meet California's SB 1383's goal of reducing organic waste disposal by 75% from 2014 levels by the compliance date of 2025.

8-1

CONT.

The development of the Raven project will generate jobs not only in the City of Richmond, but also ancillary jobs throughout the area through engineering, fabrication, construction, fuels providers, waste management, and many other areas. To this end, Raven has recently signed a Project Labor Agreement with the Contra Costa Building & Construction Trades Council and the I.B.E.W. Local #1245 relating to this project.

Because Raven's proprietary system utilizes a non-combustion process that generates minimal emissions, the project will reduce overall methane and short-lived climate pollutants emissions compared to other processes. Additionally, this project also provides a net positive reduction in greenhouse gases emissions when compared to other similar practices. This is an important and positive aspect to improving the air quality around the City of Richmond and surrounding communities.

California has taken a leadership role in the nation by launching the green hydrogen economy and setting aggressive greenhouse gas reductions goals. The City of Richmond

REPUBLIC SERVICES

has the opportunity along with Raven SR to lead in this advancement and these very important initiatives with this project. We believe development of projects such as the Raven SR bioenergy facility at the WCCSL are essential for meeting California's greenhouse gas initiatives reduction goals and making a difference towards reversing climate change.

CONT.

8-1

Thank you for your consideration and we respectfully request you approve Raven SR's CUP application and the CEQA MND so they may begin construction this year and start production in early 2023.

Sincerely,

Ken Lewis, P.E.
General Manager – North Bay

Responses to Letter 8 - Republic Services

8-1 The comment is in support of the proposed Project and notes that the proposed Project will help the City further divert waste from landfills to meet the State's goal of reducing organic waste disposal for target year 2025 (California's SB 1383). The comment also opines that the proposed Project's non-combustion system would reduce methane and short-lived climate pollutants from the landfill, and thus positive reduction in greenhouse gas emission. The comment does not address the adequacy of the analysis contained in the IS/MND. No additional analysis or response is required to this comment, however, it is noted and will be made available to City decision-makers as they consider the Project and whether or not to approve it.

LETTER 9

November 22, 2022

Lydia Elias, Planner 1
City of Richmond Planning Division
450 Civic Center Plaza—2nd Floor
Richmond, CA 94804
510-620-5558

Submitted electronically via lydia_elias@ci.richmond.ca.us

Re: Comment on Draft Initial Study/Mitigated Negative Declaration (IS/MND) for Raven SR Bioenergy Project (PLN21-282)

Dear Ms. Elias,

Please accept these comments from the undersigned organizations concerning the Draft Initial Study and Mitigated Negative Declaration (IS/MND) for the Raven SR Bioenergy Project, Project No. PLN21-282 (Project). We are thankful for the opportunity to share our concerns during this extended comment period. For the reasons described below, we do not believe the analysis supporting the IS/MND is sufficient, and therefore request that you produce a full Environmental Impact Report (EIR).

Raven SR Inc. (Applicant) proposes the construction of a novel technology for creating hydrogen that has no real precedent, making the need to do a thorough environmental impact analysis even more important. We would like to work collaboratively with the City Planning Division to ensure that the already overburdened community in North Richmond does not face any unexpected cumulative impacts from this new project. While the project is being touted as green, such claims should not influence the need for thorough in-depth analysis of Project impacts under the California Environmental Quality Act (CEQA). We believe the City should be asking many more questions, and providing the public with transparent answers about the scope of the Project; and answering them in a full EIR.

I. Outstanding air permit items must be resolved and disclosed in order to properly assess the Project's potential environmental impact

On May 11, 2022, the Bay Area Air Quality Management District (BAAQMD) determined that the Air Permit Application to construct the Raven SR Bioenergy Project (Application #31700) was incomplete. BAAQMD, as a responsible agency, needs complete information to weigh in on the review; and accordingly, the City needs such information to fully evaluate the Project's air quality impacts. The Air Permit Application remains a live application

9-1 CONT.

under review and the City's IS/MND does not include a disclosure or assessment of essential information requested by BAAQMD in its letter.

Specifically, BAAQMD flagged a staggering 57 missing or incomplete items that still need to be disclosed and analyzed, including important information needed to assess community health impacts—such as missing Health Risk Assessment (HRA) forms for specific emission sources, missed potential sources of emissions (i.e. lime stored onsite and biochar if stored onsite), confirmation that formaldehyde would not be released from the bioengines, and clear enforceable limits on flare use. Until and unless all 57 concerns are addressed, the City should not move forward with a MND. Full information regarding air pollutant loads and impact is all the more important because the Project would be located in an already overburdened community. 9-1 CONT.

II. Exceedances of chronic and acute thresholds for toxic chemicals trigger the need for a Health Risk Assessment (HRA)

Based on the current version of the BAAQMD Air Permit Application, emissions from the biogas engines powered by landfill gas (LFG) exceed chronic and acute thresholds that trigger the need for a Health Risk Assessment (HRA) under Rule 2-5 for eight different toxic chemicals. Acute HRA limits are exceeded for formaldehyde, while chronic limits are exceeded for 1,3-butadiene, acetaldehyde, acrolein, ammonia, benzene, diesel particulate matter (PM), formaldehyde, and naphthalene.

We also request that the City be conservative in determining the scope of an HRA for these chemicals. According to the Initial Study, an HRA was not conducted for the impacts of diesel PM from construction because sensitive receptors are not within 1,000 ft of the site and due to "trigger levels not applying to the project". However, there are sensitive receptors (residences) within 0.75 miles, an elementary school within 1.1 mile and a health clinic within 1.2 miles, which is still close enough to warrant full analysis. In reviewing Rule 2-5, it is unclear why HRA trigger levels would not apply to this project. Further, while emissions of criteria pollutants NOx and VOCs are estimated to be below the BAAQMD threshold for significant impact, they are extraordinarily close to the threshold. NOx emissions are estimated at 9.05 tons per year (tpy) and VOCs at 9.19 tpy, both with a threshold of 10 tpy. 9-2

III. Cumulative pollution impacts should be considered more fully

Increased emissions from this project adds to the cumulative pollution impacts of the many projects currently in operation and primed for development in North Richmond and adjacent Richmond areas—which is one of the most pollution burdened areas of the state.[1] Full 9-3 CONT.

[1] OEHHA, CalEnviroScreen 4.0. Available at https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40.

and robust cumulative impacts analysis, as required under CEQA, is thus particularly critical here.

Two cumulative impacts stand out with particular importance. First, there will be increased truck traffic as a result of this project, which is expected to add 100 trips per day of heavy duty trucks. The Initial Study minimizes the importance of this increase as 'not significant' because the area already has high truck volumes. However, this reasoning is exactly backwards: the existing high truck volumes *points to the need* to carefully assess potential cumulative impacts from even more heavy duty trucks. This is particularly so given, as described above, how close NOx and VOC pollutant emissions will potentially come to the BAAQMD threshold for significant impacts.

Second, there are two other hydrogen-related projects being evaluated by and/or within the City that are not recognized in this IS/MND:[2,3] Chevron has proposed to expand its production of hydrogen for retail sale and Chevron has also proposed an almost certainly related application to construct a hydrogen fueling station. Chevron's production expansion will result in increased air pollutant emissions; and it is very possible, in the absence of information to the contrary, that the hydrogen produced at the Project would be marketed via, *inter alia*, the proposed filling station. Yet these two other projects were not even mentioned in the MND. 9-3 CONT.

All three projects should have been addressed in the IS/MND for a cumulative impacts analysis. Pollution increases from the Chevron production project should have been considered cumulatively with pollutant emissions from this Project. To the extent it remains unclear whether the hydrogen produced by the Raven project will be marketed at the proposed Chevron filling station, the City should have asked that question of Chevron and Raven, and adjusted its analysis accordingly - possibly even considering the two projects in one EIR, but at the very least considering their impacts cumulatively. Richmond is overall being driven toward a hydrogen economy that has the potential to be highly polluting, risking the health and safety of residents[4,5]; and it behooved the City to consider that direction as a whole before simply signing off on only one corner of it.

