APPENDIX F: AIR QUALITY SUPPORTING INFORMATION

AIR QUALITY TECHNICAL REPORT AND **APPENDICES A-D**

(**APPENDICES E-I** CONTAIN TECHNICAL AIR QUALITY MODELING FILES AND ARE AVAILABLE UPON REQUEST)

DRAFT

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AIR QUALITY TECHNICAL REPORT

HUB PLAN AND INDIVIDUAL PROJECTS SAN FRANCISCO, CALIFORNIA

PROJECT NAME (SFEP CASE NO.):

HUB PLAN (2015-000940ENV)

30 VAN NESS AVENUE PROJECT (2017-008051ENV)

98 FRANKLIN STREET PROJECT (2016-014802ENV)

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ACRONYMS AND ABBREVIATIONS

AERMOD	Atmospheric Dispersion Modeling System
AQTR	Air Quality Technical Report
ARB	Air Resources Board
ASF	Age Sensitivity Factor
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
CalEEMod®	California Emission Estimator Model
CAPCOA	California Air Pollution Control Officer’s Association
CAPs	Criteria Air Pollutants
CEQA	California Environmental Quality Act
CPF	Cancer Potency Factor
cREL	Chronic Reference Exposure Level
CRRP	Community Risk Reduction Plan
DPM	Diesel Particulate Matter
EMFAC2017	Emissions Estimator Model
F&P	Fehr & Peers
g/s	Gram Per Second
HP	Horsepower
HRA	Health Risk Assessment
IARC	International Agency for Research on Cancer
kW	kilowatt
lbs	Pounds
MEI	Maximally Exposed Individual
MEISR	Maximally Exposed Individual Sensitive Receptor
NED	National Elevation Dataset
NO_X	Nitrogen Oxides ($NO + NO_2$)
OEHHA	Office of Environmental Health Hazard Assessment
$PM_{2.5}$	Particulate Matter Less Than 2.5 Micrometers in Aerodynamic Diameter
PM_{10}	Particulate Matter Less Than 10 Micrometers in Aerodynamic Diameter
ROG	Reactive Organic Gas
SFEP	San Francisco Planning Department’s Environmental Planning

TACs	Toxic Air Contaminants
TSD	Technical Support Document
USEPA	US Environmental Protection Agency
USGS	United States Geological Survey
VDECS	Verified Diesel Emission Control Strategy
VMT	Vehicle Mile Traveled
VOC	Volatile Organic Compounds
WHO	World Health Organization
$\mu g/m^3$	Microgram per Cubic Meter

1. INTRODUCTION

At the request of ICF Jones & Stokes, Inc. (ICF), Ramboll US Corporation (Ramboll) prepared this Air Quality Technical Report (AQTR) to summarize California Environmental Quality Act (CEQA) analyses of: 1) criteria air pollutants (CAPs) and precursors and 2) local risk and hazard impacts for exposure to toxic air contaminants (TACs), also referred to as a health risk assessment (HRA), for the proposed programmatic Hub Plan ("The Hub" or "Plan") as well as the construction and operation of two individual proposed projects within the Plan located at 30 Van Ness Avenue and 98 Franklin Street in San Francisco, California. The air quality analysis for the proposed Plan includes an evaluation of operational impacts from the increase in traffic in the Plan area as well as from potential generators for sites that would be rezoned to allow for 75 feet or taller buildings, as these buildings typically require an emergency backup generator to meet life safety requirements under the building and fire codes. The Plan proposes re-zoning hundreds of parcels to allow for new land uses and increasing the building heights on 18 individual sites including the 30 Van Ness and 98 Franklin Project sites. Of these 18 individual sites, 11 sites would have their heights increased above 75 feet. The air quality analysis for the proposed individual development projects (i.e., 30 Van Ness Avenue and 98 Franklin Street) includes construction and operational impacts associated with each project separately. However, because the Plan would rezone the allowable heights for the 30 Van Ness and 98 Franklin Project sites, the results of the project level analysis are also included in the analysis of the Hub Plan's impact. Air quality impacts were analyzed for the Plan and the Individual Projects under several scenarios, as summarized in **Table 1**. The CAPs and precursor emissions and local risk and hazard impacts have been estimated under the guidance of the San Francisco Planning Department's Environmental Planning (SFEP) Division. Ramboll understands that the EIR will analyze air quality impacts (both CAPs and health risks) associated with implementing the streetscape improvements proposed under the Plan.

1.1 Project Understanding

This section summarizes Ramboll's understanding of the Plan as well as the two proposed individual development projects to be located within the Plan area. The Plan as well as the two individual proposed projects would be located within an Air Pollution Exposure Zone (APEZ), which is an area designated by the San Francisco Department of Public Health (SFDPH) as having relatively poor air quality (SFDPH & SFEP 2014).

1.1.1 The Hub Plan

From the 1880s through the 1950s, intersections of Market Street and Valencia, Haight and Gough Street in San Francisco were well-known districts known as the "Market Street Hub" or simply, "The Hub." In the 2000s, the Hub neighborhoods were included within boundaries of the larger Market and Octavia Area Plan, adopted in 2008 (SFEP 2008). In the Market and Octavia Area Plan, the Hub is characterized as "SoMa West" and envisioned as a "vibrant new mixed-use neighborhood." Numerous policies in the Market and Octavia Area Plan support this vision. The Market and Octavia Area Plan also created the Van Ness Project and Market Downtown Residential Special Use District (SUD) and encourages the development of a transit-oriented, high-density, mixed-use residential neighborhood around the intersections of Market Street and Van Ness Avenue and Mission Street and Van Ness, with towers ranging from 250 to 400 feet and reduced parking.

The proposed Plan would amend the 2008 Market and Octavia Area Plan and includes development of the easternmost portion of the Market and Octavia Area Plan as well as development of two individual development projects within The Hub (30 Van Ness Avenue Project and 98 Franklin Street Project - see next section). The purpose of the Plan is to encourage housing; create safer and more walkable streets as well as welcoming and active public spaces; and create a neighborhood with a range of uses and services to meet neighborhood needs. The Plan also includes public realm improvements to streets and alleys within and adjacent to the Plan. The Plan defines neighborhood priorities and guides growth and development in the area. The Plan also seeks to capitalize on current economic and development opportunities and allows for potential zoning and policy refinements to better ensure that the area's growth supports the goals of the City and County of San Francisco for housing, transportation, and the arts.

The Plan area is indicated in **Figure 1** and comprises over 84 acres. The Plan includes street network changes on 13th Street/Duboce Avenue, from Folsom to Valencia Streets; South Van Ness Avenue, from Mission to 13th Streets; Otis Street, from South Van Ness Avenue to Duboce Avenue; 12th Street, from Market to Mission streets; Gough Street, from Stevenson to Otis Street; and the Mission Street/South Van Ness Avenue intersection. Some of the street network changes include raising crosswalks, developing loading/drop-off zones, reconfiguring streets to accommodate vehicular traffic, improving shading on streets, etc. The Plan includes rezoning which will result in changes to the allowed land uses and physical controls such as building heights, bulk, etc.

1.1.2 Individual Proposed Projects

This section summarizes Ramboll's understanding of the two individual proposed projects (Individual Projects): 30 Van Ness Avenue and 98 Franklin Street.

1.1.2.1 30 Van Ness Avenue

The 30 Van Ness Project site currently encompasses an approximately 38,100 square-foot lot with 197,940 square feet of building area. This includes approximately 164,480 square feet of general office area and 3,770 square feet of medical office, approximately 1,050 square feet of restaurants, approximately 12,790 square feet of a pharmacy retail unit, and approximately 15,850 square feet of parking that includes 42 spaces. The parking spaces located in the building are accessible from Fell Street. The site currently does not include any diesel emergency generators or above-ground fuel storage tanks. The Project would demolish the existing building structure and reconstruct a new building while retaining and increasing the existing square footage of office, retail, restaurant and parking space. The new building would also include construction of new residential units.

The proposed project, referred to herein as the Van Ness Project, would be located at 30 Van Ness Avenue on the block bounded by Van Ness Avenue to the west, Market Street to the south, 39 Fell Street/1446 Market Street to the east, and Fell Street to the north. **Figure 1** shows the location of the proposed Van Ness Project. The proposed Van Ness Project is a high-density mixed-use development providing a range of residential unit types, office, and neighborhood retail services. In total, the Van Ness Project would include a gross building area of up to 826,000 square feet with up to 610 residential units that total 520,000 square feet (levels 13 through 47), up to 11-story podium with 11 floors of offices that consists of approximately 350,000 square feet of general office floor area and ground floor retail totaling 21,000 square feet. The site would include a total of 243 parking spaces. The proposed Van Ness Project would have up to two backup emergency generators located on level 9 on top of a 120 foot podium.[1] The proposed land uses for the Van Ness Project are summarized in **Appendix Table B-1**.

Construction

The proposed plan for the Van Ness Project is assumed to include one construction phase. The duration for partial demolition of the existing structure and construction of the proposed Van Ness Project is estimated to be approximately 44 months, beginning in May 2020 and ending in December 2023. Construction would total approximately 1,149 working days occurring six days per week.[2] Construction activities would include the use of off-road and on-road equipment as shown below and in **Table 2 and Appendix Table B-2**.

Demolition of the existing site is expected to begin in May 2020 and last for approximately six months. During this phase, the existing site will be completely demolished, and the Project would require approximately 51,000 cubic yards of material to be off hauled. The demolition phase would be followed by the site preparation and grading phases, lasting three months each. Building construction is expected to begin in May 2021 and last until December 2023. Concurrently, paving and architectural coating would take place.

Construction Schedule

Year 1	May – December 2020	8 months of construction
Year 2	January – December 2021	12 months of construction
Year 3	January – December 2022	12 months of construction
Year 4	January – December 2023	12 months of construction

Operation

Construction of the Van Ness Project is expected to be completed by the end of 2023, with operations expected to begin in January 2024 ("Project build-out"). Operational emissions from the Van Ness Project include, for example, emissions from on-site natural gas use, as well as mobile-source emissions from new vehicle traffic, among other emissions sources. As noted above, the Van Ness Project would have two backup emergency generators located on the podium level.

1.1.2.2 98 Franklin Street

The proposed project, referred to herein as the Franklin Project, would be located at 98 Franklin Street on the block bounded by Franklin Street to the west, Market Street to the south, 1546–1564 Market Street to the east, and Oak Street to the north. **Figure 1** shows the location of the proposed Franklin Project. The site is approximately 23,750 square feet and is currently occupied by a surface parking lot with approximately 100 parking spaces.

The proposed Franklin Project includes development of 345 residential units and development of a new high school building for relocation of the International High School (Grades 9-12 of the French American International School [FAIS]). Development of the

[1] Depending on the mix of office and residential in the Van Ness Project, the podium may be either approximately 120 feet or approximately 150 feet. For purposes of this analysis, emergency generators are modeled at the more conservative (i.e., worst case impact) height of 120 feet. The 120 foot podium yields the more conservative case because the majority of the Plan-level receptors are located 1.8 meters (5.9 feet) above the ground. The podium closer to the ground would have greater impacts on these ground-level receptors. Within the 30 Van Ness Project site and nearby buildings, receptors were modeled at varying elevations to capture the impacts at elevation. When comparing the two podium heights, the differences in maximum impacts for these buildings were minimal.

[2] The number of working days does not double count for overlapping construction activities.

FAIS's high school building would be in close proximity to other campus buildings located near the intersection of Franklin and Oak streets in the Civic Center neighborhood and in close proximity to public transportation facilities. In total, the Franklin Project would include construction and development of roughly 510,000 gross square footage of building area that includes approximately 384,080 gross square feet of residential units, approximately 81,000 square feet of educational facilities, approximately 41,815 square feet of garage parking area with 111 parking spaces, and approximately 3,100 square feet of retail. The site also includes 22,410 square feet of common area accessible to residents and 11,530 square feet of privately owned open space area. The Franklin Project would house approximately 380 existing students relocated from a nearby FAIS location and would accommodate an increase in students to approximately 440 total students and six staff members at the project site. The proposed building structure would include three floors of below ground parking containing 111 parking spaces, five floors of the International High School on the lower levels of the site, and 31 stories of residential uses above the school podium. The proposed Franklin Project would include up to one emergency generator that would be located on level 2 (15 feet), venting out through level 5 (approximately 55 feet). The proposed land uses for the Franklin Project are summarized in **Appendix Table B-3**.

Construction

The proposed plan for the Franklin Project is assumed to include one construction phase. Construction activities would begin with demolition of the existing parking lot. The duration for demolition of existing parking lot and construction of the proposed Franklin Project is estimated to be approximately 27 months, beginning in June 2021 and ending in August 2023. Construction would total approximately 569 working days,[3] during which construction activities using off-road and on-road equipment would be conducted as shown below and in **Table 3 and Appendix Table B-4**.

Construction Schedule

Year 1	June – December 2021	7 months of construction
Year 2	January – December 2022	12 months of construction
Year 3	January – August 2023	8 months of construction

Operation

Construction of the Franklin Project is expected to be completed by August 2023, so operations are expected to begin in September 2023 ("Project build-out"). Operational emissions associated with the Franklin Project include, for example, emissions from on-site natural gas use as well as mobile-source emissions from vehicle traffic, among other sources of emissions. As noted above, the Franklin Project would have a backup emergency generator located on the level 2, venting out to level 5.

[3] The construction would typically occur 5 days per week. The number of working days does not double count for overlapping construction activities.

1.2 Scenarios Analyzed

For this evaluation, various scenarios have been analyzed to ensure that the maximum impacts from The Hub Plan, the Van Ness Project, and the Franklin Project were evaluated.[4] The scenarios evaluated are summarized in **Table 1** and discussed below.

All the scenarios listed below evaluated impacts for receptors within the Plan area and up to 1 kilometer (3,280.8 feet) from the Plan area boundary. The receptors analyzed were co-located with receptors in the updates to the Community Risk Reduction Plan Health Risk Analysis (CRRP-HRA).[5]

1.2.1 Baseline (2020) Scenarios

The first set of scenarios evaluated as part of the Hub Plan and Individual Projects analyses estimated emissions and health risks in 2020. Year 2020 was used as the baseline[6] year to be consistent with the transportation analysis and transportation model runs. Emissions were estimated for four different scenarios including Baseline (2020) No Plan, Baseline (2020) + Plan, Baseline (2020) + Van Ness Project and Baseline (2020) + Franklin Project. Emission sources for each scenario are discussed in detail below. $PM_{2.5}$ concentrations and cancer risks were estimated from these sources assuming all sources are active in 2020 even though operation of the Individual Projects wouldn’t start until 2023 and 2024.

1.2.1.1 Baseline (2020) No Plan

The Baseline (2020) No Plan scenario[7] evaluated impacts expected from background 2020 sources within the Hub area without the approval of the Hub Plan. Sources evaluated in the Baseline (2020) No Plan scenario were included in all additional Baseline (2020) scenarios as they would continue to exist under those scenarios. The Baseline (2020) No Plan scenario evaluated contributions to excess lifetime cancer risk and $PM_{2.5}$ concentrations from the following sources:

- Baseline (2020) No Plan Traffic emissions in 2020
- Stationary sources permitted by the Bay Area Air Quality Management District (BAAQMD)

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4 Throughout this AQTR, sources and analyses are described as being either “Project-level” or “Plan-level.” A Project-level source or analysis is specific only to one of the two Individual Projects – 30 Van Ness Avenue or 98 Franklin Street. A Plan-level source or analysis is specific to the Plan, which also includes the two Individual Projects because the Plan would rezone those sites, enabling the development at 30 Van Ness and 98 Franklin Street.

5 In 2012, San Francisco partnered with the Bay Area Air Quality Management District to conduct dispersion modeling from all known sources of air pollution. This modeling was conducted on a 20 by 20 meter receptor grid covering the entire City. A geodatabase of modeling results for each receptor point discloses the $PM_{2.5}$ concentrations and cancer risk resulting from modeled sources and ambient $PM_{2.5}$ concentrations. The modeling was conducted for year 2014. San Francisco, again working with the Bay Area Air Quality Management District, is in the process of completing an update to this modeling to account for new emissions sources (e.g., new stationary sources) and changes in emissions from certain emissions sources (e.g., number of vehicles on roadways) and implementation of regulatory actions. The modeling also accounts for updated health risk analysis methodologies from the Office of Environmental Health and Hazard Assessment. This updated modeling has been largely completed for the Plan area and is the basis of the Baseline 2020 No Plan scenario. Sources of emissions include traffic, stationary source, maritime, and railway. Ramboll used the same modeling results for the Cumulative 2040 No Plan scenario for all sources except traffic.

6 Throughout this AQTR, the word “Baseline” is used to refer to all scenarios that occur in 2020, as 2020 is the baseline year.

7 The Baseline (2020) No Plan scenario is equivalent to the impacts from the background 2020 sources. These background sources were all evaluated in the updates to the CRRP-HRA.

- Maritime sources
- Rail sources

Impacts for the Baseline (2020) No Plan Scenario were directly obtained from the updates to the CRRP-HRA analysis performed by Ramboll.

1.2.1.2 Baseline (2020) + Plan

The Baseline (2020) + Plan scenario evaluated the impact from the Hub Plan in conjunction with the anticipated background impacts evaluated in the Baseline (2020) No Plan Scenario. The Baseline (2020) + Plan scenario evaluated excess lifetime cancer risk and $PM_{2.5}$ concentrations from the following sources in addition to the Baseline (2020) No Plan scenario:

- Traffic impacts from the Hub Plan in 2020 (Plan 2020 Traffic, which includes traffic emissions from the 30 Van Ness and 98 Franklin Projects)
- Plan-Level generators that would likely be added to the 11 sites rezoned to allow for structures 75 feet or taller (this includes generator emissions from the 30 Van Ness and 98 Franklin Projects)
- Construction emissions from the two Individual Projects at 30 Van Ness and 98 Franklin

The maximally exposed individual sensitive (MEISR) receptor was determined by identifying the residential receptor with the maximum impact from the combination of the three source categories listed above. Additionally, the impacts from the Plan at each receptor were added to the background Baseline (2020) No Plan impacts in order to determine the total[8] health impacts at each receptor.

The Baseline (2020) + Plan scenario was evaluated for an uncontrolled scenario and a controlled scenario. The uncontrolled scenario evaluated health risks associated with operation of Plan-level generators without any controls and from construction equipment for the construction of the two Individual Projects operating without any control measures. For the uncontrolled scenarios, generators and diesel-powered construction equipment were assumed to operate with fleet-average emission factors consistent with default assumptions in the California Emissions Estimator Model version 2016.3.2 (CalEEMod®). In the controlled scenario, the generators and diesel-powered construction equipment were assumed to meet Tier 4 engine standards and certain diesel-powered equipment was assumed to use non-diesel fuel (i.e., propane) or electricity. The control assumptions for the construction equipment and generators were developed by SFEP, in coordination with the Project Sponsors. More information regarding the emissions estimation assumptions from the Plan-level sources is presented in **Section 2.1**.

1.2.1.3 Baseline (2020) + Van Ness Project

The Baseline (2020) + Van Ness Project Scenario analyzed the impacts from the Van Ness Project combined with the impacts from the Baseline (2020) No Plan scenario. The MEISR from the Baseline (2020) + Van Ness Project was determined by finding the maximum total impact from the following sources:

[8] Throughout this AQTR, the word "total" in this context refers to the overall impacts that result once background sources are added to the MEISR determined by the Plan-level or Project-level impacts.

- Van Ness Project operational traffic emissions
- Van Ness Project generator emissions
- Van Ness Project construction emissions

The Baseline (2020) + Van Ness Project scenario was evaluated for an uncontrolled scenario and a controlled scenario. The uncontrolled scenario was evaluated assuming no control measures for the diesel-powered construction equipment and generators. Fleet average emission factors consistent with default assumptions of CalEEMod® 2016.3.2 were used. The controlled scenario was evaluated assuming generators and diesel-powered construction equipment meet Tier 4 standards or equivalent. Additionally, each of the generators at the Van Ness Project site were assumed to operate for up to 20 permitted hours per year as a control measure. For construction equipment, certain diesel-powered equipment was assumed to use non-diesel fuel (i.e., propane) or electricity. All of the control assumptions were developed by SFEP, in coordination with the project sponsors. More information regarding the emissions estimation assumptions from the Van Ness Project is presented in **Section 2.2**.

Following the determination of the MEISR from Project-only impacts, the results from the Baseline (2020) No Plan scenario were added to understand the overall health risk impacts at each receptor.

1.2.1.4 Baseline (2020) + Franklin Project

The Baseline (2020) + Franklin Project scenario analyzed the impacts from the Franklin Project combined with the background impacts from the Baseline (2020) No Plan scenario. The MEISR from the Baseline (2020) + Franklin Project was determined by finding the maximum total impact from the following sources:

- Franklin Project operational traffic emissions
- Franklin Project generator emissions
- Franklin Project construction emissions

The Baseline (2020) + Franklin Project scenario was evaluated for an uncontrolled scenario and a controlled scenario. The uncontrolled scenario evaluated health risks associated with use of construction equipment and operation of up to one generator without any control measures. For the controlled scenario, the generators and diesel-powered construction equipment were assumed to meet Tier 4 standards or equipment and certain diesel-powered equipment was assumed to use non-diesel fuel (i.e., propane) or electricity. The control assumptions were developed by SFEP in coordination with the Project Sponsors. More information regarding the emissions estimation assumptions from the Franklin Project is presented in **Section 2.2**.

Following the determination of the MEISR from Project-only impacts, the results from the Baseline (2020) No Plan scenario were added to understand the overall health risk impacts at each receptor.

1.2.2 Cumulative (2040) Scenarios

The second set of scenarios evaluated as part of Plan and Individual Projects analysis estimated emissions and health risks in 2040. Year 2040 was used as the cumulative[9] horizon year because it captures when the Plan is expected to be fully built out. Emissions were estimated for two different scenarios: Cumulative (2040) No Plan and Cumulative (2040) + Plan. Because the Plan analysis also includes the impacts of the Individual Projects, the cumulative analysis for the Individual Projects presents the cancer risk and $PM_{2.5}$ concentration at each project's respective MEISR. Thus, the impacts from Cumulative (2040) + Plan scenario are evaluated at the overall plan-level MEIR and at the MEISRs for each Individual Project. The section below discusses the individual emissions sources included in the Cumulative (2040) + Plan analysis for the Plan and Project-level MEISRs.

1.2.2.1 Cumulative (2040) No Plan

The Cumulative (2040) No Plan scenario[10] evaluates impacts expected within the Plan area without assuming implementation of the Hub Plan but assuming implementation of the Central SoMa Plan from EIR Case No 2011.1356E (SFEP 2017). Sources evaluated in the Cumulative (2040) No Plan scenario were added to all additional Cumulative (2040) scenarios. The Cumulative (2040) No Plan scenario evaluated contributions to excess lifetime cancer risk and $PM_{2.5}$ concentrations from the following sources:

- Cumulative (2040) No Plan Traffic, which includes the impacts from the Central SoMa Plan as evaluated in the Central SoMa EIR
- Stationary sources permitted by BAAQMD
- Maritime sources
- Rail sources

The contribution of traffic emissions for the Cumulative (2040) No Plan scenario is taken from the Central SoMa Plan EIR and include the effects of the Central SoMa Plan. Impacts from permitted stationary sources, maritime sources, and rail sources, which are assumed to be the same as impacts used for the Baseline (2020) No Plan scenario, were taken from the ongoing updates to the CRRP-HRA, which are modeled in operational year 2020.

1.2.2.2 Cumulative (2040) + Plan

The Cumulative (2040) + Plan scenario evaluated impacts from the Plan in conjunction with the anticipated background impacts evaluated in the Cumulative (2040) No Plan scenario. In determining the Plan-level MEISR, the impacts from the following sources were estimated:

- Traffic impacts from the Plan in 2040 (Plan 2040 Traffic, which accounts for traffic generated by the 30 Van Ness Avenue and 98 Franklin Street projects)
- Plan-Level generators that would likely be added to the 11 sites rezoned for structures 75 feet or taller, including the generators proposed for the 30 Van Ness Avenue and 98 Franklin Street projects

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[9] Throughout this AQTR, the word "Cumulative" is used to refer to all scenarios that occur in 2040, as 2040 is the cumulative horizon year.

[10] The Cumulative (2040) No Plan scenario is equal to the 2040 background. Impacts from stationary sources, maritime, and rail were estimated in the updates to the CRRP-HRA. The traffic impacts for the Cumulative (2040) No Plan scenario was estimated from the Central SoMa Plan EIR and includes the impacts from the implementation of the Central SoMa Plan.

- Construction of the two Individual Projects at 30 Van Ness Avenue and 98 Franklin Street

The MEISR was determined by identifying the receptor with the maximum impact from all of the above sources. Additionally, the impacts from the Plan at each receptor were added to the background Cumulative (2040) No Plan impacts in order to determine the total health impacts at each receptor.

The Cumulative (2040) + Plan scenario impacts were evaluated for an uncontrolled scenario and a controlled scenario. The uncontrolled scenario evaluated health risks associated with uncontrolled operation of Plan-level generators and uncontrolled construction equipment for the construction of the Individual Projects. In the controlled scenario, the generators and diesel-powered construction equipment were assumed to meet Tier 4 standards or equivalent and certain diesel-powered equipment was assumed to use non-diesel fuel (i.e., propane) or electricity. The control assumptions were developed by SFEP, in consultation with the Individual Project Sponsors. More information regarding the emissions estimation assumptions from the Plan-level sources is presented in **Section 2.1**.

1.2.2.3 Cumulative (2040) + Van Ness Project

The Cumulative (2040) + Van Ness Project Scenario includes all of the emissions sources evaluated for the Cumulative (2040) + Plan scenario because the Plan scenario also includes the Individual Projects at 30 Van Ness and 98 Franklin. However, in order to determine each project's contribution to cumulative impacts, the cumulative analysis is conducted at each project's MEISR. The MEISR for the 30 Van Ness project was determined by finding the maximum total impact from the following sources:

- Van Ness Project operational traffic emissions
- Van Ness Project generator emissions
- Van Ness Project construction emissions

The Cumulative (2040) + Van Ness Project scenario was evaluated for an uncontrolled scenario and a controlled scenario. The Van Ness Project generator emissions and construction emissions are the same as are evaluated in the Baseline (2020) + Van Ness Project scenario. The operational traffic emissions from the Van Ness Project are estimated using the same methodology as in the Baseline (2020) + Van Ness Project scenario but using Plan 2040 traffic instead of Plan 2020 traffic as the basis for proportional analysis used in the risk assessment. More information regarding the emissions estimation assumptions from the Van Ness Project is presented in **Section 2.2**.

Following the determination of the MEISR from Project-only impacts, the results from the Cumulative (2040) +Plan were added to understand the overall health risk impacts at each receptor.

1.2.2.4 Cumulative (2040) + Franklin Project

The Cumulative (2040) + Franklin Project scenario also includes all of the emission sources analyzed in the Cumulative 2040 + Plan scenario because the Plan scenario includes both the Individual Projects at 30 Van Ness and 98 Franklin. To determine each project's contribution to cumulative impacts, the cumulative analysis is conducted at each project's MEISR. The MEISR from the Cumulative (2040) + Franklin Project was determined by finding the maximum total impact from the following sources:

- Franklin Project operational traffic emissions
- Franklin Project generator emissions
- Franklin Project construction emissions

The Cumulative (2040) + Franklin Project scenario was evaluated for an uncontrolled scenario and a controlled scenario. The Franklin Project generator emissions and construction emissions are the same as are evaluated in the Baseline (2020) + Franklin Project scenario. The operational traffic emissions from the Franklin Project are estimated using the same methodology as in the Baseline (2020) + Franklin Project scenario but using Plan 2040 traffic instead of Plan 2020 traffic as the basis for proportional analysis used in the risk assessment. More information regarding the emissions estimation assumptions from the Franklin Project is presented in **Section 2.2**.

Following the determination of the MEISR from Project-only impacts, the results from the Cumulative (2040)+ Plan scenario were added to understand the overall health risk impacts at each receptor.

1.3 Objectives and Methodology

Ramboll prepared a Scope of Work for this AQTR which detailed the methods used in this analysis. The Scope of Work was approved by SFEP on July 30, 2018. The Scope of Work is included as **Appendix A** of this AQTR. Any deviations from the Scope of Work are reflected in the methodology outlined in **Section 3**.

1.3.1 The Hub Plan Zoning Changes

The purpose of the air quality analysis associated with the Plan zoning changes is to assess potential health impacts that would result from growth accommodated by the Plan in the scenarios discussed in **Section 1.2**. The Plan would change allowable zoning, so Ramboll quantified CAP emissions and health risk impacts associated with emergency generators to be located on sites that are slated to be rezoned for 75 feet or taller. In addition, since the Plan would increase development potential for certain sites, the Plan could indirectly result in increased vehicle trips and associated emissions. Ramboll quantified the health risk impact associated with Plan-level traffic emissions and potential emergency generators needed for buildings rezoned to 75 feet or taller.

Construction-related impacts from implementation of the proposed street network changes are not addressed in this report. In addition, BAAQMD Risk Modeling guidance treats area source (e.g., paint for maintenance, consumer products such as personal care and cleaning products, and landscape maintenance equipment) and energy emissions as minor, low-impact sources of toxic air contaminants (BAAQMD 2012a), so those sources were not included in the Plan-level HRA.

1.3.1.1 Plan-Level Operational CAPs

By its very nature, regional air pollution is largely a combined, incremental effect of many sources, in that no single project is sufficient in size to, by itself, result in non-attainment of air quality standards. Instead, a project’s individual emissions contribute to existing overall air quality impacts. If a project’s contribution to overall air quality impacts is considerable, then the project’s impact on air quality would be considered significant. Therefore, no quantitative CAP analysis is required for the Plan, but rather assessed based upon the project-level results. Consistent with BAAQMD CEQA Guidelines (BAAQMD 2017b), Ramboll understands that the Environmental Impact Report will include a discussion of the Plan’s consistency with the 2017 Clean Air Plan as well as an evaluation of the growth in vehicle miles travelled (VMT) for the Plan compared to an increase in population. Ramboll understands that the EIR will assess, at a programmatic level, the potential for subsequent development projects to generate criteria air pollutant emissions that could contribute to overall air quality impacts.

1.3.1.2 Plan-Level Operational TACs

The objective of the Plan-level analysis for emissions of operational TACs is to determine the health risk impacts due to the increase in TAC emissions from traffic sources as a result of the Plan. Additionally, generator operational TAC emissions have been estimated for sites within the Plan that will be rezoned to allow buildings taller than 75 feet.

The HRA was conducted consistent with the following guidance:

- Air Toxics Hot Spots Program Risk Assessment Guidelines (Cal/EPA 2015);
- The San Francisco Community Risk Reduction Plan: DRAFT Model Results and Technical Support Documentation (BAAQMD et al., 2019);
- BAAQMD Recommended Methods for Screening and Modeling Local Risks and Hazards (BAAQMD 2012a); and
- California Air Pollution Control Officer's Association (CAPCOA) *Health Risk Assessment for Proposed Land Use Projects* (CAPCOA 2009).

Ramboll evaluated excess lifetime cancer risks and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) concentrations by implementing the methodology for the scenarios below, based on the results of the traffic analysis and generator emissions.

Plan-Level Generators at Baseline Year (2020) and Cumulative Year (2040)

Plan-Level generator emissions were evaluated from operation of emergency generators within the Plan area that may be required for sites that are rezoned to 75 feet or taller, including the Van Ness Project site and Franklin Project site. Ramboll conservatively assumed that the proposed engines would be 1,500 to 2,000 kilowatts (kW) and would operate up to 50 hours per year for maintenance purposes (which is consistent with BAAQMD permitting requirements for emergency generators). A discussion of the Plan-level generator methodology is included in **Section 2.1**.

Plan-Level Traffic at Baseline Year (2020) and Cumulative Year (2040)

Plan traffic emissions were evaluated based on the turning movement data for approximately 51 study intersections located within and adjacent to the Plan area as well as link-level traffic volume from the San Francisco County Transportation Authority's (SFCTA) San Francisco Chained Activity Modeling Process (SFCHAMP) model (SFCTA, 2002). The traffic engineers provided these datasets for several different scenarios that are discussed in detail in **Section 2.1**. The rationale for selection of relevant scenarios is also discussed further in **Section 2.1.1**. Ramboll converted the turning movement data for the 51 study intersections into link-level traffic volume data, which was used in the air dispersion modeling for the HRA. For intersections close to the 51 study intersections where no turning movement data was available, Ramboll scaled the SFCHAMP data using scenario-specific turning movement data provided by the traffic engineers.

Year 2020 was used as the baseline year to be consistent with the transportation CEQA analysis. Year 2040 was used as the horizon year to capture the full effects of the Plan at full buildout. Ramboll estimated excess lifetime cancer risks and $PM_{2.5}$ concentrations in each model year using No Plan traffic volumes and Plan-traffic volumes, as estimated by Fehr & Peers (F&P).[11]. Then, Plan incremental impacts were quantified based on the difference between impacts associated with Plan-traffic volumes and impacts associated with traffic volumes without the Plan. These incremental Plan traffic impacts were then added to the city-wide background traffic impacts from the updates to the CRRP-HRA.

1.3.2 Plan-Level Total Health Risk Analysis

The purpose of the total health risk analyses associated with the Hub Plan zoning changes is to assess potential health impacts that would result from growth accommodated by the Plan in 2020 and 2040. The Plan would change allowable zoning, so Ramboll quantified emissions and health risk impacts associated with emergency generators to be located on sites that are slated to be rezoned for 75 feet or taller. In addition, since the Plan has the potential to increase development, resulting in increased vehicle trips, Ramboll quantified health risk impacts associated with Plan-level traffic. The total analyses also include the construction and operational impacts of the Individual Projects as part of the Plan's health risk contribution because the Plan would result in zoning changes that would allow for those Projects.

1.3.3 Methodology for Individual Proposed Projects

The objective of the air quality analysis for the individual proposed projects is to assess potential CAP emissions and health risks and hazards that would result from the construction and operation of each proposed project (the Van Ness Project and Franklin Project), consistent with guidelines and methodologies from air quality agencies, as further discussed below. The Baseline (2020) + Project analysis for each project (the Van Ness Project and Franklin Project) does not include impacts from the other Individual Project. This allows for an analysis of the impact of each project individually. The Cumulative (2040) + Project analysis however, does account for the impact of the other Project, in addition to Hub Plan impacts. Note the MEISR location for each Project only reflects sources from that Individual Project.

1.3.3.1 Project-Level Construction CAPs

Ramboll performed a detailed assessment of construction emissions for the individual proposed projects using methodology consistent with CalEEMod® 2016.3.2. Ramboll analyzed average daily CAP emissions from each individual proposed project. Ramboll also worked with the Project Sponsors and SFEP to identify appropriate control measures, and Ramboll quantified the impact of those controls in the emissions calculations for the controlled scenario.

1.3.3.2 Project-Level Operational CAPs

Ramboll performed a detailed assessment of operational CAP emissions for each individual proposed project using CalEEMod® version 2016.3.2, and equivalent methods. Ramboll

[11] Fehr & Peers. 2018. Hub Plan/CCPRP Turning Movement Volumes. October.

analyzed average daily and maximum annual CAP emissions from each individual proposed project.

1.3.3.3 Project–Level Construction TACs

The objective of the construction HRA for the individual proposed projects is to evaluate health risks and hazards that would result from the construction of the proposed projects.

Consistent with guidelines and methodologies from air quality agencies – specifically, BAAQMD, California Air Resources Board (ARB), OEHHA, and United States Environmental Protection Agency (USEPA) – the HRA evaluated the estimated incremental increase in health risks and hazards (i.e., excess lifetime cancer risks and $PM_{2.5}$ concentrations) associated with exhaust that would be emitted by off-road construction equipment. Ramboll worked with the Project Sponsors and SFEP to identify appropriate control measures, and Ramboll quantified the impact of those controls in the HRA calculations for the controlled scenario.

Risks and hazards were evaluated at off-site sensitive populations. Since residents for each project are expected to occupy the units after project-related construction is completed, on-site sensitive populations would not be exposed to construction related emissions. However, since residents of the Franklin Project are anticipated to be exposed to approximately four months of the Van Ness Project construction, risks and hazards from the Van Ness Project construction on residents of the Franklin Project were evaluated in the Plan-level and cumulative analyses.

In the case that construction of either the Franklin Project or the Van Ness Project is delayed such that one project became operational with sensitive receptors that would be exposed to construction emissions from the other project (beyond the four months of anticipated Van Ness construction emissions impacts on Franklin Street receptors), all impacts would be less than the what are reported for each project's MEISR. This is because there are sensitive receptors between the two project sites that would be exposed to greater emissions, and have greater impacts, than those at either the Van Ness or Franklin site's receptors.

For all construction vehicles, Ramboll conducted a screening level analysis of TAC emissions. Based on the BAAQMD CEQA Guidance, annual average daily traffic (AADT) of less than 10,000 construction passenger vehicles per day or 1,000 construction trucks per day is considered a minor, low-impact source of TACs (BAAQMD 2012b & 2017b). BAAQMD has identified that minor, low-impact sources do not pose a significant health impact even in combination with other sources nearby, and these sources can be excluded from risk assessment analyses. These screening criteria were developed prior to updated exposure parameters from OEHHA (2015). Therefore, to account for these updated exposure parameters, Ramboll conservatively assumed that traffic of less than 5,000 passenger vehicles per day or 500 construction trucks per day to be a minor, low-impact source of TACs. As shown in **Tables B-5** and **B-6**, the annual average daily trip rate due to construction of each of the proposed projects is not expected to exceed 5,000 passenger vehicles per day or 500 trucks per day. The estimated maximum annual passenger trips are 382 trips/day for the Van Ness project and 192 trips/day for the Franklin Project. The maximum daily trucks trips were estimated to be 225 trips/day for the Van Ness Project and 51 trips/day for the Franklin Project. Thus, the health risks and hazards from construction traffic were assumed to be minor, and no further analysis was warranted.

1.3.3.4 Project-Level Operational TACs

The objective of the operational HRA for the individual proposed projects is to evaluate health risks and hazards that would result from the operation of the proposed projects, consistent with guidelines and methodologies from air quality agencies, specifically, BAAQMD, ARB, OEHHA, and USEPA. The HRA evaluated the estimated incremental increase in health risks and hazards (i.e., excess lifetime cancer risks, and $PM_{2.5}$ concentrations) associated with operational TAC emissions, including emissions from vehicles and diesel generators. These risks and hazards were evaluated at sensitive off-site and on-site populations.

Ramboll received project-level trip generation rate information from the traffic engineers. The health risks and particulate matter concentrations due to traffic from each Individual Project was calculated by performing a proportional analysis where the Plan-level health risks and hazards (calculated with the methodology described in Section 1.2.1.2, which already includes the Individual Projects) was scaled by the ratio of net new project traffic volume to net new Baseline (2020) + Plan traffic volume (calculated as daily average No Plan traffic volumes subtracted from the daily average Plan traffic volumes in 2020, as determined in the turning volume analysis). Ramboll estimated this scaling factor for each Project as: net new daily trips from development of the Individual Project divided by net new daily trips from implementation of the Plan, as received from F&P.

For stationary sources such as diesel generators, Ramboll conducted dispersion modeling using AERMOD. Ramboll also worked with the Project Sponsors and SFEP to identify appropriate control measures, and Ramboll quantified the impact of those controls in the HRA calculations for the controlled scenario.

1.3.3.5 Calculating the Cancer Risk

Cancer risk is assessed as a probability of contracting cancer over one’s lifetime. As a result, the estimated cancer risk from construction was added to the estimated cancer risk from project operations in order to determine the lifetime cancer risk from each Individual Project.

1.3.4 Project Specific Total Health Risk Analysis

The purpose of the health risk analyses associated with the Individual Projects is to assess potential health impacts that would result from the development of the Individual Projects in 2020 and in 2040, in conjunction with background sources (or as is the case for the 2040 analysis, all cumulative sources). Ramboll quantified emissions and health risk impacts associated with onsite Project emergency generators. In addition, because the proposed Project land uses would result in increased vehicle trips, Ramboll quantified health risk impacts associated with Project-level traffic. These analyses also include the construction impacts of the Individual Projects.