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[2] Chevron U.S.A. Inc., Chevron, Iwatani Announce Agreement to Build 30 Hydrogen Fueling Stations in California. *Available at* https://www.chevron.com/newsroom/2022/q1/chevron-iwatani-announce-agreement-to-build-30-hydrogen-fueling-stations-in-california.

[3] Raven SR, Renewable fuels company Raven SR announces strategic investment from Chevron, ITOCHU, Hyzon Motors and Ascent Hydrogen Fund. *Available at* https://ravensr.com/investment-from-chevron-itochu-hyzon-motors-and-ascent-hydrogen-fund/.

[4] Chevron U.S.A. Inc., Chevron, Iwatani Announce Agreement to Build 30 Hydrogen Fueling Stations in California. *Available at* https://www.chevron.com/newsroom/2022/q1/chevron-iwatani-announce-agreement-to-build-30-hydrogen-fueling-stations-in-california.

[5] Raven SR, Renewable fuels company Raven SR announces strategic investment from Chevron, ITOCHU, Hyzon Motors and Ascent Hydrogen Fund. *Available at* https://ravensr.com/investment-from-chevron-itochu-hyzon-motors-and-ascent-hydrogen-fund/.

IV. The biogas engines using landfill gas involves combustion, and the air pollution impacts of this combustion should be analyzed in more detail

Landfill gas is primarily methane and CO_2, but it also contains many toxic chemicals from the landfill contents. Based on past studies, biogas engines have potential to emit multiple toxic chemicals that are associated with the landfill contents.[6] The Project includes the use of biogas engines to power the hydrogen extraction and purification process, and results in emissions of both criteria air pollutants and toxic air contaminants. While the Initial Study mentions the existing biogas engines already onsite and a lower emission profile from the new engines, it does not appear that the likely increased volume of landfill gas processed by the biogas engines was taken into account. A thorough multi-criteria lifecycle assessment is important to understanding the relevant air quality impact of the new biogas engines.

9-4

V. The odor mitigation plan is inadequate

The proposed odor mitigation measures are insufficient. The Initial Study states that the method of odor control would be to employ "control measures similar as those currently employed by WCCSL [West Contra Costa Sanitary Landfill]." However, those measures have already proven insufficient, as local residents are currently complaining of odors from WCCSL.

Moreover, possible solutions are framed as a form of deferred mitigation, a proposal to address an odor problem only if it arises later rather than a plan to address it from the start. CEQA requires concrete and immediate mitigation plans, not promises to develop mitigation in the future.

And it is fairly clear that odor is going to be a problem. The site of this facility that would have piles of putrescible green waste is approximately 158 feet closer to residences than the existing composting facility. The IS claims that "nuisance odor from Raven is unlikely since feedstock material would only be on the feedstock management area floor for relatively short periods of time." However, the air permit lists the duration of feedstock onsite as 12 hours. Since the facility is running 24/7, it seems unavoidable that there would be compost and green waste onsite at all times.

9-5

VII. Potential to convert and create other fuels

Finally, the Raven SR patented technology covers other fuel products that have greater climate implications than hydrogen. We question whether the intended use of the facility is fully

9-6

[6] Konkol et al, 2022. *Biogas Pollution and Mineral Deposits Formed on the Elements of Landfill Gas Engines*. Materials. *Available at* https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8999940/

disclosed, and whether there is any potential that the facility could be used down the line to make liquid fuels such as alternative aviation fuel. The Initial Study should have explored that possibility. 9-6 CONT.

VI. Conclusion

We appreciate the opportunity to comment on this project and are especially grateful for the extension of the comment period. We hope to work collaboratively with the City to ensure the full consideration of impacts to the community of North Richmond.

Sincerely,

Connie Cho, CBE Attorney
Tessa Wardle, CBE Staff Researcher
Communities for a Better Environment

Teresa Cheng, Senior Campaign Representative
Sierra Club

Faraz Rizvi, Campaign and Policy Manager
Asian Pacific Environmental Network

Katt Ramos, Managing Director
Richmond Our Power Coalition

Kiara Pereira, Just Transition Organizer
Rafael Castro, Just Transition Organizer
Urban Tilth

Ann Alexander, Senior Attorney
Natural Resources Defense Council

Responses to Letter 9 - Environmental Justice Groups

9-1 The comment asserts that the outstanding air permit items for the proposed project must be resolved and disclosed in order to properly assess the project's potential environmental impact. The CEQA and permitting processes are separate and distinct. The pendency of the air permit should not impact the CEQA process, rather the air permit will be constrained by CEQA.

The project applicant is working closely with the BAAQMD to acquire an air permit for the project. The information provided in the IS/MND reflects the best air emissions data available from the applicant at the time of publication for determining significance of the project. The final IS/MND include updates to the emission totals that are associated with updates to the permit application materials due to the applicant's discussions with the air district. The emissions presented in the IS/MND are not anticipated to undergo any considerable changes prior to the issuance of an air permit. As such, the IS/MND is reflective of the best available information for assessing potential impacts to the atmospheric environment under BAAQMD guidance. No further analysis is warranted.

9-2 The comment asserts that exceedances of chronic and acute thresholds for toxic chemicals trigger the need for a Health Risk Assessment (HRA). The emissions of toxic air contaminants do exceed trigger thresholds for an HRA under air permitting rules and a HRA will be produced as part of the air permitting process. For permitting, a HRA is triggered by the project exceeding emission limits, irrespective of its location and proximity to sensitive receptors. However, under CEQA, we use HRA as a tool to answer checklist question 3 - whether the project would expose sensitive receptors to substantial pollutant concentrations. The BAAQMD recommends methodology and thresholds that can be used in this CEQA analysis. Since the checklist question specifically talks about exposure of sensitive receptors (and not emissions levels), using the BAAQMD's recommended zone of influence of 1000 feet is a reasonable way to screen for impacts and determine a less than significant impact if there are no receptors within that distance

For the proposed project and under the BAAQMD CEQA guidance, an HRA must be conducted for sensitive receptors identified within 1,000 feet of the project facility property line. However, no sensitive receptors exist within that buffer distance, nor within a distance of 2,000 feet of the property line. Given that the project does not have sensitive receptors within the distances indicated by the BAAQMD, an HRA was not developed as part with e CEQA IS/MND, but an HRA will be produced as part of the air permitting process. No further analysis is warranted.

9-3 The comment asserts that cumulative pollution impacts should be considered more fully in the IS/MND analysis. Similar to Response to Comment 9-2 regarding developing a HRA, the BAAQMD guidance indicates that a cumulative health risk analysis should be conducted for all sources within 1,000 feet of the project property line, but no the BAAQMD screening tool indicates that no additional sources exists within that distance. Additionally, no sensitive receptors are within 1,000 feet of the project property line, thereby negating the need for an HRA. A cumulative risk analysis is not provided as part of the IS/MND. No further analysis is warranted.

9-4 The comment claims that the biogas engines using landfill gas involve combustion, and the air pollution impacts of this combustion should be analyzed in more detail than presented in the IS/MND analysis. The air permitting process being conducted by the applicant to acquire a permit from the BAAQMD will

provided the additional detail that is being requested. As noted in Response to Comment 9-1, the most up to date estimates of air emissions from operation of the facility have been provided in the IS/MND and compared against the BAAQMD's thresholds for significance. No further analysis is warranted.

9-5 The comment opines that the odor mitigation plan is inadequate due to the efficacy of the existing WCCSL odor control measures, the operational storage characteristics of the feedstock materials. The comment also cites that the project operation would be approximately 158 feet closer than the existing WCCLS to existing residents; that distance is currently 1,750 feet from the WCCSL.