1.3.5 Health Risk Geodatabases for 2020

Ramboll has included three geodatabases to reflect the health risk results for each receptor point within 1,000 meters (3,281 feet) of the Plan area under the 2020 condition. These geodatabases correspond to the Baseline 2020 scenario and are listed below:

a) Baseline (2020) + Plan HRA Geodatabase

b) Baseline (2020) + Van Ness Project HRA Geodatabase

c) Baseline (2020) + Franklin Project HRA Geodatabase

The Project-level geodatabases include the following sources for the 2020 analysis:

1. Fields with $PM_{2.5}$ and cancer risk values for background stationary source emissions with permits on file with BAAQMD, maritime emissions, and rail emissions from the updates to the CRRP-HRA
2. Fields indicating the $PM_{2.5}$ and cancer risk values associated with background vehicle traffic emissions from the updates to the CRRP-HRA
3. Fields indicating the $PM_{2.5}$ and cancer risk values associated with Project-level vehicle traffic emissions
4. Fields indicating the $PM_{2.5}$ and cancer risk values associated with Project-level generator emissions
5. Fields indicating the $PM_{2.5}$ and cancer risk values associated with Project-level construction emissions

The Plan-level geodatabase includes the following conditions for the 2020 analysis:

1. Fields with $PM_{2.5}$ and cancer risk values for background stationary source emissions with permits on file with BAAQMD, maritime emissions, and rail emissions from the updates to the CRRP-HRA
2. Fields indicating the $PM_{2.5}$ and cancer risk values associated with background vehicle traffic emissions from the updates to the CRRP-HRA for 2020
3. Fields indicating the $PM_{2.5}$ and cancer risk values associated with Plan-level vehicle traffic emissions, which includes the impacts from the two Individual Projects
4. Separate fields indicating the $PM_{2.5}$ and cancer risk values associated with additional Plan-level emergency generator emissions and emissions from the Project-level emergency generators.
5. Separate fields indicating the $PM_{2.5}$ and cancer risk values associated with the construction emissions at each of the Individual Projects

1.3.6 Health Risk Geodatabases for 2040

The 2040 geodatabase includes all modeled cumulative sources for year 2040 and includes background 2040 sources and impacts of the Plan and two Individual Projects in year 2040. Because the Plan HRA includes the health risk impacts from the Individual Projects and because the quantitative cumulative analysis considers all cumulative projects (not including the projects listed in **Section 6.5**), no separate cumulative geodatabase is necessary for the cumulative analysis of the Individual Projects.

The cumulative analysis geodatabase includes the following conditions:

1. Fields with $PM_{2.5}$ and cancer risk values for background stationary source emissions with permits on file with BAAQMD, maritime emissions, and rail emissions from the updates to the CRRP-HRA
2. Fields indicating the $PM_{2.5}$ and cancer risk values associated with background vehicle traffic emissions from the Central SoMa EIR for 2040
3. Fields indicating the $PM_{2.5}$ and cancer risk values associated with emissions for the Plan-level vehicle traffic in 2040 and separate fields indicating the contribution attributed to

each Individual Project. The Plan-level vehicle traffic does not double-count the contributions from the two Individual Projects

4. Fields indicating the $PM_{2.5}$ and cancer risk values associated with Plan-level emergency generator emissions
5. Separate fields indicating the $PM_{2.5}$ and cancer risk values associated with the emergency generators located at each of the Individual Projects
6. Separate fields indicating the $PM_{2.5}$ and cancer risk values associated with construction emissions at each of the Individual Projects

1.4 Report Organization

This technical report is divided into eight sections as follows:

Section 1.0 – Introduction: describes the purpose and scope of this technical report, the objectives and methodology used herein and outlines report organization.

Section 2.0 – Emission Estimation Methods: describes the methods used to estimate the emissions of CAPs and TACs from the Plan and the Individual Projects.

Section 3.0 – Air Concentration Estimation Methods: discusses the air dispersion modeling, the selection of the dispersion model, the data used in the dispersion modeling (e.g., terrain, meteorology, source characterization), and the receptor locations evaluated in this technical report.

Section 4.0 – Risk Characterization Methods: provides an overview of the methodology for conducting the HRA.

Section 5.0 – Results from the Baseline (2020) Analyses: presents the estimated excess lifetime cancer risks and $PM_{2.5}$ concentrations for the Plan in 2020, as well as the CAP emissions, estimated excess lifetime cancer risks, and $PM_{2.5}$ concentrations for the Individual Projects in 2020.

Section 6.0 – Results from the Cumulative (2040) Analyses: presents the results of the cumulative analysis at the Plan level and Project level MEISRs, in addition to background cancer risks and $PM_{2.5}$ concentrations and includes a discussion of nearby projects that would also contribute to cumulative estimated excess lifetime cancer risks and $PM_{2.5}$ concentrations.

Section 7.0 – Uncertainty: identifies and describes the uncertainties associated with the risk estimates and discusses how these uncertainties may affect the risk assessment conclusions.

Section 8.0 – References: includes a listing of all references cited in this report.

2. EMISSIONS ESTIMATION METHODS

2.1 Emission Estimation Methodology from Plan-Level Sources

Ramboll estimated TAC emissions from the Plan. The objective of the Plan-level analysis is to determine the health risk impacts due to the increase in TAC emissions from sources related to implementation of the Plan. This section outlines the sources of emissions from the Plan and the methods used to estimate those emissions. **Table 4** provides the emissions estimation methodology for sources evaluated in this work.

2.1.1 Traffic Emissions

The Plan involves changes in land uses, re-zoning of about half of the plan area parcels (including height rezoning at 18 parcels) and streetscape improvements that are expected to change the amount of traffic and distribution of that traffic on the street network. The Plan would result in more intensive land use changes that would generate more vehicle trips. Additionally, the Plan includes re-zoning of sites that would introduce the need for emergency generators due to requirements of the building code for buildings above 75 feet in height. It is assumed that these traffic-related changes and generators would create new emissions. This section discusses the methodology used to estimate emissions, first from mobile sources and then from the generators.

2.1.1.1 Traffic Scenarios Modeled for The Plan

Traffic volumes associated with the development of the Hub Plan were estimated based on a turning movement study by the traffic engineers, F&P. F&P evaluated traffic for eight scenarios. The scenarios are summarized in the Proposed Project Transportation Analysis Scenarios provided by F&P (Fehr & Peers 2018b).

Modeled traffic volume data were provided by F&P, from the SFCHAMP dataset (Fehr & Peers, 2018a) for the following scenarios.[12] Bolded scenarios below indicate scenarios that were incorporated in the air quality analysis.

- Existing Conditions: reflects traffic conditions in 2018
- **Baseline 2020 (No Project)**: includes all approved, funded, and constructed San Francisco transportation projects, and land use development projects currently under construction.
- **Baseline 2020 Plus Hub Plan and Civic Center Land Use**: includes all approved, funded, and constructed transportation projects, as well as traffic from population and growth projections for year 2020 assuming implementation of the Hub Plan and Civic Center Public Realm Plan land use changes.[13] This scenario does not include any streetscape improvements.
- Baseline 2020 Plus Hub Plan and Civic Center Land Use and the Hub Streetscape Improvements: includes all approved, funded, and constructed transportation projects,

[12] Scenarios as presented here are referred to by the names provided by F&P in their analysis. Where the air quality analysis refers to "No Plan" traffic volumes, the traffic study calls these "No Project" traffic volumes. When discussing the air quality analysis scenarios (as are presented in **Table 1**), these will be referred to as "Baseline (2020) No Plan traffic" and "Cumulative (2040) No Plan traffic." When referring specifically to the traffic volumes provided by F&P, these will be referred to by the names listed in **Section 2.1.1.1**.

[13] The land use changes associated with the Civic Center Public Realm Plan are limited to a conversion of 80,000 square feet of convention space to retail space.

as well as traffic from population and growth projections for year 2020 assuming implementation of the Hub Plan. This scenario also accounts for changes to land use associated with the Civic Center Public Realm Plan and the transportation network changes associated with the Hub Streetscape improvements

- Baseline 2020 Plus Hub Plan and Civic Center Land Use and Civic Center Public Realm Plan Streetscape Improvements**:** includes all approved, funded, and constructed transportation projects; The Hub Plan and Civic Center Public Realm land use changes; and the transportation network changes associated with the Civic Center Public Realm Plan Streetscape Improvements
- **Cumulative 2040 No Project**: includes all reasonably foreseeable cumulative transportation projects through 2040, as well as growth from reasonably foreseeable cumulative development projects through 2040.
- **Cumulative 2040 Plus Hub Plan and Civic Center Land Use**: includes all reasonably foreseeable cumulative transportation projects through 2040, as well as growth from reasonably foreseeable cumulative development projects, and traffic associated with The Hub Plan and Civic Center Public Realm land use changes. This scenario does not include streetscape improvements from the Hub Plan or Civic Center Public Realm Plan.
- Cumulative 2040 Plus the Hub and Public Realm Plan**:** includes all cumulative transportation projects approved and funded through 2040, transportation network changes from both the Plan Streetscape Improvements and the Civic Center Public Realm Plan Streetscape Improvements, traffic associated with land use changes from the Hub Plan and the Civic Center Plan, and traffic resulting from reasonably foreseeable cumulative development projects through 2040.

In order to estimate the air quality impacts of traffic emissions resulting from the Hub Plan, the four bolded scenarios were chosen because these scenarios result in the maximum estimated impacts of the Plan in both baseline year (2020) and cumulative year (2040).

In the Baseline (2020) scenarios, traffic impacts from the Plan (Plan 2020 Traffic) were estimated as the difference between the "Baseline 2020 Plus Hub Plan and Civic Center Land Use" traffic scenario and the "Baseline 2020 (No Project)" traffic scenario, as evaluated by F&P. This provides the incremental impact of the Plan against Baseline (2020) No Plan conditions, where traffic impacts are estimated from the updates to the CRRP-HRA. The Hub Plan also includes streetscape changes. Initial review of the "Baseline 2020 Plus Hub Plan and Civic Center Land Use and the Hub Streetscape Improvements" scenario against the "Baseline 2020 Plus Hub Plan and Civic Center Land Use" scenario, which excludes the streetscape improvements, indicated that with inclusion of the streetscape improvements proposed under the Hub Plan, overall traffic levels would be lower resulting in less emissions and lower overall health risks. Comparing this analysis against the analysis in which streetscape changes are not included allows for a worst-case comparison of traffic-related risks and $PM_{2.5}$ concentrations as a result of the Plan. Although the road diets proposed by the street network changes may increase congestion during peak periods and result in slower traffic speeds with higher emissions, traffic speeds outside of peak periods would be higher. Hence, because traffic emissions for the risk calculations are based on annual averages and because the scenario without the street network changes results in higher overall traffic volumes, the worst-case scenario comparison adequately accounts for TAC emissions resulting from increased congestion as a result of road diets proposed as part of the Hub Plan street network changes. Modeling the impacts of the Hub Plan using the "Baseline 2020 Plus Hub Plan and Civic Center Land Use" traffic scenario that does not take into consideration the reduction in traffic that could occur from the proposed streetscape changes, presents a worst-case analysis of the amount of emissions and health risks that could result. Therefore, the results of this analysis are conservative (i.e., overestimates) and the actual emissions and health impacts resulting from the Plan are likely to be lower than presented here.

Similarly, the traffic analysis of the Plan's impact in the cumulative year (2040) is based on the difference between the "Cumulative 2040 Plus Hub Plan and Civic Center Land Use" scenario and the "Cumulative 2040 No Project" scenario that were evaluated by F&P. Subtracting the "Cumulative 2040 No Project" scenario from the "Cumulative 2040 Plus Hub Plan and Civic Center Land Use" scenario, as were evaluated by F&P, results in only the impacts from the land use changes associated with the Plan (Plan 2040 Traffic). As with the analysis for 2020 conditions, the Hub streetscape changes are not accounted for in the cumulative analysis, yielding a worst-case assessment of emissions and health risks that could result from implementation of the Plan. For this reason, the emissions and health impacts of the Plan are likely to be lower than presented here.

More details on the traffic volume calculation are below.

2.1.1.2 Calculation Methodologies for Mobile Sources

The proposed Plan would generate indirect vehicle trips (by proposing changes to allowable land uses and physical development controls). Traffic volumes indirectly generated by the Plan were estimated by integrating a turning movement study by the traffic engineers (Fehr & Peers, 2018c) into model outputs from SFCHAMP. Plan traffic emissions were evaluated using the EMFAC2017 database for the vehicle fleet mix in San Francisco County. Additionally, specific types of traffic such as delivery trucks and buses were evaluated using vehicle-type specific emission factors from EMFAC2017, as shown in **Table 4.**

The cancer risk analysis in the Plan-level operational HRA is based on diesel particulate matter (DPM) and total organic gas (TOG) concentrations from on-road diesel and gasoline vehicles, respectively. All DPM emissions were conservatively assumed to be equal to Respirable Particulate Matter Less than 10 Micrometers in Aerodynamic Diameter (PM_{10}) emissions from vehicle exhaust.

Vehicle Trip Generation Estimation Methodologies for Cars and Trucks

In order to estimate the amount of traffic and its associated emissions that directly results from the Plan, the effects of the "Baseline 2020 (No Project)" traffic emissions and "Cumulative 2040 (No Project)" traffic emissions, as were evaluated by F&P, were removed from the scenarios that include the Hub Plan as described above.

Ramboll estimated the traffic volumes for each street based on a F&P traffic study (Fehr & Peers, 2018c) for the Plan, in which they estimated turning volumes for each scenario discussed in **Section 2.1.1.1** at 51 intersections. The SFCHAMP model run for each scenario is made up of links along the roadway section with estimated traffic volumes for each link. For street links in SFCHAMP that were contained on both sides of the study intersections, Ramboll estimated the traffic by calculating the total number of cars that entered and exited the link and based the traffic volume for that link on the larger of the two metrics. For all other links within 1,000 feet (304.8 meters) of the Plan area boundary, traffic volumes were estimated by scaling the SFCHAMP data by the scenario-specific turning movement data from the F&P traffic study.

The vehicle type breakdown for each roadway segment is based on the same vehicle type breakdown used in the updates to the CRRP-HRA. For each roadway, the breakdown of medium trucks, heavy trucks, cars, and buses was estimated as a percentage of total vehicle volume for that segment. The percentage vehicle type breakdown from the updates to the CRRP HRA was applied to total link-level traffic volume for each modeled scenario to determine the number of light-duty cars, medium-heavy duty trucks, heavy-heavy duty trucks, and buses on each link for each scenario.

2.1.2 Generator Emissions

Plan-level operational emissions were estimated for emergency generators to be located at sites that are rezoned to be 75 feet or taller, including generators that would be located at the two Individual Project sites. Ramboll assumed that all the proposed engines except the generators located on the two Individual Project sites would be 2,000 kilowatts (kW). Ramboll evaluated two scenarios of operation for the Plan generators. First, an uncontrolled scenario was evaluated that used default statewide emission factors for emergency generators of this size from CalEEMod®. Ramboll also evaluated controlled emissions from the engines, assuming that they would meet Tier 4 emission standards.

Emissions were estimated assuming a maximum of 50 hours per year of non-emergency operation for all Plan level generators, consistent with the Airborne Toxic Control Measure for Stationary Toxic Compression Ignition Engines (Section 93115, Title 17, CCR) (ARB 2011). The uncontrolled scenario was evaluated using fleet-average diesel-engines emission factors from CalEEMod® 2016.3.2. The controlled scenario was evaluated assuming the engines meet the Tier 4 standards and each of the generators at 30 Van Ness operates for 20 hours per year. **Table 5** shows the annual TAC emissions for each Plan-level generator.

2.1.3 Construction Emissions

Plan-level construction emissions were estimated for construction of the two Individual Projects. Currently, the only direct physical changes proposed by Plan include construction of these two projects and impacts from streetscape improvements. Construction emissions from streetscape improvements are expected to be minimal and will be analyzed in the EIR. Further details on the methodology for estimating construction emissions from the Individual Projects is provided in **Section 2.2.1**.

2.2 Emission Estimation Methodology for Project-Level Sources

Ramboll evaluated the Project-level construction and operational CAP and TAC emissions using the 2016.3.2 version of CalEEMod® and equivalent methods. Sources of construction emissions include off-gassing from architectural coating, off-road equipment exhaust, and on-road vehicle exhaust. Sources of operational CAP emissions include emissions from traffic, area, emergency generator, and energy sources. Area sources include landscaping equipment, consumer product use, and architectural coatings.

The Project-level operational CAP and TAC emissions, discussed below, are analyzed in this report consistent with the BAAQMD 2017 CEQA Guidelines.

For the construction HRA, only DPM is considered for diesel-fueled equipment and only TOG is considered for propane-fueled equipment because these pollutants are responsible for the majority of the cancer risk from construction equipment of these fuel types. All DPM emissions are conservatively assumed to be equal PM_{10} emissions from equipment exhaust.

For operation, the CAP emissions analysis includes traffic, area, emergency generators, and energy sources of emissions. TAC emissions included in the operational HRA are from traffic as well as emergency generators. The TAC emissions analysis for the operational HRA does not take into account emissions from area sources, which is consistent with BAAQMD guidance as they consider small natural gas combustion sources, such as hot water heaters and boilers, to be minor, low-impact sources (BAAQMD 2012a). The BAAQMD guidelines state that minor and low-impact sources such as non-diesel boilers and space-heating equipment do not pose a significant health impact even in combination with other nearby sources (BAAQMD 2012a). The following describes the methodology for assessing these emissions sources in more detail.

2.2.1 Project Construction Emissions

Ramboll used CalEEMod®-equivalent methods to estimate CAP and TAC emissions from construction of the Van Ness Project and the Franklin Project.

2.2.1.1 Architectural Coating and Paving Off-Gas Emissions

Emissions from architectural coating and paving off-gas emissions were estimated using methodology consistent with CalEEMod®. Emissions were based on the square footage of different land uses, as indicated by the Project Sponsors. These land uses are reported in **Appendix Table B-1** for the Van Ness Project and in **Appendix Table B-3** for the Franklin Project. Paving off-gas emissions are assumed to be zero for enclosed parking structures Based on the Project descriptions, all parking land uses would be enclosed parking structures without any asphalt surface and hence would not have emissions from paving off-gassing in either project. Architectural coating and paving off-gas emissions are reported for the Van Ness Project and Franklin Project in **Table 6** and **Table 7**, respectively.

2.2.1.2 Off-road Equipment

Ramboll received a Project-specific construction equipment list, which is summarized for the Van Ness Project in **Appendix Table B-2** and for the Franklin Project in **Appendix Table B-4**.[14, 15]

Emissions without control measures (uncontrolled emissions) were based on Project-specific estimates of equipment use, fuel type, and construction trip generation. Uncontrolled emissions were calculated assuming fleet average equipment, meaning the emission factors used reflect the fleet predicted to be in use in the OFFROAD2011 model, which is incorporated into CalEEMod®. Uncontrolled CAP emissions for the Van Ness Project are presented in **Table 6**. Uncontrolled CAP emissions for the Franklin Project are presented in **Table 7**.

Emissions with control measures (controlled emissions) were calculated assuming the controls developed by SFEP and the Project Sponsors. These controls are summarized in **Appendix Table B-2** for the Van Ness Project and in **Appendix Table B-4** for the Franklin Project. All diesel-fueled equipment in the controlled scenario incorporate Tier 4 interim or

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[14] 30 Van Ness Project Construction Equipment List, dated November 16, 2018. "30VN - Construction Equipment Request - 20181116 - LL 11.16" workbook.

[15] 98 Franklin Project Construction Equipment List, dated December 5, 2018. "Copy of 98 Franklin Equipment List - 20181205 update.xlsx" workbook.

Tier 4 final engines. Other equipment was estimated as electric or propane, consistent with assumptions provided by the Project Sponsors. Controlled CAP emissions are presented in **Table 6** for the Van Ness Project and in **Table 7** for the Franklin Project.

TAC emissions were calculated for both the uncontrolled and controlled scenarios and are presented in **Table 8** for the Van Ness Project. TAC emissions for the uncontrolled and controlled scenarios for the Franklin Project are presented in **Table 9**.

2.2.1.3 Construction On-road Vehicles

CalEEMod® estimated worker, vendor, and hauling vehicle trip generation rates for construction of the 30 Van Ness and 98 Franklin Projects, based on the respective Project land uses, demolition amounts, and off haul amounts. The estimate of hauling truck trips for material off haul are based on the total off haul amount in cubic yards required for each Project. The default trip lengths in CalEEMod® were used for worker, vendor, and haul truck trips. The construction vehicle trip generation rates by year and subphase are summarized in **Appendix Tables B-5** and **B-6** for the Van Ness Project and the Franklin Project, respectively.

The emission factors for criteria pollutants are from EMFAC2017. Ramboll estimated emissions from running exhaust, running losses, starting, hot soak, tire wear and brake wear emissions. This version reflects the emissions benefits of ARB regulations including on-road diesel fleet rules and the Pavley Clean Car Standards. The model also includes updated information on California's car and truck fleets and travel activity. CAP emissions from on-road vehicles take into account total emissions from haul truck activity and are included in **Tables 6** and **7** for the Van Ness Project and the Franklin Project, respectively. TAC emissions from on-road construction vehicles (e.g., construction worker trips, vendor trips, and material hauling trips) are not included in the health risk assessment because the average daily construction vehicle trips for each Project is less than 5,000 passenger vehicles per day and less than 500 truck trips per day[16].

2.2.1.4 Summary of Project Construction Emissions

CAP emissions from each construction year for the Project were added and then averaged over the number of work days in the construction period. All exhaust PM_{10} emissions were conservatively assumed to be equal to DPM for the health risk analysis. **Tables 6** and **7** provide construction CAP emissions by year and for the total construction period, for the Van Ness Project and the Franklin Project respectively. Construction equipment list and construction vehicle trip estimates are included in **Appendix B**.

2.2.2 Project Operational Emissions

Ramboll used CalEEMod® version 2016.3.2 to estimate CAP emissions from the Van Ness Project and Franklin Project operation at full buildout, which is assumed to occur in 2024 and 2023, respectively. CalEEMod® estimates operational emissions from area sources, energy use, and mobile sources. The CalEEMod® outputs are included as **Appendices C** and **D** for the Van Ness Project and the Franklin Project, respectively.

2.2.2.1 Area Sources

For area sources, specifically ROG emissions from consumer products, Ramboll used the average emission factor for the City of San Francisco developed by SFEP which is 2.10E-5

[16] Based on BAAQMD CEQA Guidance, traffic of less than 10,000 vehicles per day or 1,000 trucks per day is considered a minor, low-impact source of TACs and can be excluded from the analysis (BAAQMD 2017b).

pounds per square foot per day (lb ROG/sqft/day). Details on the ROG emission factor calculations for the City of San Francisco is described in **Tables 10** and **11**.

2.2.2.2 Generator Sources

Emissions from the Project generators were estimated using CalEEMod® equivalent methodology. The approximate generator sizes were provided by the Project Sponsors. The Franklin Project would have one generator onsite; the Van Ness Project would have two generators onsite.

Two scenarios of generator sources were evaluated for the Projects. In the uncontrolled scenario, emissions were evaluated assuming 50 hours per year of operation and default engine emission factors for generators in CalEEMod® 2016.3.2. The results of the uncontrolled generator emissions are presented in **Tables 10a** and **11a** for the Van Ness Project and Franklin Project, respectively.

For the controlled scenario, the emissions were evaluated using an emission factor consistent with Tier 4 emissions standards. The controlled scenario for the Van Ness Project also assumes that the two generators would each operate for 20 hours per year instead of 50. For the Franklin Project, it is assumed that the one generator would operate for 50 hours per year. CAP emissions from these generators for the controlled scenario are presented in **Tables 10b** and **11b** for the Van Ness Project and the Franklin Project, respectively.

The TAC emissions were estimated for uncontrolled and controlled generators using the same assumptions as described above. DPM was conservatively assumed to be equal to PM_{10} emissions. The TAC emissions from Project generators are presented in **Table 5**.

2.2.2.3 Mobile Sources

Vehicles on the roadway emit CAPs and TACs from the combustion of fuel and were evaluated in the risk assessment for impacts to on-site and off-site sensitive receptors. Project traffic would include residential and retail vehicle trips as well as service vehicle and vendor vehicle trips. Vehicle trip generation estimates for estimating CAP emissions were based on CalEEMod® defaults for the mix of land uses specified for each Project (30 Van Ness Avenue and 98 Franklin Street). CAP emissions from mobile sources are presented in **Tables 10** and **11** for the Van Ness Project and the Franklin Project, respectively.

The health risks and hazards due to traffic from each Individual Project were estimated by performing a proportional analysis where the Plan-level health risks and hazards (which already includes the Individual Projects) impact from vehicle emissions were scaled by the ratio of new Project vehicle trip generation to new Plan daily trip generation, as estimated by F&P. This provided an assessment of the proportion of the Plan level traffic health risk attributable to the Van Ness and Franklin Projects respectively.

Summary of Project Operational CAP Emissions

CAP emissions from Project operation were added and then averaged over the number of operation days in a year, which is assumed to be 365 days a year. **Table 10** provides total annual and average daily CAP emissions for operational sources for the Van Ness Project in 2024, which is the first year of operation (i.e., full buildout). **Table 11** provides the total annual and average daily CAP emissions for the Franklin Project in 2023, which represents full buildout for the Franklin Project.

3. AIR CONCENTRATION ESTIMATION METHODS

Consistent with the updates to the CRRP-HRA, this HRA evaluated excess lifetime cancer risks and $PM_{2.5}$ concentrations imposed by the Plan and the two Individual Projects. For the Plan, the analysis included operational impacts from Plan traffic emissions in both 2020 and 2040, as well as operational impacts from emergency generators located on sites rezoned for 75 feet or taller. For the two Individual Projects, the analysis included construction and operational emissions impacts. The methodologies used to evaluate emissions were based on the most recent BAAQMD Recommended Methods for Screening and Modeling Local Risks and Hazards (BAAQMD 2012a).

3.1 Chemical Selection

The excess lifetime cancer risk analysis in the construction HRA was based on DPM concentrations from diesel off-road equipment, as well as speciated TOG concentrations from propane off-road construction equipment. The excess lifetime cancer risk analysis in the operational HRA was based on DPM concentrations from diesel emergency generators, as well as DPM and speciated TOG concentrations from on-road diesel and gasoline vehicles, respectively.

Diesel exhaust, a complex mixture that includes hundreds of individual constituents (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 carcinogen exposure for the mixture of chemicals that make up diesel exhaust as a whole (Cal/EPA 2016). Cal/EPA and other proponents of using the surrogate approach to quantifying excess lifetime cancer risks associated with the diesel mixture indicate that this method is preferable to use of a component-based approach because it provides a protective approach to estimating health risks. 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 exceed the multi-pathway cancer risk from the speciated components (OEHHA 2003)." These analyses were based on the surrogate approach, as recommended by Cal/EPA.

3.2 Model Selection and Parameters

Consistent with the updates to CRRP-HRA, near-field air dispersion modeling of DPM, TOG, and $PM_{2.5}$ from construction and operational sources was conducted using the USEPA's atmospheric dispersion modeling system (AERMOD). For each receptor location, the model generated average air concentrations (or air dispersion factors as unit emissions) that result from emissions from multiple sources.

Air dispersion models such as AERMOD require a variety of inputs including source parameters, meteorological parameters, topographical information, and receptor parameters. When site-specific information was unknown, Ramboll used the same assumptions used in the updates to the CRRP-HRA, when available, or the default parameter sets that are designed to produce conservative (i.e., overestimates of) air concentrations.

3.2.1 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. For this HRA, BAAQMD's Mission Bay meteorological data for year 2008 was used, which aligns with the San Francisco updates to the CRRP-HRA Methodology (BAAQMD 2012c).

3.2.2 Terrain Considerations

Elevation data was imported from the National Elevation Dataset (NED) maintained by the United States Geological Survey (USGS). An important consideration in an air dispersion modeling analysis is the decision to use an urban population to capture the urban heat island effect. Based on the urban area in which the Project site is located, Ramboll used an urban population equal to the population of the City and County of San Francisco, specifically 884,363 people based on the 2017 US Census.

3.3 Modeled Sources

Concentrations of TACs from emissions of construction equipment, generators, and mobile sources were estimated in AERMOD. Emissions were modeled using the χ/Q ("chi over q") method, such that each source group had unit emission rates (i.e., 1 gram per second [g/s]), and the model estimates dispersion factors (with units of [ug/m^3]/[g/s]).

Source location and parameters are necessary to model the dispersion of air emissions. **Table 12** summarizes the modeled source parameters for all construction and operational sources included in the analysis. **Figure 2** shows the boundary of all sources modeled in this work. **Figure 3** shows the locations of modeled sources for the Hub Plan, the Van Ness Project, and the Franklin Project.

3.3.1 Plan-Level Emission Estimates and Source Parameters

As described in **Section 1**, the Plan-level analyses include an assessment of health impacts from Plan-generated traffic, emergency generators, and emissions from the Individual Projects. This section discusses the selection of model parameters for the Plan-Level traffic and emergency generator emissions sources. Section 3.3.2 discusses the selection of model parameters for the Individual Project-Level emissions sources.

3.3.1.1 Plan-Level Traffic Emissions and Source Parameters

Vehicle emissions were modeled to reflect the actual hours of traffic operation. n line with updates to the CRRP-HRA, Ramboll adjusted the hourly traffic activity for San Francisco County by creating a diurnal profile with hourly fractions (relative to peak traffic) representing hourly changes in traffic over the course of a day. Diurnal profiles were specified for all vehicles (representing cars) and for heavy-duty trucks (representing truck and bus data). Consistent with the updates to the CRRP-HRA, Ramboll assumed the diurnal profile was constant across all roadways (BAAQMD 2012c).

For annual average ambient air concentrations, the estimated annual average dispersion factors were multiplied by the annual average emission rates. The emission rates varied on an hourly basis to account for fluctuations in traffic patterns throughout the day. Hourly variations in emission rates were incorporated in the model based on data provided in EMFAC2017 for San Francisco County.

On-road mobile sources, following the CRRP-HHRA methodology, were modeled in AERMOD as adjacent volume sources, with the number of sources dependent on the length and width of the roadway segment. For AERMOD modeling of on-road trucks, the release height of each truck volume source was set to 2.6 meters (8.5 feet), the initial lateral dimension was variable (dependent on roadway width), and the initial vertical dimension was set at 2.4 meters (7.9 feet), following the updates to the CRRP-HRA methodology and EPA Haul Truck Working Group Guidance (USEPA 2012). For AERMOD modeling of on-road light duty vehicles, the release height of each volume source was set to 1.7 meters (5.6 feet), the initial lateral dimension was variable (dependent on roadway width), and the initial vertical dimension was set at 1.6 meters (5.2 feet), consistent with the updates to the CRRP-HRA methodology.[17]

3.3.1.2 Plan-Level Emergency Generators Emissions and Source Parameters

Plan-level emergency generators were modeled assuming that emergency testing can occur at any time of the day. Due to lack of information on the exact location of generators, Plan-level emergency generators were assumed to operate at ground level near the center of the rezoned sites. Since the breathing height for receptors modeled on each site is 1.8 meters (5.9 feet), placement at the ground level would result in a conservative estimate of risks on these receptors. Receptors from CRRP-HRA grid within the same building as the generator were assumed to be exposed to the emissions from the generators. Generators were modeled as point sources with the source parameters based on updates to the CRRP-HRA methodology.[18]

For the HRA, the annual average ambient air concentrations were determined by multiplying the annual average dispersion factors from AERMOD ($\mu g/m^3$) by the annual average emission rates (g/s). For simplicity, the model assumed a constant emission rate for every day of the year.

3.3.2 Project-Level Emissions Estimates and Source Parameters

As described in **Section 1**, the Plan-level analyses include an assessment of health impacts from operational traffic and emergency generators, as well as construction sources. This section discusses the selection of model parameters for the Project-level sources.

3.3.2.1 Project-Level Construction Emissions and Source Parameters

During construction, at any given time there would be multiple emission sources associated with construction equipment within the active construction zones. For each of the two

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17 Modeling parameters for the on-road light duty vehicles deviate from the Scope of Work (**Appendix A**). Ramboll used modeling parameters from the updates to the CRRP-HRA traffic analysis. Ramboll deviated from the Scope of Work in-order to be consistent with the city-wide modeling effort. The release height used for on-road light duty vehicles is 1.7 meters, as opposed 0.6 meters as proposed in the Scope of Work. The initial vertical dimension modeled was 1.6 meters as opposed to 0.14 meters as proposed in the Scope of Work.

18 Modeling parameters for the emergency generators deviate from the Scope of Work (**Appendix A**). Ramboll had initially proposed to use generator-specific release parameters for the Project-level generators. However, due to revisions in the size, type, and number of emergency generators, Ramboll used default release parameters from the CRRP-HRA technical guidance document. The updated release parameters for the Project generators are also consistent with the Plan-level generator parameters. Deviations from the Scope of Work include the following: The Van Ness Project would have up to two collocated generators that are assumed to operate at the same time. The exit temperature for both Project-level generators is 872° F compared to a previously proposed temperature of 965° F and 900° F for Van Ness Project and Franklin Project, respectively. Exit velocity for the Project-level generators is 45 m/s compared to a previously proposed value of 217 m/s and 276 m/s for the Van Ness Project and Franklin Project generators, respectively. A release height of 40 meters was used for the Van Ness Project compared to a proposed value of 3.66 meters. Similarly, release height for the Franklin Project is 21 meters compared to a proposed value of 3.66 meters.

Individual Projects, the construction area was modeled as one area source encompassing the active area of the Project site. The location and dimensions of each area source corresponded to the footprint of the site under development. A release height of 5 meters (16.4 feet) was used for the area sources, with an initial vertical dimension of 1.4 meters (4.6 feet), consistent with the assumptions used in the updates to the CRRP-HRA (see **Table 12**).

Construction emissions were modeled to reflect the actual hours of construction. Van Ness Project construction was modeled to occur from 7AM to 7PM.[19,20] Franklin Project construction was modeled to occur from 7AM to 8PM.[21] Emissions were modeled using the χ/Q method, such that the area source had unit emission rates (i.e., 1 gram per second [g/s] for volume sources or 1 g/s per square meter [m^2] for area sources), and the model estimated dispersion factors (with units of microgram per cubic meter [$\mu g/m^3$]/[g/s]).

For the HRA, the annual average ambient air concentrations were determined by multiplying the annual average dispersion factors from AERMOD ($\mu g/m^3$) by the annual average emission rates (g/s). For simplicity, the model assumed a constant emission rate for every day of the year.

3.3.2.2 Project-Level Emergency Generator Emissions

Project-level emergency generators were modeled assuming that emergency testing occurs from 8 AM to 6 PM. Emissions were modeled using the χ/Q method, such that each generator had a unit emission rate (i.e., 1 gram per second [g/s]), and the model estimated dispersion factors (with units of microgram per cubic meter [$\mu g/m^3$]/[g/s]).

Project-level emergency generators were assumed to operate at elevations specified by the Project Sponsors. For the Van Ness Project, the emergency generator was assumed to operate on the podium, which would be located on the 9th floor on top of a 120 foot podium. For the Franklin Project, the emergency generator was assumed to operate on the 2nd floor (15 ft) but vent to the podium, which is located on the 5th floor (54.75 ft). Generators were modeled as point sources with the source parameters based on information provided by the Project Sponsors, where available. When source parameter information was not available, parameters consistent with the updates to the CRRP-HRA methodology were used.

For the HRA, the annual average ambient air concentrations were determined by multiplying the annual average dispersion factors from AERMOD ($\mu g/m^3$) by the annual average emission rates (g/s). For simplicity, the model assumed a constant emission rate for every day of the year.

[19] Ramboll understands that construction could extend to 8 PM, however this change in schedule is not anticipated to have a material impacts on results presented in the AQTR. Additionally, while there may be limited night time construction activities, it is anticipated that it will be minimal as to not affect overall results.

[20] For the Van Ness Project, concrete pour is expected to occur during night time hours for roughly 2 to 4 days during the entire construction period, which represents approximately 0.5% of the entire construction activity. Impacts from night time construction are expected to be minimal, and are therefore not accounted for quantitatively in this analysis

[21] For the Franklin Project, night time construction is expected to occur for approximately 40 days during the entire construction period, which represents approximately 7% of the entire construction activity. Night time construction was not modeled for this project because risks and hazards due to construction are low, and including night time construction activity is not anticipated to have a material impact on results.

3.4 Modeled Receptors

In order to evaluate health impacts to on-site and off-site receptors, receptors were modeled at locations co-located with the receptors used in the updates to the CRRP-HRA and within one kilometer of the Project site. Of the modeled receptors, only impacts to sensitive receptor locations are evaluated and reported.

For the Plan-level analysis, receptors were modeled at a height of 1.8 meters (5.9 ft) above terrain height (i.e., the default breathing height for ground-floor receptors) which is consistent with the updates to the CRRP-HRA methodology.

Figure 2 shows the modeling extent for the receptors evaluated in this work. **Figure 4A** shows the locations and classifications of the modeled receptors for the Hub Plan, the Van Ness Project, and the Franklin Project.

For the Project-level analysis, on-site receptors and off-site receptors at adjacent buildings were also modeled at 1.8 meters (5.9 ft) above terrain height, pursuant to the approved Scope of Work (Appendix A). As noted above, Project-level emergency generators were assumed to operate at their proposed elevation. Thus, in an effort to ensure that the most conservative air quality impacts were evaluated, Ramboll also modeled receptors at various heights corresponding to the occupied floors in onsite and surrounding buildings. For the Van Ness Project, onsite receptors were modeled from 1.8 to 155 meters (5.9 to 508.5 ft) with varying increments depending on the floor height. For the Franklin Project, onsite receptors were modeled from 1.8 to 110 meters (5.9 to 360.9 ft) with varying increments depending on the floor height. The offsite receptors were modeled from 1.8 to 166 meters (5.9 to 544.6 ft) with varying increments depending on the building floor heights. **Figure 4B** shows the locations of the project onsite receptors modeled.

For the HRA from the generator, offsite receptors were modeled at heights above 1.8 meters (5.9 ft) for buildings near the two Project sites. Because the CRRP-HRA grid receptors at 1.8 (5.9 ft) meters are far below the generator exhaust, additional receptors were modeled in the same 20 meter by 20 meter (65.6 by 65.6 ft) grid but at elevations that reflect approximate floor elevations for surrounding buildings. Receptor elevations were determined by estimating the overall building height and dividing by the approximate number of floors. In evaluating total operational health impacts from each Project, the absolute maximum impact from generators at any elevation was conservatively added to the impacts from traffic and background sources at that receptor location at 1.8 meters (5.9 ft) elevation.

As discussed previously, maximum average annual dispersion factors were estimated for each receptor location. Modeled receptors covered the entire Plan area, as shown in **Figure 4A**, as well as a 1 kilometer buffer from the Plan area. The types of receptors in the area are discussed in more detail in **Section 4.2.2**.

4. RISK CHARACTERIZATION METHODS

In February 2015, OEHHA released the updated Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments (Cal/EPA 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 Guidance Manual (Cal/EPA 2003) that previously provided methodologies for conducting health risk assessments under the Air Toxics Hot Spots Program (AB2588). The BAAQMD adopted the OEHHA 2015 Guidance Manual (BAAQMD 2016a) for the purposes of New Source Review permitting. This evaluation uses the 2015 methodology in anticipation of its adoption by the BAAQMD for use in CEQA analyses. Details of this methodology are discussed below.

4.1 Plan-Level Operational HRA

4.1.1 Sources Evaluated

Ramboll evaluated excess lifetime cancer risk and $PM_{2.5}$ concentrations for road segments modeled as part of the SF CRRP-HRA within 1 kilometer of the Plan for four scenarios that are described in detail in **Section 2.1.1.1**. In addition, Ramboll evaluated excess lifetime cancer risk and $PM_{2.5}$ concentrations for generators that could be added to sites rezoned to allow for structures that are 75 feet or taller.

4.1.2 Exposure Assessment

4.1.2.1 Potentially Exposed Populations

Ramboll conservatively modeled all existing CRRP-HRA grid (20-meter spacing) receptors within the Plan boundary and within 1 kilometer of the proposed Plan boundary. Consistent with the updates to the CRRP-HRA, all receptors were analyzed as residents. Residents were assumed to be exposed to traffic emissions for a 30-year lifetime as consistent with the OEHHA 2015 Hot Spots Guidelines.

4.1.2.2 Exposure Assumptions

The exposure parameters used to estimate excess lifetime cancer risks for all potentially exposed populations were obtained using risk assessment guidelines from OEHHA (Cal/EPA 2015). **Table 13a** and **13b** show the exposure duration and exposure parameters that were used for the HRA.