The IS/MND states that "nuisance odor from Raven is unlikely since feedstock material would only be on the feedstock management area floor for relatively short periods of time." The project applicant and operator, in coordination with City and BAAQMD staff, have further detailed the draft conditions of approval to fully address Raven operations specifically. As stated in Response to Comment 1-4, all incoming organic feedstock material shall be received and stored under roof in designated areas and shall be processed within 48 hours of receipt. Response to Comment 1-4 further details the requirements of Condition No. 19.3 that is consistent with Contra Costa County requirements prior to commissioning and operation of the facility. As with all conditions of approval, the proposed project's adherence is presumed as part of the project, even though full text of conditions may not be stated in the environmental document.

The environmental impact under CEQA remains less than significant according to the applicable CEQA significance criteria, as analyzed in IS/MND Section 4.3, *Air Quality* (criterion "d"), which assumes adherence to Condition 19.3. No mitigation measure is required. For clarity and update, the following update is made to the IS/MND:

- *Section 4.3, Air Quality, Criterion "d" (p. 41):* Nuisance odor from Raven is unlikely since feedstock material would only be on the feedstock management area floor for relatively short periods of time; all incoming organic feedstock material shall be received and stored under roof in designated areas and shall be processed within 48 hours of receipt, pursuant to project Condition No. 19.3, which is incorporated as part of the proposed project…

  …The project ~~may~~ will incorporate control measures similar to those current employed by WCCSL, but expanded and tailored per project Condition No. 19.3, such as ensuring the input of feedstock into the system within a designated period of time from receiving it from WCCSL's onsite organic material processing facility to prevent potential odor buildup; routine cleaning of floors, walls, and equipment; use of odor suppressants as deemed necessary. Also pursuant to Condition No. 19.3, o~~O~~dor control would be added to the management area if objectionable odors occur. The Raven facility ~~could~~ would also store topical treatment solutions (non-toxic and biodegradable) onsite, which would be applied to neutralize odors if an immediate need arises.

LETTER 10

November 7th, 2022

Lydia Elias
City of Richmond
Community Development Department
450 Civic Center Plaza, PO Box 4046
Richmond, CA 94804

Dear Lydia,

I am writing in support of Raven SR's Conditional Use Permit (CUP) application and CEQA Mitigated Negative Declaration (MND) for the construction and operation of a bioenergy facility at Republic Service's West Contra Costa County Sanitary Landfill.

Raven's Waste to Renewable Hydrogen Project will provide important progress enabled by innovations in California policy and the hydrogen industry. Raven SR is providing the City of Richmond the opportunity to showcase a new hydrogen production technology that will revolutionize waste-to-hydrogen production. The focus in California policy on renewable content and carbon intensity enables the diversity of hydrogen production methods to make the best use of renewable feedstocks in California. Innovations improving the gaseous hydrogen approach by companies like Shell Hydrogen – including high-pressure high-capacity tube trailers that triple capacity while halving cost and refueling stations that enable up to 95% usable fraction – enable a market for distributed hydrogen production with significant benefits for the safety, environment, and economy in California. Please consider:

- New hydrogen production facilities can be built by a wide range of innovative companies, deploying technologies and production pathways that make the very best use of renewable resources in California.

- New hydrogen production facilities can be built in California, close to market, making use of local renewable resources and creating local employment and economic development.

- Hydrogen supply for mobility can become reliable and resilient most quickly, with rapid increase in the number and diversity of production facilities and in the aggregate hydrogen storage capacity in the system.

- Distributed gaseous hydrogen supply for mobility can be safer, lower cost and lower carbon intensity than centralized liquid hydrogen by avoiding the capital cost and energy requirements for liquefaction; minimizing the road transport distances,

10-1

costs, and emissions; and enabling storage without product loss to boil-off.

In closing, Shell is committed to a low carbon energy future, with more and cleaner energy, and is working to become a net-zero energy business by 2050 or sooner in step with society. Shell already offers customers a range of decarbonized renewable power, fuels, and energy products, including hydrogen dispensed as a transportation fuel. Thank you for your consideration and I respectfully ask that you approve Raven SR's CUP application and the CEQA MND so they may begin construction this year and start production in early 2023.

10-1 CONT.

Sincerely,

Humberto Orantes

Humberto Orantes
Acting Commercial Head, North America
Shell Hydrogen

Responses to Letter 10 - Shell Hydrogen

10-1 The comment is in support of the proposed Project and does not address the adequacy of the analysis contained in the IS/MND. No additional analysis or response is required to this comment, however, it is noted and will be made available to City decision-makers as they consider the Project and whether or not to approve it.

LETTER 11

POWER ENGINEERS, INC.
2041 SOUTH COBALT POINT WAY
MERIDIAN, ID 83642 USA

PHONE 208-288-6100
FAX 208-288-6199

Lydia Elias
City of Richmond
Community Development Department
450 Civic Center Plaza, PO Box 4046
Richmond, CA 94804

November 7, 2022

Subject: Raven SR Conditional Use Permit (CUP)

Dear Lydia,

I am writing to provide my support of Raven SR's Conditional Use Permit (CUP) application and CEQA Mitigated Negative Declaration (MND) for the construction and operation of a bioenergy facility at Republic Service's West Contra Costa County Sanitary Landfill.

Raven SR has developed a new hydrogen production technology for waste-to-hydrogen production. Richmond will be their first location, and the community has a significant opportunity to receive attention in the current pro-hydrogen focus by the State of California and Department of Energy. In addition to providing clean hydrogen fuel for the Bay area, Raven will also help Richmond further divert waste from landfills to meet California's SB 1383's goal of reducing organic waste disposal by 75% from 2014 levels (up to 27 M tons of organic waste) by 2025.

The development of the Raven systems will generate jobs not only in Richmond, but also ancillary jobs through the fabrication, fuels providers, engineering, waste management and so many other areas. Raven has signed a Project Labor Agreement with the Contra Costa Building & Construction Trades Council and the I.B.E.W. Local #1245. 11-1

Because Raven's system is non-combustion with minimal emissions, they will actually be reducing methane and short-lived climate pollutants from the landfill, and there will be a positive reduction in greenhouse gases. This is such a positive aspect to improving the air around the Richmond area.

California has taken a leadership role in the nation for launching the hydrogen economy, and Richmond has the opportunity with Raven SR to lead the advancement of clean fuels production, emissions reduction, and reversing climate change in the East Bay region.

Thank you for your consideration and we respectfully request you approve Raven SR's CUP application and the CEQA MND so they may begin construction this year.

Respectfully Submitted,

James P. Hays, PE
Business Unit Director, POWER Engineers

Responses to Letter 11 - Powers Engineers

11-1 The comment is in support of the proposed Project and notes that the proposed Project will help the City further divert waste from landfills to meet the State's goal of reducing organic waste disposal for target year 2025 (California's SB 1383). The comment also opines that the proposed Project's non-combustion system would reduce methane and short-lived climate pollutants from the landfill, and thus positive reduction in greenhouse gas emission. The comment does not address the adequacy of the analysis contained in the IS/MND. No additional analysis or response is required to this comment, however, it is noted and will be made available to City decision-makers as they consider the Project and whether or not to approve it.

LETTER 12

TRAC
Trails for Richmond Action Committee

73 Belvedere Avenue
Richmond, CA 94801
Phone/Fax 510-235-2835
tracbaytrail@earthlink.net

October 27, 2022

VIA Email:
Ms. Lydia Elias, Planner I
City of Richmond Planning Division

Dear Ms, Elias:

TRAC, the Trails for Richmond Action Committee, would like to comment on the October 7 Draft IS/MND for the Raven SR Bioenergy Project (PLN21-282).