4.1.2.3 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}, was calculated as follows:

$$IF_{inh} = \frac{DBR * ET * EF * ED * CF}{AT}$$

Where:

IF_{inh}	=	Intake Factor for Inhalation (m^3/kg-day)
DBR	=	Daily Breathing Rate (L/kg-day)
ET	=	Exposure Time (hours/24 hours)
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 was 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 OEHHA's Hot Spots guidance (Cal/EPA 2015).

4.1.3 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 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.

Following the updates to the CRRP-HRA methodology for cancer risk calculations, Ramboll included carcinogenic toxicity for DPM and organic gases from on-road gasoline-powered vehicles. Toxicity values are summarized in **Table 14.**

4.1.4 Age-Specific Sensitivity Factors

The estimated excess lifetime cancer risks for a resident was 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 2015 Guidance (Cal/EPA 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. **Table 15** presents the ASF values that were used for the HRA.

4.1.5 Estimation of $PM_{2.5}$ Concentrations

In line with the updates to the CRRP-HRA, Ramboll estimated $PM_{2.5}$ concentrations along with the risk evaluation. $PM_{2.5}$ concentrations were calculated based on $PM_{2.5}$ emissions and AERMOD dispersion modeling results as follows:

$$C_{PM2.5} = E_{PM2.5} \times Disp$$

Where:

$C_{PM2.5}$	=	$PM_{2.5}$ concentration
$E_{PM2.5}$	=	$PM_{2.5}$ emissions (see Section 2.1 for methodology)
Disp	=	Dispersion factor (direct result from AERMOD, see Section 3.2.3 for methodology)

4.1.6 Estimation of Cancer Risks

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 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 cancer potency factor (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-day)$^{-1}$
ASF	=	Age Sensitivity Factor (unitless)

4.2 Individual Proposed Projects

This section describes the risk characterization methodology for the project-level HRA. The project-level methodology for toxicity assessment, age-specific sensitivity factors, estimation of $PM_{2.5}$ concentration, and estimation of cancer risks is similar to the methodology used for the Plan-level assessment (see Section 4.1 for additional details).

4.2.1 Sources Evaluated

For each of the two individual proposed projects, Ramboll evaluated health risks and hazards (i.e., excess lifetime cancer risks and $PM_{2.5}$ concentrations) for on-site and off-site sensitive receptors exposed to emissions from project construction as well as project operation (i.e., on-road traffic and emergency generators). Because both of the proposed projects would be completed in a single phase of construction activity (i.e., it is not anticipated for there to be onsite residents while construction is ongoing), construction impacts on on-site residents were not analyzed. However, impacts from operational emissions (i.e., emissions from emergency generators and traffic) were analyzed for on-site residents.

For project-related traffic, health risks and hazards due to traffic from each Individual Project were estimated by performing a proportional analysis where the Plan-level health risks and hazards (which already includes the Individual Projects) impact from vehicle emissions were scaled by the ratio of new Project vehicle trip generation to new Plan daily trip generation, as estimated by F&P.

4.2.2 Exposure Assessment

Ramboll conservatively modeled all existing CRRP-HRA grid (20-meter spacing) receptors onsite and within 1 kilometer of the larger Plan boundary. Consistent with the updates to the CRRP-HRA, all off-site sensitive receptors were analyzed as residents.

Residents were assumed to be exposed to traffic emissions for a 30-year lifetime, consistent with OEHHA 2015 Hot Spots Guidelines (Cal/EPA 2015). **Tables 13a** and **13b** show the exposure duration and exposure parameters that were used for the project-level HRAs, which are the same as those used for the Plan-level analysis.

5. RESULTS FROM THE BASELINE (2020) SCENARIOS

5.1 Results from the Baseline (2020) + Plan Scenario

This section discusses the Baseline (2020) + Plan analysis that incorporates the Plan-level (The Hub Plan) and project-level (the Van Ness Project and the Franklin Project) HRA results as described in the sections above and **Table 1**, estimated in 2020. For the Baseline (2020) + Plan analysis, Ramboll prepared a database (see **Appendix F**) similar to that of the CRRP-HRA that includes $PM_{2.5}$ and cancer risk fields for the following sources:

1. Baseline (2020) No Plan traffic that was obtained from the updates to the CRRP-HRA
2. Non-road Baseline (2020) No Plan sources that have impacts on on-site and off-site sensitive receptor locations within the modeling domain, including: non-plan permitted stationary sources, rail sources, and maritime sources. As noted earlier, stationary source, rail, and maritime results were obtained from the updates to the CRRP-HRA
3. Plan 2020 Traffic, which also accounts for traffic emissions from the Individual Projects
4. The Van Ness and Franklin Project-level construction emissions
5. Emergency generators that could be installed for the 11 sites rezoned to allow for structures that are 75 feet or taller, including the two Individual Projects[22]
6. Totals that sum the cancer risk and $PM_{2.5}$ concentrations from the above sources.

Table 16a summarizes the maximum total excess lifetime cancer risk and **Table 16b** summarizes the maximum $PM_{2.5}$ concentration at the Plan MEISR. Results are shown for both the uncontrolled and controlled scenarios. The specific differences between the uncontrolled and controlled scenarios are described in **Section 2.1**. For the Baseline (2020) + Plan scenario, the MEISR for uncontrolled operations is the same as the MEISR for controlled operations for Cancer Risk Impacts. This is because the MEISR was largely driven by the operation of Plan generators (182 in a million for uncontrolled and 24 in a million for controlled operation). For $PM_{2.5}$, the MEISRs for the uncontrolled and controlled scenarios are different. This is because the MEISR for the uncontrolled scenario was largely driven by the Van Ness Project construction (0.59 $\mu g/m^3$) while at the controlled scenario MEISR, Plan traffic and generators contribute more than Van Ness Project construction.[23]

5.1.1 Cancer Risk for the Uncontrolled Baseline (2020) + Plan MEISR

For the uncontrolled scenario, the maximum cancer risk from the Plan is 225 in a million. The contribution to this cancer risk is broken out by source below:

- Construction of the Van Ness Project contributes 12 in a million
- Construction of the Franklin Project contributes 21 in a million

[22] Because building emergency generators for the two Individual Projects operate at elevation, receptors were modeled on Project buildings and nearby buildings at multiple elevations. The highest impact for each receptor column was conservatively added to the impacts from traffic and other sources as if it were occurring at a ground-level breathing height of 1.8 meters (5.9 ft).

[23] The location of MEISR changes only for $PM_{2.5}$ and not cancer risk because the MEISR for $PM_{2.5}$ is determined based on the maximum impact in any year while the MEISR for cancer risk is evaluated cumulatively over 30 years. Since $PM_{2.5}$ concentration is higher during the years when construction takes place, $PM_{2.5}$ concentration for the uncontrolled scenario is driven by Van Ness construction. Once controls are applied, the MEISR moves to another location where $PM_{2.5}$ contribution from Plan Traffic and generators are higher.

- Emergency generators at the 11 sites, including the two Individual Projects, contribute 182 in a million
- Plan 2020 Traffic contributes 11 in a million

In the uncontrolled scenario, the cancer risk from the operation of Plan generators, including those from the two Individual projects, contributes approximately 81 percent of the overall Plan-level cancer risk and this is because the Plan-level MEISR is located near four of the Plan generators. The overall impact at this MEISR, including impacts from Baseline (2020) No Plan sources, is 492 in a million. The additional 267 in a million increased excess lifetime cancer risk over the contributions from the Hub Plan and Individual Projects can also be broken out by source:

- Baseline (2020) No Plan traffic contributes 226 in a million
- Rail sources contribute 0.85 in a million
- Maritime sources contribute 35 in a million
- Existing stationary sources contribute 4.7 in a million

5.1.2 Cancer Risk for the Controlled Baseline (2020) + Plan MEISR

For the controlled scenario, the maximum cancer risk from the Plan is 37 in a million. The contribution to this cancer risk for the controlled scenario in 2020 is broken out by source below:

- Construction of the Van Ness Project contributes 0.26 in a million
- Construction of the Franklin Project contributes 1.7 in a million
- Emergency generators at the 11 sites, including the two Individual Projects, contribute 24 in a million
- Plan 2020 Traffic contributes 11 in a million

The overall impact at this MEISR, including impacts from Baseline (2020) No Plan sources, is 303 in a million. The additional 267 in a million increased excess lifetime cancer risk over the contributions from the Hub Plan and Individual Projects can also be broken out for this MEISR by source:

- Baseline (2020) No Plan traffic contributes 226 in a million
- Rail sources contribute 0.85 in a million
- Maritime sources contribute 35 in a million
- Existing stationary sources contribute 4.7 in a million

5.1.3 $PM_{2.5}$ Concentration for the Uncontrolled Baseline (2020) + Plan MEISR

For the uncontrolled scenario, the maximum $PM_{2.5}$ concentration from the Plan is 0.67 $\mu g/m^3$. The contribution to this $PM_{2.5}$ concentration is broken out by source below:

- Construction of the Van Ness Project contributes 0.59 $\mu g/m^3$
- Construction of the Franklin Project contributes 0.010 $\mu g/m^3$
- Emergency generators at the 11 sites, including the two Individual Projects, contribute 0.0077 $\mu g/m^3$

- Plan 2020 Traffic contributes 0.055 μg/m^3

As shown above, construction activities from the Van Ness Project contribute approximately 89 percent of the Plan-level $PM_{2.5}$ concentrations at the Plan MEISR. The overall impact at the MEISR that includes construction, including impacts from Baseline (2020) No Plan sources, is 10.2 μg/m^3. The additional 9.5 μg/m^3 concentration of $PM_{2.5}$ over the contributions from the Hub Plan and Individual Projects can also be broken out by source:

- Baseline (2020) No Plan traffic contributes 1.6 μg/m^3
- Rail sources contribute 0.0015 μg/m^3
- Maritime sources contribute 0.048 μg/m^3
- Existing stationary sources contribute 0.049 μg/m^3
- Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 μg/m^3 to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 μg/m^3 is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station.

5.1.4 $PM_{2.5}$ Concentration for the Controlled Baseline (2020) + Plan MEISR

For the controlled scenario, the maximum $PM_{2.5}$ concentration from the Plan is 0.12 μg/m^3. The contribution to this $PM_{2.5}$ concentration is broken out by source below:

- Construction of the Van Ness Project contributes 0.0012 μg/m^3
- Construction of the Franklin Project contributes 0.0094 μg/m^3
- Emergency generators at the 11 sites, including the two Individual Projects, contribute 0.032 μg/m^3
- Plan 2020 traffic contributes 0.076 μg/m^3

The MEISR for the controlled scenario is located at a different receptor point than for the uncontrolled scenario. Therefore, the baseline contributions to the total $PM_{2.5}$ concentrations are different for the controlled scenario. However, construction activities are temporary and upon completion of both the Van Ness and Franklin Project construction activities, the total Plan-level $PM_{2.5}$ contribution to this receptor point would be 0.11 μg/m^3. Upon completion of Project construction activities, the new MEISR would move to a different location where the total Plan-level $PM_{2.5}$ concentration is also estimated to be 0.11 μg/m^3.

The overall impact at this MEISR, including impacts from Baseline (2020) No Plan sources, is 9.5 μg/m^3. The additional 9.4 μg/m^3 concentration of $PM_{2.5}$ over the contributions from the Hub Plan and Individual Projects can also be broken out by source:

- Baseline (2020) No Plan traffic contributes 1.5 μg/m^3
- Rail sources contribute 0.0016 μg/m^3
- Maritime sources contribute 0.046 μg/m^3
- Existing stationary sources contribute 0.044 μg/m^3
- Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 μg/m^3 to the total $PM_{2.5}$ concentration at each receptor point. The

ambient $PM_{2.5}$ concentration of 7.8 μg/m^3 is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station.

5.2 Results from the Baseline (2020) + Van Ness Project Scenario

This section presents the CAP emissions and health impact results for the Van Ness Project. Emission calculation methodologies were discussed in **Section 2.2** above. The risk calculation databases are included in **Appendix G**.

5.2.1 CAP Emissions

CAP emissions were estimated for construction sources and for operational sources and the average daily emissions for both the sources are reported below. The emission methodology for estimating CAP emissions from the construction and operation of the Van Ness Project is presented in **Section 2**.

5.2.1.1 Construction Sources

Table 6 summarizes uncontrolled and controlled construction CAP emissions from the Van Ness Project by construction source type. As discussed above, uncontrolled construction emissions assume default fleet-average emission factors from CalEEMod® for diesel engines for all pieces of equipment. As shown in **Table 6**, average daily uncontrolled construction emissions are predicted to equal the following: ROG 12 lbs/day; NO_x 23 lbs/day; PM_{10} exhaust 1.5 lbs/day; $PM_{2.5}$ exhaust 0.84 lbs/day.

The controlled scenario assumes a mix of Tier 4 diesel engines, electric engines, and propane engines, as shown in **Appendix Table B-2**. As shown in **Table 6**, average daily controlled construction emissions are predicted to equal the following: ROG 11 lbs/day; NO_x 17 lbs/day; PM_{10} exhaust 1.2 lbs/day; $PM_{2.5}$ exhaust 0.56 lbs/day.

5.2.1.2 Operational Sources

Existing and Project operational CAP emissions from area, energy, and mobile sources were evaluated in CalEEMod® 2016.3.2 to determine the net increase in operational CAP emissions from the Van Ness Project. As discussed previously, CAP emissions from the Project generators were estimated for uncontrolled and controlled scenarios. Emissions for the uncontrolled scenario were evaluated assuming fleet-average default emission factors and emissions for the controlled scenario were evaluated assuming Tier 4 diesel generator standards, with each of the two engines operating for 40 hours of emergency testing per year.

Operational CAP emissions were evaluated from proposed onsite generators, traffic generated by the project, area sources and emissions from consumption of energy. Existing operational CAP emissions are shown in **Tables 10a** and **10b** for operation in 2018. Project operational CAP emissions for the uncontrolled and controlled scenarios are shown in **Tables 10a** and **10b,** respectively, for 2024, which is the first year of operation. As shown in **Table 10a** for the uncontrolled scenario, net operational CAP emissions would equal the following: ROG 20 lbs/day (3.7 tons/year); NO_X 8.2 lbs/day (1.5 tons/year); PM_{10} 20 lbs/day (3.6 tons/year); $PM_{2.5}$ 5.5 lbs/day (1.0 tons/year). For the controlled scenario, as shown in **Table 10b**, net operational CAP emissions would equal the following: ROG 20 lbs/day (3.7 tons/year); NO_X 6.2 lbs/day (1.1 tons/year); PM_{10} 20 lbs/day (3.6 tons/year); $PM_{2.5}$ 5.5 lbs/day (1.0 tons/year).

5.2.2 Risks and $PM_{2.5}$ Concentrations

As discussed above, this analysis evaluated total risk from Project construction and operation. The off-site cancer risks and $PM_{2.5}$ concentrations are shown in **Tables 17a** and **17b**, respectively. **Figure 5** shows the locations of the on- and off-site MEISRs for both the uncontrolled and controlled scenarios. For the Baseline (2020) + Van Ness scenario, the location of the MEISR does not change between the controlled and uncontrolled scenarios. The specific differences between the uncontrolled and controlled scenarios are described in **Section 2.2**.

5.2.2.1 Risks for the Baseline (2020) + Van Ness Project Off-Site MEISR

For the off-site MEISR, the cancer risks from construction and operation for the uncontrolled scenario and controlled scenario are 202 in a million and 4.6 in a million, respectively, as shown in the "Project Contributions" rows of **Table 17a.** The breakdown of individual sources contributing to these health risks at the Van Ness off-site MEISR is below:

- Van Ness Project construction contributes 201 in a million for uncontrolled and 4.4 in a million for controlled equipment
- Van Ness Project generators contribute 0.90 in a million for uncontrolled operation and 0.12 in a million for controlled operation
- The proportion of traffic estimated to be the direct result of the Van Ness Project contributes 0.11 in a million to both the uncontrolled and controlled scenarios

For the off-site MEISR, the total cancer risk for the uncontrolled scenario including cancer risk from Project construction, operation, and Baseline (2020) No Plan sources is 496 in a million, and the total cancer risk for the controlled scenario is 298 in a million, as shown in **Table 17a**. Because the MEISR for uncontrolled and controlled construction and operation are at the same location, the contributions from Baseline (2020) No Plan sources are the same for the controlled and uncontrolled scenarios:

- Baseline (2020) No Plan traffic contributes 251 in a million
- Rail sources contribute 0.80 in a million
- Maritime sources contribute 37 in a million
- Existing stationary sources contribute 4.9 in a million

5.2.2.2 Risks for the Baseline (2020) + Van Ness Project On-Site MEISR

For the on-site MEISR, which is not exposed to Van Ness Project construction emissions, the cancer risks from uncontrolled and controlled operation are 22 in a million and 3.0 in a million, respectively, as shown in **Table 17a.** The breakdown of individual sources contributing to these health risks at the Van Ness off-site MEISR is below:

- Van Ness Project generators contribute 21 in a million for uncontrolled operation and 2.9 in a million for controlled operation
- The proportion of traffic estimated to be the direct result of the Van Ness Project contributes 0.10 in a million to both the uncontrolled and controlled scenarios

The total cancer risk for the on-site MEISR for the uncontrolled scenario, including cancer risk from Project operation and Baseline (2020) No Plan sources is 281 in a million, and the total cancer risk for the controlled scenario is 262 in a million as shown in **Table 17a**.

Because the MEISR for uncontrolled and controlled construction and operation are at the same location, the contributions from Baseline (2020) No Plan sources are the same for the controlled and uncontrolled scenarios:

- Baseline (2020) No Plan traffic contributes 217 in a million
- Rail sources contribute 0.78 in a million
- Maritime sources contribute 37 in a million
- Existing stationary sources contribute 4.7 in a million

5.2.2.3 $PM_{2.5}$ Concentration for the Baseline (2020) + Van Ness Project Off-Site MEISR

As shown in **Table 17b**, maximum $PM_{2.5}$ concentration at the off-site MEISR from construction and operation for the uncontrolled and controlled scenarios are 0.60 μg/m^3 and 0.021 μg/m^3, respectively. These are shown in the "Project Contributions" row of **Table 17b**. The breakdown of individual sources contributing to these health risks at the Van Ness off-site MEISR is below:

- Van Ness Project construction contributes 0.59 μg/m^3 for uncontrolled and 0.020 μg/m^3 for controlled equipment
- Van Ness Project generators contribute 0.0024 μg/m^3 for uncontrolled operation and 0.00031 μg/m^3 for controlled operation
- The proportion of traffic estimated to be the direct result of the Van Ness Project contributes 0.00075 μg/m^3 to both the uncontrolled and controlled scenarios

For the off-site MEISR, the maximum $PM_{2.5}$ concentration for the uncontrolled scenario including $PM_{2.5}$ from Project construction, operation, and Baseline (2020) No Plan sources is 10.1 μg/m^3, and the maximum $PM_{2.5}$ concentration for the controlled scenario is 9.5 μg/m^3, as shown in **Table 17b**. Because the MEISR for uncontrolled and controlled construction and operation are at the same location, the contributions from Baseline (2020) No Plan sources are the same for the controlled and uncontrolled scenarios:

- Baseline (2020) No Plan traffic contributes 1.6 μg/m^3
- Rail sources contribute 0.0015 μg/m^3
- Maritime sources contribute 0.048 μg/m^3n
- Existing stationary sources contribute 0.049 μg/m^3
- Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 μg/m^3 to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 μg/m^3 is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station.

5.2.2.4 $PM_{2.5}$ Concentration for the Baseline (2020) + Van Ness Project On-Site MEISR

For the on-site MEISR, which is not exposed to the Van Ness Project construction emissions, maximum $PM_{2.5}$ concentration at the on-site MEISR from operation for the uncontrolled and controlled scenarios are 0.030 μg/m^3 and 0.0046 μg/m^3, respectively. These are shown in the "Project Contributions" row of **Table 17b**. The breakdown of individual sources contributing to these health risks at the Van Ness off-site MEISR is below:

- Van Ness Project generators contribute 0.029 μg/m^3 for uncontrolled operation and 0.0038 μg/m^3 for controlled operation
- The proportion of traffic estimated to be the direct result of the Van Ness Project contributes 0.00078 μg/m^3 to both the uncontrolled and controlled scenarios

For the on-site MEISR, the maximum $PM_{2.5}$ concentration for the uncontrolled scenario including $PM_{2.5}$ from Project operation and Baseline (2020) No Plan sources is 9.5 μg/m^3, and the maximum $PM_{2.5}$ concentration for the controlled scenario is 9.5 μg/m^3, as shown in **Table 17b**. Because the MEISR for uncontrolled and controlled construction and operation are at the same location, the contributions from Baseline (2020) No Plan sources are the same for the controlled and uncontrolled scenarios:

- Baseline (2020) No Plan traffic contributes 1.6 μg/m^3
- Rail sources contribute 0.0015 μg/m^3
- Maritime sources contribute 0.048 μg/m^3n
- Existing stationary sources contribute 0.048 μg/m^3
- Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 μg/m^3 to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 μg/m^3 is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station.

5.3 Results from the Baseline (2020) + Franklin Scenario

This section presents the CAP emissions and health impact results for the Franklin Project. Emission calculation methodologies were discussed in Section 2 above. The risk calculation databases are included in Appendix H.

5.3.1 CAP Emissions

CAP emissions were estimated for construction sources and for operational sources. Both are reported below as average daily emissions. For more information on the calculation methodology, please refer to **Section 2.2**.

5.3.1.1 Construction Sources

Table 7 summarizes uncontrolled and controlled construction CAP emissions from the Franklin Project by source category for the entire construction period. As discussed above, uncontrolled construction emissions assume default CalEEMod® tiers for all pieces of equipment. As shown in **Table 7**, average daily uncontrolled construction emissions are predicted to equal the following: ROG 12 lbs/day; NOx 8.6 lbs/day; PM_{10} exhaust 0.67 lbs/day; $PM_{2.5}$ exhaust 0.39 lbs/day.

The controlled scenario assumes a mix of Tier 4 Final diesel engines, Tier 4 Interim diesel engines, electric engines, and propane engines, as shown in **Appendix Table B-4**. As shown in **Table 7**, average daily controlled construction emissions are predicted to equal the following: ROG 12 lbs/day; NOx 5.6 lbs/day; PM_{10} exhaust 0.50 lbs/day; $PM_{2.5}$ exhaust 0.23 lbs/day.

5.3.1.2 Operational Sources

Project operational CAP emissions from area, energy, and mobile sources were evaluated in CalEEMod® 2016.3.2. CAP emissions from the Project onsite generators were estimated for uncontrolled and controlled scenarios. Emissions for the uncontrolled scenario were evaluated assuming fleet-average default emission factors and emissions for the controlled scenario were evaluated assuming Tier 4 diesel generator standards, operating for 50 hours per year.

Similar to the Van Ness project, operational CAP emissions were estimated from onsite generators, project-related traffic, area sources, and energy sources.

Project operational CAP emissions for the uncontrolled and controlled scenarios are shown in **Tables 11a** and **11b,** respectively**,** for 2023, which is the first year of operation. As shown in **Table 11a** net operational CAP emission for the uncontrolled scenario would equal the following: ROG 15 lbs/day (2.8 tons/year); NO_X 10 lbs/day (1.8 tons/year); PM_{10} 11 lbs/day (2.0 tons/year); $PM_{2.5}$ 3.1 lbs/day (0.57 tons/year). For the controlled scenario as shown in **Table 11b**, net operational CAP emissions would equal the following: ROG 15 lbs/day (2.8 tons/year); NO_X 7.7 lbs/day (1.4 tons/year); PM_{10} 11 lbs/day (2.0 tons/year); $PM_{2.5}$ 3.1 lbs/day (0.56 tons/year).

5.3.2 Risks and $PM_{2.5}$ Concentrations

As discussed above, this analysis evaluated total risk from Project construction and operation. The off-site risks and $PM_{2.5}$ concentrations are shown in **Tables 18a** and **18b**, respectively. **Figure 6** shows the locations of the on- and off-site MEISRs for both the uncontrolled and controlled scenarios. For the Baseline (2020) + Franklin scenario, the location of the MEISR does not change between the controlled and uncontrolled scenarios. The specific differences between the uncontrolled and controlled scenarios are described in **Section 2.2**.

5.3.2.1 Risks for the Baseline (2020) + Franklin Project Off-Site MEISR

For the off-site MEISR, the cancer risks from construction and operation for the uncontrolled scenario and controlled scenario are 72 in a million and 5.8 in a million, respectively, as shown in the "Project Contributions" rows of **Table 18a.** The breakdown of individual sources contributing to these health risks at the Franklin off-site MEISR is below:

- Franklin Project construction contributes 70 in a million for uncontrolled and 5.6 in a million for controlled equipment
- Franklin Project generators contribute 1.6 in a million for uncontrolled operation and 0.22 in a million for controlled operation
- The proportion of traffic estimated to be the direct result of the Franklin Project contributes 0.024 in a million to both the uncontrolled and controlled scenarios

For the off-site MEISR, the total cancer risk for the uncontrolled scenario including cancer risk from Project construction, operation, and Baseline (2020) No Plan sources is 305 in a million, and the total cancer risk for the controlled scenario is 239 in a million, as shown in **Table 18a**. Because the MEISR for uncontrolled and controlled construction and operation are at the same location, the contributions from Baseline (2020) No Plan sources are the same for the controlled and uncontrolled scenarios:

- Baseline (2020) No Plan traffic contributes 193 in a million
- Rail sources contribute 0.84 in a million
- Maritime sources contribute 35 in a million
- Existing stationary sources contribute 4.3 in a million

5.3.2.2 Risks for the Baseline (2020) + Franklin Project On-Site MEISR

For the on-site MEISR, which is not exposed to the Franklin Project construction emissions, the cancer risks from uncontrolled and controlled operation are 6.2 in a million and 0.84 in a million, respectively, as shown in **Table 18a.** The breakdown of individual sources contributing to these health risks at the Franklin on-site MEISR is below:

- Franklin Project generators contribute 6.1 in a million for uncontrolled operation and 0.82 in a million for controlled operation
- The proportion of traffic estimated to be the direct result of the Franklin Project contributes 0.019 in a million to both the uncontrolled and controlled scenarios

The total cancer risk for the on-site MEISR for the uncontrolled scenario, including cancer risk from Project operation and Baseline (2020) No Plan sources is 229 in a million, and the total cancer risk for the controlled scenario is 224 in a million as shown in **Table 18a**. Because the MEISR for uncontrolled and controlled construction and operation are at the same location, the contributions from Baseline (2020) No Plan sources are the same for the controlled and uncontrolled scenarios:

- Baseline (2020) No Plan traffic contributes 183 in a million
- Rail sources contribute 0.83 in a million
- Maritime sources contribute 35 in a million
- Existing stationary sources contribute 4.1 in a million

5.3.2.3 $PM_{2.5}$ Concentration for the Baseline (2020) + Franklin Project Off-Site MEISR

As shown in **Table 18b**, maximum $PM_{2.5}$ concentration at the off-site MEISR from construction and operation for the uncontrolled and controlled scenarios are 0.29 μg/m^3 and 0.032 μg/m^3, respectively. These are shown in the "Project Contributions" row of **Table 18b**. The breakdown of individual sources contributing to these health risks at the Franklin off-site MEISR is below:

- Franklin Project construction contributes 0.28 μg/m^3 for uncontrolled and 0.032 μg/m^3 for controlled equipment
- Franklin Project generators contribute 0.0024 μg/m^3 for uncontrolled operation and 0.00032 μg/m^3 for controlled operation
- The proportion of traffic estimated to be the direct result of the Franklin Project contributes 0.00018 μg/m^3 to both the uncontrolled and controlled scenarios

For the off-site MEISR, the maximum $PM_{2.5}$ concentration for the uncontrolled scenario including $PM_{2.5}$ from Project construction, operation, and Baseline (2020) No Plan sources is 9.5 μg/m^3, and the maximum $PM_{2.5}$ concentration for the controlled scenario is 9.3 μg/m^3, as shown in **Table 18b**. Because the MEISR for uncontrolled and controlled construction and operation are at the same location, the contributions from Baseline (2020) No Plan sources are the same for the controlled and uncontrolled scenarios:

- Baseline (2020) No Plan traffic contributes 1.4 μg/m^3
- Rail sources contribute 0.0016 μg/m^3
- Maritime sources contribute 0.046 μg/m^{3}n

- Existing stationary sources contribute 0.044 μg/m^3
- Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 μg/m^3 to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 μg/m^3 is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station.

5.3.2.4 $PM_{2.5}$ Concentration for the Baseline (2020) + Franklin Project On-Site MEISR

For the on-site MEISR, which is not exposed to the Franklin Project construction emissions, maximum $PM_{2.5}$ concentration at the on-site MEISR from operation for the uncontrolled and controlled scenarios are 0.0084 μg/m^3 and 0.0012 μg/m^3, respectively. These are shown in the "Project Contributions" row of **Table 18b**. The breakdown of individual sources contributing to these health risks at the Franklin on-site MEISR is below:

- Franklin Project generators contribute 0.0083 μg/m^3 for uncontrolled operation and 0.0011 μg/m^3 for controlled operation
- The proportion of traffic estimated to be the direct result of the Franklin Project contributes 0.00015 μg/m^3 to both the uncontrolled and controlled scenarios

For the on-site MEISR, the maximum $PM_{2.5}$ concentration for the uncontrolled scenario including $PM_{2.5}$ from Project construction, operation, and Baseline (2020) No Plan sources is 9.3 μg/m^3, and the maximum $PM_{2.5}$ concentration for the controlled scenario is 9.3 μg/m^3, as shown in **Table 18b**. Because the MEISR for uncontrolled and controlled operation are at the same location, the contributions from Baseline (2020) No Plan sources are the same for the controlled and uncontrolled scenarios:

- Baseline (2020) No Plan traffic contributes 1.4 μg/m^3
- Rail sources contribute 0.0016 μg/m^3
- Maritime sources contribute 0.045 μg/m^3
- Existing stationary sources contribute 0.043 μg/m^3
- Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 μg/m^3 to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 μg/m^3 is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station.

6. RESULTS FROM CUMULATIVE (2040) SCENARIO

6.1 Cumulative (2040) Scenario Risks and Hazards

This section discusses the Cumulative analysis that incorporates the Plan-level (The Hub Plan) and Project-level (the Van Ness Project and the Franklin Project) HRA results as described in the sections above and **Table 1**, estimated in 2040. The Cumulative 2040 analysis also includes contributions to emissions from changes in vehicle traffic conditions, consistent with the cumulative transportation modeling. The Cumulative (2040) No Plan traffic analysis also accounts for the impacts from traffic emissions associated with implementation of the Central SoMa Plan. For the Cumulative analysis, Ramboll prepared a database (see **Appendix H**) similar to that of the CRRP-HRA that includes $PM_{2.5}$ and cancer risk fields for the following emissions sources at each evaluated receptor point:

1. Cumulative (2040) No Plan traffic, which includes the traffic impacts from the implementation of the Central SoMa Plan and other background growth not related to the Hub Plan
2. Non-road background sources that have impacts on sensitive receptor locations within the modeling domain, including: non-plan or project permitted stationary sources, rail, and maritime sources. As noted earlier, non-plan or project stationary, rail, and maritime results were obtained from the updates to the CRRP-HRA
3. Plan 2040 Traffic, which also accounts for traffic emissions from the Individual Projects
4. The Van Ness and Franklin Project-level construction emissions
5. Emergency generators that could be installed for the 11 sites rezoned to allow for structures that are 75 feet or taller, including the two Individual Projects.[24]
6. Totals that sum the cancer risk and $PM_{2.5}$ concentrations from the above sources.

The contribution to health risk and hazards from each project (the Plan, 30 Van Ness, and 98 Franklin) are evaluated at each project's MEISR in order to determine each project's maximum contribution to cumulative health risks. The MEISR for each Project for the Cumulative (2040) scenarios was found to be at the same location as the Baseline (2020) scenarios; however, the MEISR for the Plan changed between 2020 and 2040.

6.2 Analysis of the Hub Plan's Contribution to Cumulative Risks and Hazards

This section provides the results of the Cumulative (2040) health risks and hazards at the Plan's MEISR.

6.2.1 Cancer Risk for the Uncontrolled Cumulative (2040) Scenario at the Plan MEISR

Table 19a summarizes the maximum total excess lifetime cancer risk for the uncontrolled scenario. The total excess cancer risk at the Hub Plan MEISR is 303 in a million. For the Cumulative (2040) + Plan scenario, the MEISR for uncontrolled operations was different than the MEISR for controlled operations. This is because impacts at the MEISR for the uncontrolled scenario are largely driven by the Van Ness Project construction (201 in a

[24] Because building emergency generators for the two Individual Projects operate at elevation, receptors were modeled on Project buildings and nearby buildings at multiple elevations. The highest impact for each receptor column was conservatively added to the impacts from traffic and other sources as if it were occurring at a ground-level breathing height of 1.8 meters (5.9 ft).

million) that does not have any control equipment. Once controls were applied to the construction equipment, the MEISR moved to a different location that was no longer directly next to and downwind of the Van Ness Project construction site. The specific differences between the uncontrolled and controlled scenarios are described in **Section 2.1**.

The contribution to this cancer risk is broken out by source below:

- Construction of the Van Ness Project contributes 201 in a million
- Construction of the Franklin Project contributes 2.4 in a million
- Emergency generators at the 11 sites, including the two Individual Projects, contribute 13 in a million
- Plan 2040 Traffic contributes 1.5 in a million

The overall contribution from the Plan-level sources at this MEISR is 217 in a million. The additional 85 in a million increased excess lifetime cancer risk over the contributions from the Hub Plan and Individual Projects can also be broken out by source:

- Cumulative (2040) No Plan traffic contributes 43 in a million
- Rail sources contribute 0.80 in a million
- Maritime sources contribute 37 in a million
- Existing stationary sources contribute 4.9 in a million

6.2.2 Cancer Risk for the Controlled Cumulative (2040) Scenario at the Plan MEISR

For the controlled scenario, the total excess cancer risk at the MEISR is 111 in a million, as shown in **Table 19a**. As mentioned in **Section 6.2.1**, the location of the MEISR for the controlled scenario is different from the MEISR for the uncontrolled scenario. The contribution to cancer risk at the controlled MEISR is broken out by source below:

- Construction of the Van Ness Project contributes 0.26 in a million
- Construction of the Franklin Project contributes 1.7 in a million
- Emergency generators at the 11 sites, including the two Individual Projects, contribute 24 in a million
- Plan 2040 Traffic contributes 2.1 in a million

The overall contribution from the Plan-level sources at this MEISR is 28 in a million. The additional 83 in a million increased excess lifetime cancer risk over the contributions from the Hub Plan and Individual Projects can also be broken out by source:

- Cumulative (2040) No Plan traffic contributes 42 in a million
- Rail sources contribute 0.85 in a million
- Maritime sources contribute 35 in a million
- Existing stationary sources contribute 4.7 in a million

6.2.3 $PM_{2.5}$ Concentration for the Uncontrolled Cumulative 2040 Scenario at the Plan MEISR

For the uncontrolled scenario, the total $PM_{2.5}$ concentration at the Plan MEISR is 9.5 µg/m^3, as shown in **Table 19b.** Similar to cancer risk impact, the MEISR for the uncontrolled scenario was different than the MEISR for the controlled scenario.

The contribution to this $PM_{2.5}$ concentration is broken out by source below:

- Construction of the Van Ness Project contributes 0.59 µg/m^3
- Construction of the Franklin Project contributes 0.010 µg/m^3
- Emergency generators at the 11 sites, including the two Individual Projects, contribute 0.0077 µg/m^3
- Plan 2040 Traffic contributes 0.028 µg/m^3

The overall impact at this MEISR from the Plan-level sources is 0.64 µg/m^3. The additional 8.8 µg/m^3 concentration of $PM_{2.5}$ over the contributions from the Hub Plan and Individual Projects can also be broken out by source:

- Cumulative (2040) No Plan traffic contributes 0.94 µg/m^3
- Rail sources contribute 0.0015 µg/m^3
- Maritime sources contribute 0.048 µg/m^3
- Existing stationary sources contribute 0.049 µg/m^3

6.2.4 Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 µg/m^3 to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 µg/m^3 is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station. $PM_{2.5}$ Concentration for the Controlled Cumulative (2040) Scenario at the Plan MEISR

For the controlled scenario, the total $PM_{2.5}$ concentration at the Plan MEISR is 10.4 µg/m^3. The MEISR for the controlled scenario is different from the MEISR for the uncontrolled scenario. The Plan-level contributions to the $PM_{2.5}$ concentration at this MEISR is broken out by source below:

- Construction of the Van Ness Project contributes 0.000025 µg/m^3
- Construction of the Franklin Project contributes 0.000054 µg/m^3
- Emergency generators at the 11 sites, including the two Individual Projects, contribute 0.00070 µg/m^3
- Plan 2040 Traffic contributes 0.13 µg/m^3

The overall Plan-level contribution at this MEISR[25], including impacts from the construction of the Individual Projects, Plan and Project generators and Plan-level traffic is 0.13 µg/m^3.

[25] The overall maximum $PM_{2.5}$ concentration, including the Cumulative (2040) No Plan sources at the controlled MEISR for the Cumulative (2040) + Plan scenario is higher than in the uncontrolled scenario. This occurs because the uncontrolled MEISR location is driven by the uncontrolled construction equipment at the Van Ness Project site. Once controls are applied to construction equipment, the location of the MEISR moves to the location with the highest impact from Plan (2040) Traffic. This corresponds to an area of high Cumulative

The additional 10.3 μg/m^3 concentration of $PM_{2.5}$ over the contributions from the Hub Plan and Individual Projects can also be broken out by source:

- Cumulative (2040) No Plan traffic contributes 2.4 μg/m^3
- Rail sources contribute 0.0031 μg/m^3
- Maritime sources contribute 0.045 μg/m^3
- Existing stationary sources contribute 0.029 μg/m^3
- Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 μg/m^3 to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 μg/m^3 is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station.

6.3 Analysis of the Van Ness Project's Contribution to Cumulative Risks and Hazards

This section provides the results of the Cumulative (2040) Scenario health risks and hazards at the Van Ness Project's MEISR.

Emission calculation methodologies were discussed in Section 2 above. As discussed above, the sources of emission included in this analysis are the same as the emissions sources included in the Cumulative (2040) analysis. The risks and $PM_{2.5}$ concentrations at both the offsite and onsite MEISRs are shown in Tables 20a and 20b, respectively. Figure 5 shows the locations of the on- and off-site MEISRs for both the uncontrolled and controlled scenarios. For the Cumulative (2040) scenario at the Van Ness Project MEISRs, the locations of the onsite and offsite MEISRs do not change between the controlled and uncontrolled scenarios. The specific differences between the uncontrolled and controlled scenarios are described in Section 2.2.

The MEISRs were determined by identifying the receptors with the maximum impact from all Project-level sources in 2040.

6.3.1 Risks for the Cumulative (2040) Scenario at the Van Ness Project Off-Site MEISR

For the offsite MEISR, the total excess cancer risk for the uncontrolled scenario is 303 in a million and the total excess cancer risk for the controlled scenario is 93 in a million, as shown in **Table 20a**. The breakdown of the Project-level contribution from the individual sources at the Van Ness offsite MEISR for the uncontrolled and controlled scenarios is below:

- Van Ness Project construction contributes 201 in a million for uncontrolled and 4.4 in a million for controlled equipment
- Van Ness Project generators contribute 0.90 in a million for uncontrolled operation and 0.12 in a million for controlled operation
- The proportion of traffic estimated to be the direct result of the Van Ness Project contributes 0.026 in a million to both the uncontrolled and controlled scenarios

Thus, the total contribution from the Van Ness Project is 202 in a million for the uncontrolled scenario and 4.5 in a million for the controlled scenario. The contribution from Plan-level

(2040) No Plan traffic since it is next to the highway. The uncontrolled MEISR, in comparison, is located next to the Van Ness Project construction site and further away from major traffic sources.

sources is different for the controlled and uncontrolled scenarios due to controls added to Plan-level emission sources, as explained in **Section 2.1**. Contribution from the other Individual Project (98 Franklin Project) is also different for the controlled and uncontrolled scenarios due to controls on the generators and construction equipment, as explained in **Section 2.2**.