The project site is very close to the Landfill Loop Trail, which is part of the regional San Francisco Bay Trail as shown on the attached Bay Trail map for Richmond. However, the draft IS/MND in many locations erroneously refers to the Wildcat Marsh Trail, e.g. in Sections 1.10, 2.9 & 4.1a and on Figure 4.1-1. The Wildcat Marsh Trail is located on West County Wastewater District property, whereas the Landfill Loop Trail is located on the Republic Services site of the Raven SR facility as shown by the attached orientation map posted at the Landfill Loop trailhead staging area. 12-1

Section 4.12 Noise and Vibration: The nearest noise-sensitive receptors would be those walking, bicycling and bird watching on the Landfill Loop Trail. Noise impacts on trail users should be assessed and mitigated as appropriate. 12-2

TRAC hopes that these comments will prove helpful in finalizing the IS/MND.

Sincerely,

Bruce Beyaert, TRAC Chair

Attachments:
Richmond Bay Trail Map
Wildcat Marsh & Landfill Loop Trail orientation map


Bay Trail
Complete
Incomplete
Connector Trail
Complete
Incomplete
Water Trail site
Water Trail site (planned)
Parks/Open Space
Water Bodies
Raven SR Bioenergy
Welcome to Richmond
Over 36 miles of Bay Trail linking a necklace of 12 shoreline parks
August 2022
Point Wilson
Point Pinole Regional Shoreline
Atlas Rd
San Pablo Ave
Richmond
Goodrick Ave
Richmond Parkway
San Pablo
Landfill Loop Trail
Wildcat Creek Trail
Wildcat Marsh Trail
Point San Pablo
Point San Pablo Yacht Harbor
Gertrude Ave
Hensley St
Winehaven Historic District
Point Molate
Point Molate Beach Park
Richmond
Pennsylvania Ave
Barrett Ave
Nevin Ave
West Macdonald
Richmond BART Station
Richmond Museum of History
Castro St
Richmond Pkwy
Garrard Blvd
Stenmark Dr
Trail Open — Pilot Project
Richmond-San Rafael Bridge
80
El Cerrito
Ohio Ave
Richmond Greenway
Richmond Wellness Trail
23rd St
Point Richmond
Cutting Blvd
Boat Ramp St
Hoffman
Wright
580
El Cerrito del Norte BART Station
Ohlone Greenway
Keller Beach
Canal Blvd
Regatta Blvd
Marina Bay Pkwy
Miller-Knox Regional Shoreline
Doman Dr
Harbour Way South
Marina Wy
Hall
Marina Bay
Marina Bay Park
51st St
Brickyard Cove
Kaiser Shipyard 3
To Point Isabel Regional Shoreline
Ferry Point
SS Red Oak Victory
Point Potrero
Lucretia Edwards Park
Jay & Barbara Vincent Park
Shimada Park
Richmond-San Francisco Ferry Terminal
Rosie the Riveter/ WWII Home Front NHP Visitor Center
Point Isabel Regional Shoreline
Brooks Island
N
0 0.25 0.5 0.75 1 MILES

WILDCAT MARSH & LANDFILL LOOP TRAIL

A part of the San Francisco Bay Trail

The story of this portion of the Bay Trail is one based on the very essence of today's meaning of "green." Non-existent until now, the trail incorporates fantastic views of San Pablo Bay, Wildcat and San Pablo Creeks with remarkable examples of industrial water conservation and reuse, resource recovery, electrical generation, recycling and recreation.

Map Legend

	Bay Trail suitable for walking, biking, roller skating & wheelchair access
	Bay Trail of compacted aggregate
0.00 mi	Distance markers and mileage between two markers
	Future Bay Trail
	Connector Trail
P Parking	Drinking Water
Picnic area	Restrooms

AS A WORKING INDUSTRY, Republic Services has established regulations that will assure continued public enjoyment of this unique portion of the Bay Trail that is located on private landfill property. Visitors use the trail at their own risk.

NOT ALLOWED: No dogs (excepting seeing eye dogs) or horses. No fishing or swimming, fires, fireworks or firearms, smoking, camping, motorized vehicles, boating, alcoholic beverages, straying off trail, climbing fences or on shoreline riprap, or feeding of wildlife. Bicycles are not allowed on the upper trail.

HOURS: The Landfill Loop Trail is generally open 8:30 a.m. to 4 p.m., seven days a week. **The gates are locked at 5 p.m.** The trail will be closed on the following holidays: New Year's Day, Easter, July 4, Labor Day, Thanksgiving and Christmas. Some trail sections may be closed for routine maintenance. Call 510-262-1660 for trail information. Wildcat Creek Trail Head and Wildcat Marsh Trail are open dawn to dusk.

Credit for the Landfill Loop Trail goes to Larry Burch and Jay Vincent for their vision, and to Republic Services, Inc., and the Trails for Richmond Action Committee (TRAC) for carrying out this vision. Credit for the Wildcat Marsh Trail goes to East Bay Regional Park District for building and maintaining it, to West County Wastewater District for making their land available, and to funding from both the San Francisco Bay Trail Project and voter approval of East Bay Regional Park District Measure CC.

Responses to Letter 12 - Trails for Richmond Action Committee (TRAC)

12-1 The comment distinguishes the existing Landfill Loop Trail from the Wildcat Marsh Trail, both of which are part of the regional San Francisco Bay Trail. In the following instances, the IS/MND is updated to specify the two facilities that exist near to the proposed Project site.

- *Section 1.10, p. 6:* Figure 1-3 shows the closest structure and development is the Golden Bear Waste Recycling Facility approximately 300 feet southwest of the proposed project location, and the West County Wastewater District Treatment Plant and the Landfill Loop~~Wildcat Marsh~~ Trail and trail head parking exist approximately 1,000 feet east of the project location.

- *Section 2.9, p. 22:* As part of the proposed project, off-site landscaping improvements to the Landfill Loop~~Wildcat Marsh~~ Trail and trail head parking located approximately 1,000 feet east of the project location. Due to limited space and potential safety hazards, no new plants or vegetation will be installed within the Raven project site. Instead, new trees will be added to the public parking area near the trailhead.

- *Section 4.1a and Figure 1-1:* **Figure 4.1-1, Landfill Loop~~Wildcat Marsh~~ Trail Approach Toward Project Site (from East)**, captures part of the project site that would be visible to users of this public trail.

These modifications do not change the adequacy of the analysis or impacts identified in the IS/MND, and no further analysis is warranted, pursuant to the findings enumerated in Section 1 of this memo.

12-2 The comment asserts that trail users should be considered the nearest noise-sensitive receptors to the proposed Project and factored into the noise analysis. This consideration would not be consistent with the City's established approach to noise analyses in other CEQA documents for project located adjacent to public trails. Moreover, users of the trail would be electing their activity in the noise environment and would be a temporary, relatively short-term recreational users, unlike residences, schools and medical facilities or wildlife species. No additional analysis is warranted in response to the comment.

Benicia Fabrication & Machine

101 East Channel Rd
Benicia, CA 94510
Phone (707) 745-8111
Fax (707) 745-8102
www.beniciafab.com

10/20/2022

Lydia Elias
City of Richmond
Community Development Department
450 Civic Center Plaza, PO Box 4046
Richmond, CA 94804

Dear Lydia,

I am writing to provide our company's support of Raven SR's Conditional Use Permit (CUP) application and CEQA Mitigated Negative Declaration (MND) for the construction and operation of a bioenergy facility at Republic Service's West Contra Costa County Sanitary Landfill.

Raven SR has developed a new hydrogen production technology that will revolutionize waste-to-hydrogen production, and as Richmond will be their first location, the community has a significant the opportunity to receive attention in the current pro-hydrogen focus by the State of California and Department of Energy. In addition to providing clean hydrogen fuel for the Bay area, Raven will also help Richmond further divert waste from landfills to meet California's SB 1383's goal of reducing organic waste disposal by 75% from 2014 levels (up to 27 M tons of organic waste) by 2025.

The development of the Raven systems will generate jobs not only in Richmond, but also ancillary jobs through the fabrication, fuels providers, engineering, waste management and so many other areas. Raven has signed a Project Labor Agreement with the Contra Costa Building & Construction Trades Council and the I.B.E.W. Local #1245.

Because Raven's system is non-combustion with minimal emissions, they will actually be reducing methane and short-lived climate pollutants from the landfill, and there will be a positive reduction in greenhouse gases. This is such a positive aspect to improving the air around the Richmond area.

California has taken a leadership role in the nation for launching the hydrogen economy, and Richmond has the opportunity with Raven SR to lead the advancement of clean fuels production, emissions reduction, and reversing climate change in the East Bay region.

Thank you for your consideration and we respectfully request you approve Raven SR's CUP application and the CEQA MND so they may begin construction this year and start production in early 2023.

Sincerely,

Carmelo Santiago
CEO & President
Benicia Fabrication & Machine, Inc.

Responses to Letter 13 - Benicia Fabrication & Machine

13-1 The comment is in support of the proposed Project and notes that the proposed Project will help the City further divert waste from landfills to meet the State's goal of reducing organic waste disposal for target year 2025 (California's SB 1383). The comment also opines that the proposed Project's non-combustion system would reduce methane and short-lived climate pollutants from the landfill, and thus positive reduction in greenhouse gas emission. The comment does not address the adequacy of the analysis contained in the IS/MND. No additional analysis or response is required to this comment, however, it is noted and will be made available to City decision-makers as they consider the Project and whether or not to approve it.

LETTER 14

Contra Costa Building and Construction Trades Council

2727 Alhambra Ave. Suite 5
Martinez, CA 94553
FAX (925) 372-7414

Bill Whitney
C.E.O.
Phone (925) 228-0900

October 17, 2022

Lydia Elias
City of Richmond
Community Development Department
450 Civic Center Plaza, PO Box 4046
Richmond, CA 94804

Dear Ms. Elias,

On behalf of the Contra Costa Building & Construction Trades Council we are writing in support of Raven SR's Conditional Use Permit (CUP) application and CEQA Mitigated Negative Declaration (MND) for the construction and operation of a bioenergy facility at Republic Service's West Contra Costa County Sanitary Landfill.

Raven SR is poised to place the City of Richmond front and center in the production of clean hydrogen fuels not only in the Bay Area, but in the State of California. We have the opportunity to showcase a new hydrogen production technology that will revolutionize waste-to-hydrogen production. No longer will we be dependent on our hydrogen being shipped in from out of state, and we will ensure energy security for the owners of commercial and passenger hydrogen vehicles.

In addition to providing clean hydrogen fuel to our community, Raven will also help the City further divert waste from landfills to meet California's SB 1383's goal of reducing organic waste disposal by 75% from 2014 levels (up to 27 M tons of organic waste) by 2025. 14-1

Because Raven's system is non-combustion with minimal emissions, the company will actually be reducing methane and short-lived climate pollutants from the landfill, and we will see a positive reduction in greenhouse gases in our community. Clearly this project advances the production of clean fuels, as well as reducing emissions, and a crucial step in reversing climate change.

This project will be built with a PLA which means middle class, skilled and trained Union jobs. Local hire, apprenticeship training, and a veteran hire program are additional community benefits of the PLA.

We respectfully request that you approve Raven SR's CUP application and the CEQA MND so they may begin construction this year, which creates jobs for our Union workers, and starts the production of clean hydrogen as early as 2023.

Sincerely,

William Whitney

Responses to Letter 14 - Contra Costa Construction and Building Trades Council

14-1 The comment is in support of the proposed Project and notes that the proposed Project will help the City further divert waste from landfills to meet the State's goal of reducing organic waste disposal for target year 2025 (California's SB 1383). The comment also opines that the proposed Project's non-combustion system would reduce methane and short-lived climate pollutants from the landfill, and thus positive reduction in greenhouse gas emission. The comment does not address the adequacy of the analysis contained in the IS/MND. No additional analysis or response is required to this comment, however, it is noted and will be made available to City decision-makers as they consider the Project and whether or not to approve it.

WATLOW®

October 14, 2022

Lydia Elias
City of Richmond
Community Development Department
450 Civic Center Plaza, PO Box 4046
Richmond, CA 94804

Dear Lydia,

I am writing to provide Watlow's support of Raven SR's Conditional Use Permit (CUP) application and CEQA Mitigated Negative Declaration (MND) for the construction and operation of a bioenergy facility at Republic Service's West Contra Costa County Sanitary Landfill.

Raven SR has developed a new hydrogen production technology that will revolutionize waste-to-hydrogen production, and Watlow has been a proud technology partner providing our thermal expertise, engineering assistance and partnership towards this exciting and promising new technology.

We commend Richmond's vision and leadership becoming the first location to implement Raven's SR2 Reformer, representing the opportunity to receive both recognition and attention by the State of California and Department of Energy related to their desire to promote the hydrogen economy.

Watlow remains committed to Raven's efforts and we share a passion for providing leading products and solutions contributing to the advancement of clean fuels production, emissions reduction and energy transition.

Thank you for your consideration and we respectfully request that you approve Raven SR's CUP application and the CEQA MND so they may begin construction this year and start production in early 2023.

Please let me know if Watlow can be of any further assistance to you on your decision process.

Sincerely,

Ashish Bhatnagar

Dr. Ashish Bhatnagar
Chief Technology Officer
Watlow

12001 Lackland Road • St. Louis, Missouri 63146 USA
Phone: 314-878-4600 • www.watlow.com

Responses to Letter 15 - Watlow

15-1 The comment is in support of the proposed Project and does not address the adequacy of the analysis contained in the IS/MND. No additional analysis or response is required to this comment, however, it is noted and will be made available to City decision-makers as they consider the Project and whether or not to approve it.

LETTER 16

IRON WORKERS LOCAL 378

UNION OFFICE OF BRIDGE, STRUCTURAL, ORNAMENTAL AND REINFORCING

3120 Bayshore Road, Benicia CA 94510 | www.ironworkers378.org

P. (707) 746-6100 | F. (707) 746-0979

October 13, 2022

Lydia Elias
City of Richmond
Community Development Department
450 Civic Center Plaza, PO Box 4046
Richmond, CA 94804

Dear Mrs. Elias,

On behalf of the Iron Workers Local 378, we are writing in support of Raven SR's Conditional Use Permit (CUP) application and CEQA Mitigated Negative Declaration (MND) for the construction and operation of a bioenergy facility at Republic Service's West Contra Costa County Sanitary Landfill.

Raven SR is poised to place the City of Richmond front and center in the production of clean hydrogen fuels not only in the Bay Area, but in the State of California. We have the opportunity to showcase a new hydrogen production technology that will revolutionize waste-to-hydrogen production. No longer will we be dependent on our hydrogen being shipped in from out of state, and we will ensure energy security for the owners of commercial and passenger hydrogen vehicles. It may even generate additional drivers coming to our community to fuel their cars, increasing our retail and gas revenues.

In addition to providing clean hydrogen fuel to our community, Raven will also help the City further divert waste from landfills to meet California's SB 1383's goal of reducing organic waste disposal by 75% from 2014 levels (up to 27 M tons of organic waste) by 2025. In an era when disadvantage communities are pleading for improvements, Raven SR is providing us solutions. Because Raven's system is non-combustion with minimal emissions, the company will actually be reducing methane and short-lived climate pollutants from the landfill, and we will see a positive reduction in greenhouse gases in our community. It is a win-win all the way around! California has taken a leadership role in the nation for launching the hydrogen economy, and Richmond has the opportunity with Raven SR to take our place in the advancement of clean fuels production, emissions reduction, and reversing climate change.