- Plan-level generators contribute 11 in a million for the uncontrolled scenario and 1.5 in a million for the controlled scenario. This does not include the generator impacts from the two Individual Projects
- Plan-level traffic contributes 1.5 in a million for the uncontrolled scenario and the controlled scenarios. This does not include the impacts from traffic attributed to the two Individual Projects
- Franklin Project construction contributes 2.4 in a million for the uncontrolled scenario and 0.19 in a million for the controlled scenario
- Franklin Project operation, including traffic and generators, contributes 0.69 in a million for the uncontrolled scenario and 0.10 in a million for the controlled scenario

The contributions from the Cumulative (2040) No Plan sources are the same for the controlled and uncontrolled scenarios because the location of the MEISR does not change. The breakdown of impacts for the controlled and uncontrolled scenarios is below :

- Cumulative (2040) No Plan traffic contributes 43 in a million
- Rail sources contribute 0.80 in a million
- Maritime sources contribute 37 in a million

Existing stationary sources contribute 4.9 in a million

6.3.2 Risks for the Cumulative (2040) Scenario at the Van Ness Project On-Site MEISR

The overall Cumulative (2040) impacts at the Van Ness onsite MEISRs are 120 in a million for the uncontrolled scenario and 93 in a million for the controlled scenario, as shown in **Table 20a**. The on-site MEISR is not exposed to the Van Ness Project construction emissions.

The breakdown of Project-level contribution from the individual sources at the Van Ness onsite MEISR for uncontrolled and uncontrolled scenarios is below:

- Van Ness Project generators contribute 21 in a million for uncontrolled operation and 2.9 in a million for controlled operation
- The proportion of traffic estimated to be the direct result of the Van Ness Project contributes 0.030 in a million to both the uncontrolled and controlled scenarios

Thus, the total contribution from the Van Ness Project at the onsite MEISR is 22 in a million for the uncontrolled scenario and 2.9 in a million for the controlled scenario.

Contributions from Plan-level sources are different for the controlled and uncontrolled scenarios due to controls added to Plan-level emission sources, as explained in **Section 2.1**. Contributions from the other Individual Project (98 Franklin Project) are also different for the controlled and uncontrolled scenarios due to controls on the generator engine, as explained in **Section 2.2**.

- Plan-level generators contribute 9.2 in a million for the uncontrolled scenario and 1.2 in a million for the controlled scenario. This does not include the generator impacts from the two Individual Projects
- Plan-level traffic contributes 1.8 in a million for the uncontrolled scenario and the controlled scenario. This does not include the impacts from traffic attributed to the two Individual Projects
- Franklin project construction is not anticipated to occur while the Van Ness Project is operational based on construction schedules
- Franklin project operation, including traffic and generators, contributes 0.55 in a million for the uncontrolled scenario and 0.080 in a million for the controlled scenario

The contributions from Cumulative (2040) No Plan sources are the same for the controlled and uncontrolled scenarios because the location of the MEISR does not change. The breakdown of impacts for the controlled and uncontrolled scenarios is below:

- Cumulative (2040) No Plan traffic contributes 45 in a million
- Rail sources contribute 0.78 in a million
- Maritime sources contribute 37 in a million
- Existing stationary sources contribute 4.7 in a million

6.3.3 $PM_{2.5}$ Concentration for the Cumulative (2040) Scenario at the Van Ness Project Off-Site MEISR

As shown in **Table 20b**, maximum $PM_{2.5}$ concentration at the off-site Van Ness MEISR for the uncontrolled and controlled scenarios are 9.5 μg/m^3 and 7.9 μg/m^3. These are shown in the "Total $PM_{2.5}$ concentration at Van Ness Project MEISR" row of **Table 20b**. The breakdown of Project-level contribution from the individual sources at the Van Ness offsite MEISR for the uncontrolled and controlled scenarios is below:

- Van Ness Project construction contributes 0.59 μg/m^3 for uncontrolled and 0.020 μg/m^3 for the controlled scenario
- Van Ness Project generators contribute 0.0024 μg/m^3 for uncontrolled operation and 0.00031 μg/m^3 for controlled operation
- The proportion of traffic estimated to be the direct result of the Van Ness Project contributes 0.00047 μg/m^3 to both the uncontrolled and controlled scenarios

Thus, the total contribution from the Van Ness Project is 0.60 μg/m^3 for the uncontrolled scenario and 0.021 μg/m^3 for the controlled scenario.

As described in **Section 6.3.1**, contribution from Plan-level sources and from the other Individual Project (98 Franklin Project) is different for the controlled and uncontrolled scenarios, due to mitigation measures for the controlled scenario. The contribution from Plan-level sources and from the other Individual Project is broken down by source below:

- Plan-level generators contribute 0.0035 μg/m^3 for the uncontrolled scenario and 0.00047 μg/m^3 for the controlled scenario. This does not include the generator impacts from the two Individual Projects

- Plan-level traffic contributes 0.027 μg/m^3 for the uncontrolled scenario and controlled scenarios. This does not include the impacts from traffic attributed to the two Individual Projects
- Franklin Project construction contributes 0.010 μg/m^3 for the uncontrolled scenario and 0.0011 μg/m^3 for the controlled scenario
- Franklin Project operation, including traffic and generators contribute 0.0019 μg/m^3 for the uncontrolled scenario and 0.00037 μg/m^3 for the controlled scenario

The contributions from the Cumulative (2040) No Plan sources are the same for the controlled and uncontrolled scenarios because the location of the MEISR does not change. The breakdown of impacts for the controlled and uncontrolled scenarios is below:

- Cumulative (2040) No Plan traffic contributes 0.94 μg/m^3
- Rail sources contribute 0.0015 μg/m^3
- Maritime sources contribute 0.048 μg/m^3
- Existing stationary sources contribute 0.049 μg/m^3
- Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 μg/m^3 to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 μg/m^3 is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station.

6.3.4 $PM_{2.5}$ Concentration for the Cumulative (2040) Scenario at the Van Ness Project On-Site MEISR

For the on-site MEISR, which is not exposed to the Van Ness Project construction emissions, maximum $PM_{2.5}$ concentration at the on-site MEISR for the uncontrolled and controlled scenarios are 8.0 μg/m^3 and 7.9 μg/m^3, respectively, as shown in the "Total $PM_{2.5}$ concentration at MEISR" row of **Table 20b**. The breakdown of the Project-level contribution from the individual sources at the Van Ness on-site MEISR for the uncontrolled and controlled scenarios is below:

- Van Ness Project generators contribute 0.029 μg/m^3 for uncontrolled operation and 0.0038 μg/m^3 for controlled operation
- The proportion of traffic estimated to be the direct result of the Van Ness Project contributes 0.00056 μg/m^3 to both the uncontrolled and controlled scenarios

Thus, the total contribution from the Van Ness Project at the onsite MEISR is 0.029 μg/m^3 for the uncontrolled scenario and 0.0044 μg/m^3 for the controlled scenario.

Similar to cancer risk, contributions from the Plan-level and the other Individual Project (98 Franklin) sources are different for the uncontrolled and controlled scenarios. The breakdown of Plan-level and Individual Project sources is below:

- Plan-level generators contribute 0.0028 μg/m^3 for the uncontrolled scenario and 0.00037 μg/m^3 for the controlled scenario. This does not include the generator impacts from the two Individual Projects
- Plan-level traffic contributes 0.033 μg/m^3 for the uncontrolled and controlled scenarios. This does not include the traffic risk contribution from the two Individual Projects

- Franklin project construction is not anticipated to occur while the Van Ness Project is operational based on construction schedules
- Franklin project operation, including traffic and generators contribute 0.00088 μg/m^3 for the uncontrolled scenario and 0.00024 μg/m^3 for the controlled scenario

The contributions from the Cumulative (2040) No Plan sources are the same for the controlled and uncontrolled scenarios because the location of the MEISR does not change. The breakdown of impacts from the Cumulative (2040) No Plan sources for the controlled and uncontrolled scenarios is summarized below:

- Cumulative (2040) No Plan traffic contributes 1.1 μg/m^3
- Rail sources contribute 0.0015 μg/m^3
- Maritime sources contribute 0.048 μg/m^3
- Existing stationary sources contribute 0.048 μg/m^3
- Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 μg/m^3 to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 μg/m^3 is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station.

6.4 Analysis of the Franklin Project's Contribution to Cumulative Risks and Hazards

This section provides the results of the Franklin Project's contribution to cumulative 2040 health risks and hazards at the Franklin Project's MEISR.

Emission calculation methodologies were discussed in Section 2 above. As discussed above, the sources of emissions included in this analysis are the same as the emissions sources included in the Cumulative (2040) + Plan analysis. The off-site risks and $PM_{2.5}$ concentrations are shown in **Tables 21a** and **21b**, respectively. **Figure 6** shows the locations of the on- and off-site MEISRs for both the uncontrolled and controlled scenarios. For the Cumulative (2040) scenario at the Franklin Project MEISRs, the locations of the offsite and onsite MEISRs do not change between the controlled and uncontrolled scenarios. The specific differences between the uncontrolled and controlled scenarios are described in **Section 2.2**.

The MEISR was determined by identifying the receptor with the maximum impact from all Project-level sources in 2040.

6.4.1 Risks for the Cumulative (2040) Scenario at the Franklin Project Off-Site MEISR

For the off-site MEISR, the total excess cancer risk for the uncontrolled scenario is 173 in a million and the total excess cancer risk for the controlled scenario is 89 in a million, as shown in **Table 21a.** The breakdown of the Project-level contribution from the individual sources at the Franklin off-site MEISR for the uncontrolled and controlled scenarios is below:

- Franklin Project construction contributes 70 in a million for the uncontrolled scenario and 5.6 in a million for the controlled scenario
- Franklin Project generators contribute 1.6 in a million for uncontrolled operation and 0.22 in a million for controlled operation

- The proportion of traffic estimated to be the direct result of the Franklin Project contributes 0.0063 in a million to both the uncontrolled and controlled scenarios

Thus, the total contribution from the Franklin Project is 72 in a million for the uncontrolled scenario and 5.8 in a million for the controlled scenario.

Contributions from Plan-level sources and the other Individual Project (30 Van Ness Project) are different for the controlled and uncontrolled scenarios due to mitigation measures added to the controlled scenarios. The breakdown of Plan-level and Individual Project sources is below:

- Plan-level generators contribute 11 in a million for the uncontrolled scenario and 1.5 in a million for the controlled scenario. This does not include the generator impacts from the two Individual Projects
- Plan-level traffic contributes 1.4 in a million for the uncontrolled and controlled scenarios. This does not include the traffic risk contribution from the two Individual Projects
- Van Ness project construction contributes 7.4 in a million for the uncontrolled scenario and 0.16 in a million for the controlled scenario
- Van Ness project operation, including traffic and generators contribute 1.0 in a million for the uncontrolled scenario and 0.15 in a million for the controlled scenario.

The contributions from the Cumulative (2040) No Plan sources are the same for the controlled and uncontrolled scenarios because the location of the MEISR does not change. The breakdown of impacts for the controlled and uncontrolled scenarios is summarized below:

- Cumulative (2040) No Plan traffic contributes 40 in a million
- Rail sources contribute 0.84 in a million
- Maritime sources contribute 35 in a million
- Existing stationary sources contribute 4.3 in a million

6.4.2 Risks for the Cumulative (2040) Scenario at the Franklin Project On-Site MEISR

For the on-site MEISR, which is not exposed to the Franklin Project construction emissions, the cancer risks from uncontrolled and controlled operation are 100 in a million and 84 in a million, respectively, as shown in the “Total Excess Cancer Risk at Franklin Project MEISR” row in **Table 21a.** The breakdown of Project-level contribution from the individual sources at the Franklin onsite MEISR is below:

- Franklin generators contribute 6.1 in a million for uncontrolled operation and 0.82 in a million for controlled operation
- The proportion of traffic estimated to be the direct result of the Franklin Project contributes 0.0056 in a million to both the uncontrolled and controlled scenarios

Thus, the total contribution from the Franklin project at the onsite MEISR is 6.2 in a million for the uncontrolled scenario and 0.82 in a million for the controlled scenario.

The contribution from Plan-level sources and the other Individual Project (30 Van Ness) is different for the controlled and uncontrolled scenarios, due to control measures. The contributions to cancer risk from the Plan-level and Individual Project-level sources is broken down below:

- Plan-level generators contribute to 11 in a million for the uncontrolled scenario and 1.4 in a million for the controlled scenario. This does not include the generator impacts from the two Individual Projects
- Plan-level traffic contributes 1.2 in a million for both the uncontrolled and controlled scenarios. This does not include the traffic risk contribution from the two Individual Projects
- Van Ness project construction contributes 0.63 in a million for the uncontrolled scenario and 0.18 in a million for the controlled scenario

Franklin project operation, including traffic and generators contribute to 0.89 in a million for the uncontrolled scenario and 0.14 in a million for the controlled scenario.

The contributions from the Cumulative (2040) No Plan sources are the same for the controlled and uncontrolled scenarios because the location of the MEISR does not change. The breakdown of impacts for the controlled and uncontrolled scenarios is below:

- Cumulative (2040) No Plan traffic contributes 41 in a million
- Rail sources contribute 0.83 in a million
- Maritime sources contribute 35 in a million

Existing stationary sources contribute 4.1 in a million

6.4.3 $PM_{2.5}$ Concentration for the Cumulative (2040) Scenario at the Franklin Project Off-Site MEISR

As shown in **Table 21b**, maximum $PM_{2.5}$ concentration at the off-site Franklin MEISR for the uncontrolled and controlled scenarios are 8.2 μg/m^3 and 8.0 μg/m^3, respectively, for the Plan, Project-level and Cumulative (2040) No Plan sources. These are shown in the "Total $PM_{2.5}$ concentration at MEISR" row of **Table 21b**. The breakdown of Project-level contribution from the individual sources at the Franklin off-site MEISR is below for the uncontrolled and controlled scenarios is below:

- Franklin Project construction contributes 0.28 μg/m^3 for the uncontrolled scenario and 0.032 μg/m^3 for the controlled scenario
- Franklin Project generators contribute 0.0024 μg/m^3 for uncontrolled operation and 0.00032 μg/m^3 for controlled operation
- The proportion of traffic estimated to be the direct result of the Franklin Project contributes 0.00012 μg/m^3 to both the uncontrolled and controlled scenarios

Thus, the total contribution from the Franklin Project is 0.29 μg/m^3 for the uncontrolled scenario and 0.032 μg/m^3 for the controlled scenario.

As described in **Section 6.4.1**, the contribution from Plan-level sources and from the other Individual Project (30 Van Ness Project) is different for the controlled and uncontrolled scenarios, due to mitigation measures for the controlled scenario. The contribution from Plan-level sources and from the other Individual Project is broken down by source below:

- Plan-level generators contribute to 0.0076 μg/m^3 for the uncontrolled scenario and 0.0010 μg/m^3 for the controlled scenario. This does not include the generator impacts from the two Individual Projects
- Plan-level traffic contributes 0.026 μg/m^3 for the uncontrolled and controlled scenarios. This does not include the traffic risk contribution from the two Individual Projects
- Van Ness Project construction contributes 0.022 μg/m^3 for the uncontrolled scenario and 0.00075 μg/m^3 for the controlled scenario
- Van Ness Project operation, including traffic and generators, contribute to 0.0030 μg/m^3 for the uncontrolled scenario and 0.00079 μg/m^3 for the controlled scenario

The contributions from the Cumulative (2040) No Plan sources are the same for the controlled and uncontrolled scenarios because the location of the MEISR does not change. The breakdown of impacts for the controlled and uncontrolled scenarios is below:

- Cumulative (2040) No Plan traffic contributes 0.89 μg/m^3
- Rail sources contribute 0.0016 μg/m^3
- Maritime sources contribute 0.046 μg/m^3
- Existing stationary sources contribute 0.044 μg/m^3
- Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 μg/m^3 to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 μg/m^3 is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station

6.4.4 $PM_{2.5}$ Concentration for the Cumulative (2040) Scenario at the Franklin Project On-Site MEISR

For the on-site MEISR, which is not exposed to the Franklin Project construction emissions, maximum $PM_{2.5}$ concentration at the on-site MEISR for both the uncontrolled and controlled scenarios is 7.9 μg/m^3 as shown in the "Total $PM_{2.5}$ concentration at Franklin Project MEISR" row of **Table 21b**. The breakdown Project-level contribution from the individual sources at the Franklin on-site MEISR for the uncontrolled and controlled scenarios is below:

- Franklin Project generators contribute 0.0083 μg/m^3 for uncontrolled operation and 0.0011 μg/m^3 for controlled operation
- The proportion of traffic estimated to be the direct result of the Franklin Project contributes 0.00011 μg/m^3 to both the uncontrolled and controlled scenarios

Thus, the total contribution from the Franklin Project at the onsite MEISR is 0.0084 μg/m^3 for the uncontrolled scenario and 0.0012 μg/m^3 for the controlled scenario.

Similar to cancer risk, contributions from the Plan-level and the other Individual Project (30 Van Ness) sources are different for the uncontrolled and controlled scenarios. The breakdown of Plan-level and Individual Project sources is below:

- Plan-level generators contribute 0.0051 μg/m^3 for the uncontrolled scenario and 0.00069 μg/m^3 for the controlled scenario. This does not include the generator impacts from the two Individual Projects

- Plan-level traffic contributes 0.023 $\mu g/m^3$ for the uncontrolled and controlled scenarios. This does not include the traffic risk contribution from the two Individual Projects
- Van Ness project construction contributes 0.0089 $\mu g/m^3$ for the uncontrolled scenario and 0.00053 $\mu g/m^3$ for the controlled scenario
- Van Ness project operation, including traffic and generators, contribute to 0.0016 $\mu g/m^3$ for the uncontrolled scenario and 0.00056 $\mu g/m^3$ for the controlled scenario

The contributions from the Cumulative (2040) No Plan sources are the same for the controlled and uncontrolled scenarios because the location of the MEISR does not change. The breakdown of impacts for the controlled and uncontrolled scenarios is summarized below:

- Cumulative (2040) No Plan traffic contributes 0.94 $\mu g/m^3$
- Rail sources contribute 0.0016 $\mu g/m^3$
- Maritime sources contribute 0.045 $\mu g/m^3$
- Existing stationary sources contribute 0.043 $\mu g/m^3$
- Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 $\mu g/m^3$ to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 $\mu g/m^3$ is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station.

6.5 Other Cumulative Projects

As requested by SF Planning, Ramboll has included a qualitative discussion of emissions from other reasonably foreseeable projects that are not yet included in the CRRP-HRA database for which health risk information is available. Other projects for which a health risk assessment was not required are also described below. Reasonably foreseeable projects located within 1,000 feet of the Hub Plan area are listed below. These land use projects are either under construction or the subject of an Environmental Evaluation Application on file with the Planning Department. The effects of traffic emissions from the Central SoMa Plan are included in the 2040 Cumulative No Plan scenario and therefore included in the quantitative total health risk analysis above.

Below is a list of nearby projects with their size, land use type and square footage. Also included below are the results of any quantitative health risk assessment conducted for those projects.