16-1

Thank you for your consideration and we respectfully request that you approve Raven SR's CUP application and the CEQA MND so they may begin construction this year, creating jobs for our Union Iron Workers, and start production of clean hydrogen in early 2023.

Best Regards,

Jason Gallia
Business Manager
Financial Secretary/Treasurer

Responses to Letter 16 - Iron Workers Local 378

16-1 The comment is in support of the proposed Project and notes that the proposed Project will help the City further divert waste from landfills to meet the State's goal of reducing organic waste disposal for target year 2025 (California's SB 1383). The comment also opines that the proposed Project's non-combustion system would reduce methane and short-lived climate pollutants from the landfill, and thus positive reduction in greenhouse gas emission. The comment does not address the adequacy of the analysis contained in the IS/MND. No additional analysis or response is required to this comment, however, it is noted and will be made available to City decision-makers as they consider the Project and whether or not to approve it.

Local Union No. 302

INTERNATIONAL BROTHERHOOD OF ELECTRICAL WORKERS

REGULAR MEETING 4TH WEDS. EACH MONTH 1 EXECUTIVE BOARD MEETS 3RD WEDS. EACH MONTH

1875 ARNOLD DRIVE • MARTINEZ, CALIFORNIA 94553-4239
TELEPHONE (925) 228-2302 • FAX (925) 228-0764

October 13, 2022

Lydia Elias
City of Richmond
Community Development Department
450 Civic Center Plaza, PO Box 4046
Richmond, CA 94804

Dear Ms. Elias,

On behalf of the Members of IBEW Local 302 we are writing in support of Raven SR's Conditional Use Permit (CUP) application and CEQA Mitigated Negative Declaration (MND) for the construction and operation of a bioenergy facility at Republic Service's West Contra Costa County Sanitary Landfill.

Raven SR is poised to place the City of Richmond front and center in the production of clean hydrogen fuels not only in the Bay Area, but in the State of California. We have the opportunity to showcase a new hydrogen production technology that will revolutionize waste-to-hydrogen production. No longer will we be dependent on our hydrogen being shipped in from out of state, and we will ensure energy security for the owners of commercial and passenger hydrogen vehicles.

In addition to providing clean hydrogen fuel to our community, Raven will also help the City further divert waste from landfills to meet California's SB 1383's goal of reducing organic waste disposal by 75% from 2014 levels (up to 27 M tons of organic waste) by 2025.

Because Raven's system is non-combustion with minimal emissions, the company will actually be reducing methane and short-lived climate pollutants from the landfill, and we will see a positive reduction in greenhouse gases in our community. Clearly this project advances the production of clean fuels, as well as reducing emissions, and a crucial step in reversing climate change.

This project will be built with a PLA which means middle class, skilled and trained Union jobs. Local hire, apprenticeship training, and a veteran hire program are additional community benefits of the PLA.

We respectfully request that you approve Raven SR's CUP application and the CEQA MND so they may begin construction this year, which creates jobs for our Union workers, and starts the production of clean hydrogen as early as 2023.

Sincerely,

Tom Hansen
Business Manager
Financial Secretary

TH:nlp
OPEIU#29:afl-cio

17-1

Responses to Letter 17 - Local Union No. 302 International Brotherhood of Electrical Workers

17-1 The comment is in support of the proposed Project and notes that the proposed Project will help the City further divert waste from landfills to meet the State's goal of reducing organic waste disposal for target year 2025 (California's SB 1383). The comment also opines that the proposed Project's non-combustion system would reduce methane and short-lived climate pollutants from the landfill, and thus positive reduction in greenhouse gas emission. The comment does not address the adequacy of the analysis contained in the IS/MND. No additional analysis or response is required to this comment, however, it is noted and will be made available to City decision-makers as they consider the Project and whether or not to approve it.

LETTER 18

GREEN HYDROGEN COALITION

October 10, 2022

Lydia Elias
City of Richmond
Community Development Department
450 Civic Center Plaza, PO Box 4046
Richmond, CA 94804

Dear Lydia,

I am writing in support of Raven SR's Conditional Use Permit (CUP) application and CEQA Mitigated Negative Declaration (MND) for the construction and operation of a bioenergy facility at Republic Service's West Contra Costa County Sanitary Landfill.

Raven SR is providing the City of Richmond the opportunity to showcase a new hydrogen production technology that will revolutionize waste-to-hydrogen production. In addition to providing clean hydrogen fuel to the Richmond community, Raven will also help the City of Richmond further divert waste from landfills to meet California's SB 1383's goal of reducing organic waste disposal by 75% from 2014 levels (up to 27 M tons of organic waste) by 2025.

Another plus is that Raven has signed a Project Labor Agreement with the Contra Costa Building & Construction Trades Council and the I.B.E.W. Local #1245. The jobs that Raven SR will be generating for the Richmond community, in addition to the construction jobs to build the plant, are to be commended. 18-1

California has taken a leadership role in the nation for launching the hydrogen economy, and Richmond has the opportunity with Raven SR to support the advancement of clean fuel production, emissions reduction, and reversing climate change.

Thank you for your consideration, and I respectfully ask that you approve Raven SR's CUP application and the CEQA MND so they may begin construction this year and start production in early 2023.

Sincerely,

/s/ Nicholas Connell

Nicholas Connell
Policy Director
Green Hydrogen Coalition
Tel: 949-558-1305
Email: nconnell@ghcoalition.org

Responses to Letter 18 - Green Hydrogen Coalition

18-1 The comment is in support of the proposed Project and notes that the proposed Project will help the City further divert waste from landfills to meet the State's goal of reducing organic waste disposal for target year 2025 (California's SB 1383). The comment does not address the adequacy of the analysis contained in the IS/MND. No additional analysis or response is required to this comment, however, it is noted and will be made available to City decision-makers as they consider the Project and whether or not to approve it.

October 10, 2022

Lydia Elias
City of Richmond
Community Development Department
450 Civic Center Plaza, PO Box 4046
Richmond, CA 94804

Dear Lydia,

I am writing in support of Raven SR's Conditional Use Permit (CUP) application and CEQA Mitigated Negative Declaration (MND) for the construction and operation of a bioenergy facility at Republic Service's West Contra Costa County Sanitary Landfill.

Raven SR is providing the City of Richmond the opportunity to showcase a new hydrogen production technology that will revolutionize waste-to-hydrogen production. In addition to providing clean hydrogen fuel to our community, Raven will also help the City further divert waste from landfills to meet California's SB 1383's goal of reducing organic waste disposal by 75% from 2014 levels (up to 27 M tons of organic waste) by 2025.

I believe that because Raven's system is non-combustion with minimal emissions, the company will actually be reducing methane and short-lived climate pollutants from the landfill, and we will see a positive reduction in greenhouse gases in our community. For once, a company that is trying to improve our environment!

Another plus is that Raven has signed a Project Labor Agreement with the Contra Costa Building & Construction Trades Council and theI.B.E.W. Local #1245. The jobs that Raven SR will be generating for our community, in addition to the construction jobs to build the plant, are to be commended. Jobs in Benicia will also be impacted with Benicia Fabrication, a subsidiary company, that is building the reforming units for the project. Benicia Fabrication is located in the Industrial Park of Benicia and founded in 1983. It specializes in the repair, maintenance and new construction of pressure vessels, heat exchangers and miscellaneous industrial equipment.

19-1

California has taken a leadership role in the nation for launching the hydrogen economy, and Richmond has the opportunity with Raven SR to take our place in the advancement of clean fuels production, emissions reduction, and reversing climate change.

Thank you for your consideration and I respectfully ask that you approve Raven SR's CUPapplication and the CEQAMNDso they may begin construction this year and start production in early 2023.

Sincerely,

Christina Strawbridge

Responses to Letter 19 - Christina Strawbridge

19-1 The comment is in support of the proposed Project and notes that the proposed Project will help the City further divert waste from landfills to meet the State's goal of reducing organic waste disposal for target year 2025 (California's SB 1383). The comment does not address the adequacy of the analysis contained in the IS/MND. No additional analysis or response is required to this comment, however, it is noted and will be made available to City decision-makers as they consider the Project and whether or not to approve it.

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ATTACHMENT A

Final Mitigation Monitoring and Reporting Program (MMRP) (Update to IS/MND Appendix C)

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FINAL UPDATED MITIGATION MONITORING AND REPORTING PROGRAM

Project Mitigation Measures	Implemented By	Monitored By	Monitoring and Reporting Action	Monitoring Schedule	Verification of Compliance
4.1 Aesthetics – None Required					
4.2 Agriculture and Forestry Resources – None Required					
4.3 Air Quality					
(Expanded) Mitigation Measure AQ-1: Best Management Practices. • All subsequent projects, regardless of size, shall implement the following best management practices to reduce construction impacts, particularly fugitive dust, to a less-than-significant level: • All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day, except when not required for dust control. • All haul trucks transporting soil, sand, or other loose material off-site shall be covered. • All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited. • All vehicle speeds on unpaved roads shall be limited to 15 mph. • All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used. • Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points. • All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.	Project Applicant / Construction Contractor	Richmond Building Division and Engineering Services Department	Richmond Engineering Services Department to verify inclusion of BAAQMD BMPs in applicable construction plans and specifications. City of Richmond Building Division to inspect site during construction to ensure compliance with Project construction plans.	Prior to issuance of building permit. Field inspections during construction.	*Verified by:* *Date:*

Project Mitigation Measures	Implemented By	Monitored By	Monitoring and Reporting Action	Monitoring Schedule	Verification of Compliance
• Post a publicly visible sign with the telephone number and person to contact at the Lead Agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations. • BMP #6: All excavation, grading, and/or demolition activities shall be suspended when average wind speeds exceed 20 mph. • BMP #7: All trucks and equipment, including their tires, shall be washed off prior to leaving the site. • BMP #8: Unpaved roads providing access to sites located 100 feet or further from a paved road shall be treated with a 6- to 12-inch layer of compacted layer of wood chips, mulch, or gravel. • Additional BMP: Limit the simultaneous occurrence of excavation, grading, and ground- disturbing construction activities. • Additional BMP: Install wind breaks (e.g., trees, fences) on the windward side(s) of actively disturbed areas of construction. Wind breaks should have at maximum 50 percent air porosity. • Additional BMP: Plant vegetative ground cover (e.g., fast-germinating native grass seed) in disturbed areas as soon as possible and watered appropriately until vegetation is established. • Additional BMP: Install sandbags or other erosion control measures to prevent silt runoff to public roadways from sites with a slope greater than one percent. • Additional BMP: Minimize the amount of excavated material or waste materials stored at the site. • Additional BMP: Hydroseed or apply non-toxic soil stabilizers to construction areas, including previously graded areas, that are inactive for at least 10 calendar days. • Require zero visible fugitive dust and use fence line air monitoring to demonstrate compliance with this requirement. • Set requirements for when dust generating operations have to be shut down due to dust crossing the property					

Project Mitigation Measures	Implemented By	Monitored By	Monitoring and Reporting Action	Monitoring Schedule	Verification of Compliance
boundary or if dust is contained within the property boundary but not controlled after a specified number of minutes. • Prohibiting grading on days when a Spare the Air is in effect (https://www.sparetheair.org/) Prohibiting grading on days with an Air Quality Index forecast of greater than 100 for particulates for the project area.					
4.4 Biological Resources					
Mitigation Measure BIO-1: Avoid and Minimize Impacts to Nesting Birds, Except Rails. To the extent practicable, project construction activities requiring heavy equipment, or any tree trimming, shall be performed outside of the bird nesting season (February 1st through August 31st) to avoid impacts to nesting birds.	Project Applicant / Construction Contractor Qualified Biologist	Richmond Building Division and Planning Division	City of Richmond Building Division to ensure construction activities are performed between February 1st and August 31st.	Prior to any site alterations or issuance of building permit. Field inspections during construction.	*Verified by:* *Date:*
If these activities must be performed during the nesting bird season, a qualified biologist shall be retained to conduct a pre-construction survey in the project construction and staging areas for nesting birds and verify the presence or absence of nesting birds no more than 14 calendar days prior to construction activities or after any construction breaks of 14 calendar days or more. Surveys shall be performed for the project construction and staging areas and suitable habitat within 250 feet of the project construction and staging areas in order to locate any active passerine (perching bird) nests and within 500 feet of the project construction and staging areas to locate any active raptor (birds of prey) nest, including potential burrowing owl burrows. If nesting birds and raptors do not occur within 250 and 500 feet of the Project area, respectively, then no further action is required if construction begins within 14 calendar days. If active nests are located during the pre-construction bird nesting surveys, no-disturbance buffer zones shall be established around nests, with a buffer size established by the qualified biologist. Typically, these buffer distances are between 50 feet and 250 feet for passerines and between 150 feet and 500 feet for raptors. These distances may be adjusted depending on the level of surrounding ambient activity and if an obstruction, such as a building or structure, is within line-of-sight between the nest and construction. Reduced buffers may be allowed if a full-time qualified biologist is present to monitor the nest and has authority to halt construction if bird behavior indicates continued activities could lead to nest failure. Buffered zones shall be avoided during construction-related activities until young have fledged or the nest is otherwise abandoned. If active burrowing owl dens are found within the survey area, the project applicant shall implement measures at least equal to the 2012 (or	Project Applicant / Construction Contractor Qualified Biologist	Richmond Building Division	City of Richmond Building Division to confirm surveys are conducted pursuant to specified measures, and if warranted, that buffer zone distances are indicated in project plans and adhered to during construction activities. City of Richmond Planning Division to receive and confirm survey report.	Field inspections during construction. Upon completion of surveys.	*Verified by:* *Date:*

Project Mitigation Measures	Implemented By	Monitored By	Monitoring and Reporting Action	Monitoring Schedule	Verification of Compliance
subsequent applicable) CDFW Staff Report (CDFG, 2012), as determined by the qualified biologist.					
Mitigation Measure BIO-2: Avoid and Minimize Impacts to California Black Rail and California Ridgway's Rail • To minimize or avoid the loss of individual California black rail and Ridgway's rail, construction activities requiring heavy equipment, adjacent to tidal marsh areas (within 500 feet [150 meters] or a distance determined in coordination with U.S. Fish and Wildlife (USFWS) or the California Department of Fish and Wildlife (CDFW)), shall be avoided during the breeding season from February 1 through August 31.	Project Applicant / Construction Contractor Qualified Biologist	Richmond Building Division and Planning Division	City of Richmond Building Division to ensure construction activities are performed between February 1st and August 31st.	Field inspections during construction.	*Verified by:* *Date:*
• If areas within 500 feet of rail habitat cannot be avoided during the breeding season (February 1 through August 31), protocol-level surveys shall be conducted to determine rail nesting locations. The surveys will focus on potential habitat that could be indirectly disturbed by construction activities during the breeding season to ensure that rails are not breeding within 500 feet of project activities. • Survey methods for rails will follow the *Site-Specific Protocol for Monitoring Marsh Birds*, which was developed for use by USFWS and partners (Wood et al. 2017). Surveys are concentrated during the approximate period of peak detectability, January 15 to March 25 and are structured to efficiently sample an area in three rounds of surveys by broadcasting calls of target species during specific periods of each survey round. Call broadcast increase the probability of detection compared to passive surveys when no call broadcasting is employed. This protocol has since been adopted by Invasive Spartina Project (ISP) and Point Blue Conservation Science to survey Ridgway's rails at sites throughout San Francisco Bay Estuary. The survey protocol for Ridgway's rail is summarized below. – Previously used survey locations (points) should be used when available to maintain consistency with past survey results. Adjacent points should be at least 200 meters apart along transects in or adjacent to areas representative of the marsh. Points should be located to minimize disturbances to marsh vegetation. Up to 8 points can be located on a transect. – At each transect, three surveys (rounds) are to be conducted, with the first round of surveys initiated between January 15 and February 6, the second round performed February 7 to February 28, and the third round	Project Applicant / Construction Contractor Qualified Biologist	Richmond Building Division	City of Richmond Building Division to confirm surveys are conducted pursuant to specified measures. City of Richmond Planning Division to receive and confirm survey report.	Field inspections during construction. Upon completion of surveys.	*Verified by:* *Date:*

Project Mitigation Measures	Implemented By	Monitored By	Monitoring and Reporting Action	Monitoring Schedule	Verification of Compliance
March 1 to March 25. Surveys should be spaced at least one week apart and the period between March 25 to April 15 can be used to complete surveys delayed by logistical or weather issues. A Federal Endangered Species Act Section 10(a)(1)(A) permit is required to conduct active surveys. – Each point on a transect will be surveyed for 10 minutes each round. A recording of calls available from USFWS is broadcast at each point. The recording consists of 5 minutes of silence, followed by a 30-second recording of Ridgway's rail vocalizations, followed by 30 seconds of silence, followed by a 30-second recording of California black rail, followed by 3.5 minutes of silence. • If no breeding Ridgway's rails or black rails are detected during surveys, or if their breeding territories can be avoided by 500 feet (150 meters), then project activities may proceed at that location.					
• If protocol surveys determine that breeding Ridgway's rails or black rails are present in the project area, the following measures would apply to project activities conducted during their breeding season (February 1- August 31): – The applicant shall coordinate with the USFWS- and CDFW, as appropriate depending upon species, to determine if project activities can continue during the nesting season based on nest location, natural visual barriers (e.g., levees) between the project and marshlands, and the distance between proposed activities and identified activity centers. If impact cannot be avoided during the rail nesting season, activities would be delayed until after the nesting season.	Project Applicant / Construction Contractor Qualified Biologist	Richmond Building Division	City of Richmond Building Division to ensure construction activities are performed between February 1st and August 31st, based on agency coordination per this measure. City of Richmond Planning Division to verify agency coordination and outcome.	Field inspections during construction. Upon completion of surveys.	*Verified by:* *Date:*
4.5 Cultural Resources					
Mitigation Measure CUL-1a: Cultural Resources Awareness Training. Prior to authorization to proceed, the City shall engage a qualified archaeologist, defined as an archaeologist meeting the U.S. Secretary of the Interior's Professional Qualification Standards for Archeology, to conduct a training program for all construction workers involved on site disturbance. On-site personnel shall attend a mandatory pre-project training that outlines the general archaeological sensitivity of the vicinity and the procedures to follow	Project Applicant / Construction Contractor Qualified Archaeologist	Richmond Building Division	City of Richmond Building Division to review and confirm documentation of training, required personnel attending, and scope of training.	Prior to commencement of any ground-disturbing activities.	*Verified by:* *Date:*

Project Mitigation Measures	Implemented By	Monitored By	Monitoring and Reporting Action	Monitoring Schedule	Verification of Compliance
in the event an archaeological resource and/or human remains are inadvertently discovered.					
Mitigation Measure CUL-1b: Inadvertent Discovery of Cultural Materials or Tribal Cultural Resources. If pre-contact or historic-era cultural materials are encountered during project implementation, all construction activities within 100 feet of the find shall halt and the contractor shall notify the City. The City shall notify a qualified archaeologist who will inspect the find within 24 hours of discovery and provide the City of an initial assessment. Pre-contact cultural materials might include obsidian and chert flaked-stone tools (e.g., projectile points, knives, scrapers) or toolmaking debris; culturally darkened soil ("midden") containing heat-affected rocks, artifacts, or shellfish remains; stone milling equipment (e.g., mortars, pestles, handstones, or milling slabs); and battered stone tools, such as hammerstones and pitted stones. Historic-era cultural materials might include building or structure footings and walls, and deposits of metal, glass, and/or ceramic refuse. If the City determines, based on recommendations from a qualified archaeologist and a Native American representative (if the resource is pre-contact), that the resource may qualify as a historical resource or unique archaeological resource (as defined in CEQA Guidelines Section 15064.5) or a tribal cultural resource (as defined in PRC Section 21080.3), the resource shall be avoided if feasible. Consistent with Section 15126.4(b)(3), this may be accomplished through planning construction to avoid the resource, incorporating the resource within open space, capping and covering the resource, or deeding the site into a permanent conservation easement. If avoidance is not feasible, the City shall consult with a qualified archaeologist and a Native American representative (if the resource is pre-contact) to determine treatment measures to avoid, minimize, or mitigate any potential impacts to the resource pursuant to PRC Section 21083.2 and CEQA Guidelines Section 15126.4. This shall include documentation of the resource and may include data recovery (according to PRC Section 21083.2), if deemed appropriate, or other actions such as treating the resource with culturally appropriate dignity and protecting the cultural character and integrity of the resource (according to PRC Section 21084.3).	Project Applicant / Construction Contractor	Qualified Archaeologist If applicable, Native American representative	Richmond Building Division to review and approve of archaeologist, of cultural resources monitoring plan and of the construction plan that includes archaeological mitigation. If resources are encountered, Contractor to verify work is suspended as required, review and approve qualified archaeologist and recommendations. If resources encountered are found to be qualifying as described in the measure, the City to ensure preservation measures are implemented or that the ARDTP is completed and submitted to NWIC. City to inspect site during construction to ensure compliance with project construction plans.	Prior to issuance of building permit for, or commencement of, any ground-disturbing activities. Field inspections during construction.	*Verified by:* *Date:*

Project Mitigation Measures	Implemented By	Monitored By	Monitoring and Reporting Action	Monitoring Schedule	Verification of Compliance
Mitigation Measure CUL-2: Inadvertent Discovery of Human Remains. If human remains are encountered during project implementation, the contractor shall halt all construction activities within 100 feet of the find and notify the City. The City shall contact the Contra Costa County Coroner who will determine that no investigation of the cause of death is required. If it is determined that the remains are Native American, the Coroner shall contact the Native American Heritage Commission within 24 hours. The Commission shall then identify the person or persons it believes to be the Most Likely Descendant from the deceased Native American, who in turn would make recommendations for the appropriate means of treating the human remains and any grave goods.	Project Applicant / Construction Contractor	Qualified Archaeologist	Richmond Building Division verify mitigation measure on construction plans. Inspect site during construction to ensure compliance with project construction plans. If needed, engage County Coroner and ensure NAHC contact.	Prior to issuance of a building permit for, or commencement of, any ground-disturbing activities. Field inspections during construction.	*Verified by:* *Date:*
4.6 Energy – None Required					
4.7 Geology, Soils, and Mineral Resources - MM CUL-1a, CUL-1b, CUL-2 (see 4.5, Cultural Resources)					
4.8 Greenhouse Gas Emissions – None Required					
4.9 Hazards and Hazardous Materials – None Required					
4.10 Hydrology and Water Quality – None Required					
4.11 Land Use and Planning – None Required					
4.12 Noise / Vibration – None Required					
4.13 Population and Housing– None Required					
4.14 Public Services and Recreation – None Required					
4.15 Transportation – None Required					
4.16 Tribal Cultural Resources - MM CUL-1a, CUL-1b, CUL-2 (see 4.5, Cultural Resources)					
4.17 Utilities and Service Systems – None Required					
4.18 Wildfire – None Required					

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