	Address (Case Number)	Project Description	Excess Cancer Risk (in one million)	$PM_{2.5}$ Concentration $\mu g/m^3$
1	1629 Market Street (1601 – 1637 Market Street & 1125 Stevenson Street; 53 Colton Street (Plumbers Union site) two parcels: 3505/008 and 032 (2015-005848ENV)	The proposed project would demolish the existing UA Local 38 building (1621 Market Street), demolish the majority of the Lesser Brothers Building (1629–1645 Market Street), rehabilitate the Civic Center Hotel (1601 Market Street), and demolish the 242-space surface parking lots. In total, the project would construct five new buildings (ranging from four to 10 stories, 58 to 85-feet-tall). The project would include 477 market-rate residential units, 107 affordable supportive housing units. The project would also include the construction of 18,300-square-foot Brady Open Space at the northeast corner of Brady and Colton Streets. Within the new buildings there would be approximately 13,100 square feet of ground-floor retail/restaurant space.	Off-Site Mitigated: 3.9 On-Site Mitigated: 6.3	Off-Site Mitigated: 0.093 µg/m3 On-Site Mitigated: 0.065 µg/m3
2	1500 Mission Street (2014-000362ENV)	The project would demolish a 29,000 sf building and construct a mixed use development with 767,200 sf residential and retail/restaurant building. The project would include 560 dwelling units, 567,300 sf of office and a permit center.	Off-Site Mitigated: 2.2 On-Site Resident Mitigated: 5.7 On-Site Child Mitigated: 1.4	Off-Site Mitigated: 0.012 µg/m3 On-Site Resident Mitigated: 0.010 µg/m3 On-Site Child Mitigated: 0.0056 µg/m3
3	1700 Market Street (2013.1179E)	The project would demolish the existing two-story building on the site and construct an 8-story mixed-use residential building (up to 48 dwelling units) with approximately 1,500 square feet of ground floor retail.	--	--
4	1740 Market Street (2014.0409E)	The project would demolish the existing approximately 25,000 square foot commercial building and construct a 9-story, 85-foot-tall mixed-use building with 110 group housing dwelling units, and approximately 7,600 square feet of ground-floor retail.	--	--

5	1601 Mission Street (Tower Car Wash) (2014.1121ENV)	The project would demolish the existing gas station facilities and construct a 120-foot-tall, 12-story mixed-use building containing up to 220 dwelling units; 7,336 square feet of retail space; up to 97 below-grade vehicle parking spaces that would be accessed from South Van Ness Avenue. The project would include an additional 20 feet in height for a mechanical penthouse and solarium.	--	--
6	10 South Van Ness Avenue (2015-004568ENV)	The project site is occupied by a two-story, 30- to 45-foot-tall building, and a small vacant lot. The project would demolish the existing building and construct a mixed-use residential building, with up to 984 residential units, retail space on the ground floor, and two below-grade levels for parking and loading activities (up to 518 vehicle parking spaces and seven freight loading spaces) accessed from a single curb cut and driveway on 12th Street.	Off-Site Mitigated: 6.39 On-Site Mitigated: 2.43	Off-Site Mitigated: 0.1 µg/m3 On-Site Mitigated: 0.08 µg/m3
7	One Oak Street (formerly 1500-1540 Market Street) (2009.0159E)	The project would demolish the two existing buildings on the site and construct a new, 39-story mixed-use residential building (400 feet tall plus a 20-foot-tall parapet, for a total height of 420 feet). The project would include a total of 320 residential units, approximately 13,000 gsf of retail/restaurant uses on the ground floor and potentially on the 21st floor, and 160 accessory parking spaces for building residents.	--	--
8	30 Otis Street (2015-010013ENV)	The project is to demolish the existing buildings and construct a new approximately 27-story, 250-foot-tall mixed-use building. The project would include up to 354 dwelling units. Approximately 13,000 square feet of space at the ground floor would be used by the City Ballet School, which currently operates on-site. In addition, the ground floor would have approximately 4,600 square feet of retail space.	--	--

9	42 Otis Street (2016-005406ENV)	The project site contains a two-story industrial building in an approximately 4,100-square-foot lot, currently used as commercial space. The project sponsor proposes to replace the existing building with a new 15,805-square-foot, five-story, 55-foot-tall, mixed-used building. The proposed building would have 24 single-room occupancy residential units on the upper floors, and 1,900 square feet of ground-floor commercial space fronting Otis Street. No off-street parking would be provided.	--	--
10	200-214 Van Ness Avenue (2015-012994ENV)	The proposed project would demolish two buildings a three-story building with 27 dwelling units (200 Van Ness Avenue) and a two-story, approximately 12,400 gross square feet (gsf) building with vacant office space previously occupied by the Lighthouse for the Blind (214 Van Ness Avenue); merge the two parcels; and construct a 12-story mixed-use building to provide housing and other facilities for the San Francisco Conservatory of Music. The proposed building would have approximately 113 units (420 beds), three faculty housing units, 27 housing units to replace the 27 existing units at 200 Van Ness Avenue, approximately 49,600 gsf of institutional uses, approximately 4,320 gsf of broadcasting studio space, and 5,000 gsf of restaurant space. The new building would be 120 feet tall, with an additional 12 feet to the top of rooftop architectural features (“upper roof”) and another 2.5 feet to the top of roof-top mechanical equipment (total height of 134.5 feet). The project proposes two underground levels for bicycle storage, institutional spaces, and mechanical equipment. No vehicle parking would be provided.	--	--

11	Parcel M (300 Octavia Street) (APN 0832/026) & Parcel N (350 Octavia Street) (APN 0832/025) (2014-002330ENV)	The project site consists of two discontinuous vacant lots located along the east side of Octavia Street between Fell and Oak streets. Parcel M is an approximately 2,200-square-foot lot with frontages on Fell, Octavia, and Hickory streets while Parcel N is approximately 2,300-square-foot lot with frontages on Oak, Octavia, and Hickory streets. The proposed project would involve the construction of two 55-foot-tall (70 feet with elevator penthouse), five-story, mixed-use buildings approximately 15,400 square feet in size with 12 residential units over approximately 800 square feet of ground-floor commercial use. No off-street parking is proposed. The proposed project includes the installation of a corner bulb-out at the southeast corner of Octavia and Fell streets.	--	--
12	Parcel T / 188 Octavia Street (APN 0853/033, 034, and 022) (2014.1509ENV)	The project would construct a new 5-story, 55-foot-tall (71 feet with elevator penthouse) mixed-use building with up to 26 dwelling units above ground-floor commercial space. The project would not include off-street parking spaces.	--	--
13	Better Market Street (BMS) (2014.0012E)	San Francisco Public Works, in coordination with the San Francisco Planning Department and the San Francisco Municipal Transportation Agency would redesign and provide various transportation and streetscape improvements to the 2.2-mile segment of Market Street between Octavia Boulevard and The Embarcadero.		

14	Parcel O (455 Fell Street) (APN 0831/024) (2015-002837ENV)	A 100% affordable housing project with approximately 108 below-market-rate apartment dwelling units, approximately 1,200 square feet of ground-floor retail space, approximately 2,000 square feet of office space, approximately 2,900 square feet of community activities space, and no vehicle parking. Build a mid-block pedestrian passage to connect Oak and Fell streets, and would align with a similar mid-block pedestrian passage that would be constructed as part of the Parcel P project.	--	--
15	Parcel R and Parcel S (APN 0838/034, 035, 093- 096) (2014.1322ENV)	The project would redevelop each existing vacant lot into a mixed-use project consisting of two buildings with 100% affordable housing (up to 56 dwelling units) and approximately 7,500 square feet in each building of ground-floor neighborhood-serving retail. The project would partially satisfy the offsite Below Market Rate requirement for the multifamily One Oak Street residential project.	--	--
16	1245 Folsom (3756/041) (2015-014148ENV)	Demolition of existing 1 story of Alt School and new construction of a 7 story at Folsom street and 5 story at Ringold Street mixed-use building. The project proposes 37 residential units above one 2 story commercial space at ground floor with parking space at the basement level.	--	--
17	1228 Folsom (2014.0964ENV)	The project would merge three lots into one lot, demolish the existing 16,450 sf building, and the construct a new 41,440-square-foot, mixed-use building containing 24 residential units and 1,110 square feet of ground floor commercial use. The building would be 65 feet tall (79 feet tall with elevator penthouse) and six stories on its Folsom Street frontage and 45 feet tall and four stories on its Clementina Street frontage.	--	--

18	1695 Folsom (2015-012878ENV)	The project would construct a five-story building with 4 dwelling units.	--	--
19	1500-1528 15th Street (2016-011827ENV)	The project would demolish an existing automotive sales office and smog check facility and parking area to construct an eight story, 62,100 gsf building with 1,300 sf of ground floor retail and 184 group housing units. No off-street parking is proposed.	--	--
20	198 Valencia St (3502/108) (2013.1458E)	The project would demolish an existing one-story, 1,900 square foot oil change facility and a surface parking lot with seven off-street parking spaces and construct a five-story, 55 foot-tall, 33,795 gross square foot mixed-use building (6,269 gross square feet of ground-floor commercial space and a subterranean garage to accommodate 19 off-street parking spaces), with 28 residential units (16 one-bedroom units and 12 two-bedroom units) on the first through fourth-floor levels.	--	--
21	1870 Market ST (2014.1060ENV)	The project would demolish a vacant single-story, 600-gross-square-foot (gsf) commercial building and a four-vehicle surface parking lot and construct an approximately eight-story, 85-foot-tall (with an additional 16 feet for the mechanical and staircase penthouses) mixed-use development. The approximately 16,300-gsf building would be comprised of approximately 12,900 gsf of residential space and 400 gsf of ground-floor commercial space. The proposed project would provide approximately 10 dwelling units. No off-street parking is proposed.	--	--

All of these projects would require construction activities, most of which would require the use of off-road and/or on-road diesel equipment which would increase the level of TAC exposure and could result in higher overall total cancer risk and $PM_{2.5}$ concentrations than reported for the MEISRs in **Tables 19a, 19b, 20a, 20b, 21a** and **21b**. Furthermore, any required stationary TAC sources, such as emergency back-up generators could also increase the overall cancer risk and $PM_{2.5}$ concentrations at surrounding sensitive receptor locations. However, vehicle trip emissions associated with these projects are already reasonably accounted for in the background 2040 traffic emissions analysis.

7. UNCERTAINTIES

This section summarizes the critical uncertainties associated with the emissions estimation, air dispersion modeling, and risk estimation components of the risk assessment.

7.1 Estimation of Emissions

There are uncertainties associated with the estimation of emissions from construction and operation in CalEEMod®. Where Project and/or Plan-specific data are not available, CalEEMod® default assumptions were used. These assumptions result in a conservative estimate of overall construction emissions.

As discussed in Section 2, there are uncertainties associated with the calculation of traffic emissions. Ramboll followed the same methodology used during the updates to the SF CRRP-HRA modeling to calculate car versus truck volumes, using roadway classification from the SFCHAMP data to estimate the breakdown of vehicle types on each link. Though there is some level of uncertainty with this methodology, Ramboll followed previously approved methodology which estimates traffic volume by vehicle type at a very refined level.

In addition to uncertainty associated with the estimation of emissions, the $PM_{2.5}$ concentration analyses for the Baseline (2020) and Cumulative (2040) scenarios does not include $PM_{2.5}$ emissions from resuspended road dust because of the high uncertainty and low reliability associated with the methodology to estimate emissions. According to the US EPA's AP-42 documentation, the equation to determine the quantity of particulate matter emissions from resuspension has a quality rating of "D". The quality rating for the emission factor equation would be retained if site-specific parameter values are used. If site-specific parameter values are not available, the quality rating of the equation should be reduced by two levels, according to US EPA (US EPA 1995a). For the Hub Plan, since site-specific values of silt loading are not available, the quality rating associated with the equation would drop to a rating of "F", which is below the lowest rating of "E". A rating of "E" indicates the equation to determine emissions has very poor reliability or robustness and is not representative of a random sample for that specific parameter (US EPA 1995b). Thus, due to the high uncertainty associated with the emission factor methodology, Ramboll did not include $PM_{2.5}$ emissions from resuspended road dust.

7.2 Estimation of Exposure Concentrations

In addition to uncertainty associated with emission estimates, there is also uncertainty associated with the estimated exposure concentrations. The limitations of the air dispersion model provide a source of uncertainty in the estimation of exposure concentrations. According to USEPA, errors of ±10 percent to 40 percent are typical for the highest estimated concentrations due to the limitation of the algorithms implemented in AERMOD (USEPA 2005). Ramboll's methodologies consistently produce conservative results; thus, predicted exposure concentrations are likely to be at or above actual exposure concentrations.

7.3 Source Representation

The source parameters used to model emission sources add uncertainty. For all emission sources, Ramboll used source parameters that are either recommended as defaults, consistent with the updates to the CRRP-HRA methodology (construction modeled as area sources and initial vertical dimension for construction sources), or expected to produce more conservative (i.e., overestimation of) results. Discrepancies might exist between the actual emissions characteristics of a source and its representation in the model; exposure concentrations used in this assessment represent approximate exposure concentrations.

7.4 Source Locations

There are uncertainties with source locations based on the data provided in the SFCHAMP model outputs. Although Ramboll performed post-processing to manually align traffic volumes from SFCHAMP with actual street, there is uncertainty in the alignment and assignment of these traffic volumes. Exact traffic source locations modeled are consistent with those modeled in the updates to the CRRP-HRA. Because of these consistencies, the major sources of emissions are adequately captured in the air dispersion modeling.

7.5 Exposure Assumptions

Numerous assumptions must be made in order to estimate human exposure to chemicals. These assumptions include parameters such as breathing rates, exposure time and frequency, exposure duration, and human activity patterns. While a mean value derived from scientifically defensible studies is the best estimate of central tendency, many of the exposure variables used in this HRA under the 2015 OEHHA guidelines are high-end estimates. For example, although OEHHA 2015 guidance recommends assuming a period of time spent out of the home each day, this analysis conservatively makes the same 24-hour daily exposure assumption as under OEHHA 2003 guidance for children, and assumes adult residents are home 73% of the time. Additionally, it is assumed that residential receptors are exposed 350 days per year to Project-level construction emissions for the entire construction duration, with the emissions occurring over 1,149 workdays for the Van Ness Project and 569 workdays for the Franklin Project. These are highly conservative assumptions since most residents do not remain in their homes all day, every day, for these periods of time. The analysis here follows OEHHA guidance in evaluating outdoor air, while indoor air concentrations may be different due to filtration or other reductions due to the building shell. The combination of several high-end estimates used as exposure parameters may substantially overestimate chemical intake. The excess lifetime cancer risks calculated in this assessment are therefore likely to be overestimated.

7.6 Toxicity Assessment

Standard Cancer Potency Factors (CPFs) established by Cal/EPA were used to estimate potential carcinogenic and non-cancer health effects from exposures to DPM and TOG. These values are derived by applying conservative assumptions and are intended to protect the most sensitive individuals in the potentially exposed populations.

To derive the toxicity values, Cal/EPA makes several assumptions that tend to overestimate the actual hazard or risk to human health. CPFs used to estimate carcinogenic risk are also typically derived based on data from animal studies. These data are based on studies in which high doses of a test chemical were administered to laboratory animals, and the reported response is extrapolated to the much lower doses typical of human exposure. Very little experimental data are available on the nature of the dose-response relationship at low doses, such as whether a threshold exists or if the dose-response curve passes through the origin. Because of this uncertainty, a conservative model is used to estimate the low-dose relationship and uses an upper bound estimate (the 95 upper confidence limit of the slope predicted by the extrapolation model) as the CPF. With this factor, an upper-bound estimate of potential cancer risks is obtained.

The Cal/EPA CPFs for DPM and TOG are used to estimate cancer risks associated with exposure to DPM and TOG from Project- and Plan-related emissions. However, the CPF derived by Cal/EPA for DPM is highly uncertain in both the estimation of response and dose. In the past, due to inadequate animal test data and epidemiology data on diesel exhaust, the International Agency for Research on Cancer (IARC), a branch of the World Health Organization (WHO), had classified DPM as Probably Carcinogenic to Humans (Group 2); the USEPA had also concluded that the existing data did not provide an adequate basis for quantitative risk assessment (USEPA 2002). However, based on two recent scientific studies (Attfield 2012, Benbrahim-Tallaa 2012, Silverman 2012), IARC has re-classified DPM as Carcinogenic to Humans to Group 1 (IARC 2012), which means that the agency has determined that there is "sufficient evidence of carcinogenicity" of a substance in humans and represents the strongest weight-of-evidence rating in IARC's carcinogen classification scheme. This determination by the IARC may provide additional impetus for the USEPA to identify a quantitative dose-response relationship between exposure to DPM and cancer.

7.7 Risk Calculations

The USEPA notes that the conservative assumptions used in a risk assessment are intended to ensure that the estimated risks do not underestimate the actual risks posed by a source and that the estimated risks do not necessarily represent actual risks experienced by populations at or near a site (USEPA 1989).

The estimated risks in this HRA are based primarily on a series of conservative assumptions related to predicted environmental concentrations, exposure, and chemical toxicity. The use of conservative assumptions tends to produce upper-bound estimates of risk. Although it is difficult to quantify the uncertainties associated with all the assumptions made in this risk assessment, the use of conservative assumptions is likely to result in overestimates of exposure, and hence, risk. BAAQMD acknowledges this uncertainty by stating: "the methods used [to estimate risk] are conservative, meaning that the real risks from the source may be lower than the calculations, but it is unlikely that they will be higher" (BAAQMD 2013).

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TABLES

Table 1
The Hub Plan and Individual Projects Air Quality Scenarios
The Hub Plan
San Francisco, CA

Scenario		Background	Generators	Traffic	Construction	MEIR Scenario
Baseline 2020	No Plan	Background Traffic, Stationary, Maritime, and Rail Sources in 2020 from the Draft Results for the Updated CRRP	--	--	--	
	+ Uncontrolled: Plan		Uncontrolled: Plan +30 Van Ness + 98 Franklin	Plan 2020	Uncontrolled: 30 Van Ness + 98 Franklin	Plan
	+Controlled: Plan		Controlled: Plan +30 Van Ness + 98 Franklin		Controlled: 30 Van Ness + 98 Franklin--	Plan
	+ 30 Van Ness Project (Uncontrolled)		30 Van Ness (uncontrolled)	30 Van Ness	30 Van Ness (uncontrolled)	30 Van Ness
	+ 30 Van Ness Project (Controlled)		30 Van Ness (controlled)		30 Van Ness (controlled)	30 Van Ness
	+ 98 Franklin Project (Uncontrolled)		98 Franklin (uncontrolled)	98 Franklin	98 Franklin (uncontrolled)	98 Franklin
	+ 98 Franklin Project (Controlled)		98 Franklin (controlled)		98 Franklin (controlled)	98 Franklin
Cumulative 2040	No Plan	Background Stationary, Maritime, and Rail Sources in 2020 from the Draft Results for the Updated CRRP Background Traffic from Central SoMa in 2040	--	--	--	
	+ Uncontrolled: Plan		Uncontrolled: Plan + 30 Van Ness + 98 Franklin	Plan 2040	Uncontrolled: 30 Van Ness + 98 Franklin	Plan, 30 Van Ness, and 98 Franklin
	+ Controlled: Plan		Controlled: Plan + 30 Van Ness + 98 Franklin		Controlled: 30 Van Ness + 98 Franklin	Plan, 30 Van Ness, and 98 Franklin

Abbreviations
CRRP - Community Risk Reduction Plan
MEISR - maximally exposed individual sensitive receptor
SoMa - South of Market

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Table 2
Van Ness Project Construction Schedule
The Hub Plan
San Francisco, CA

Project	Phase Name	Phase Start Date[1]	Phase End Date	Number of Workdays per Week[1,2]	Total Construction Days
30 Van Ness	Demolition	5/1/2020	11/1/2020	6	159
	Site Preparation	11/2/2020	1/31/2021	6	78
	Grading	2/1/2021	4/30/2021	6	76
	Building Construction	5/1/2021	12/31/2023	6	836
	Paving	11/1/2022	5/1/2023	6	156
	Architectural Coating	11/1/2021	1/1/2023	6	366

Notes:

1. Construction schedule and phasing information was provided by the Project Sponsor.
2. Project construction will occur on Mondays through Saturdays between 7 AM and 7 PM for the majority of the construction duration. Concrete pour is expected to occur during night time hours for roughly 2-4 days during the entire construction period, which represents < 0.5% of the entire construction activity. Impacts from night time construction are expected to be minimal, and are therefore not accounted for in this analysis.

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Table 3
Franklin Project Construction Schedule
The Hub Plan
San Francisco, CA

Project[1]	Phase Name	Phase Start Date	Phase End Date	Number of Workdays per Week[2]	Total Construction Days
98 Franklin	Demolition	6/1/2021	6/5/2021	5	5
	Shoring	6/8/2021	8/7/2021	5	43
	Excavation	8/10/2021	10/30/2021	5	58
	Building Construction	11/2/2021	8/5/2023	5	446
	Paving	8/1/2023	8/5/2023	5	3
	Architectural Coating	1/7/2023	8/5/2023	5	150

Notes:

1. Construction schedule was provided by the Project Sponsor.
2. Project construction will occur on Mondays through Fridays between 7 AM and 8 PM. Night time construction is expected to occur for approximately 40 days during the entire construction period, which represents approximately 7% of the entire construction duration. Night time construction was not modeled for this project because risks and hazards due to construction are low, and including night time construction activity is not anticipated to have a material impact on results.

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Table 4
Emissions Estimation Methodology
The Hub Plan
San Francisco, CA

Type	Source	Methodology and Formula	Reference
Construction Equipment[1]	Off-Road Equipment	$E_c = \Sigma(EF_c * HP * LF * Hr * C)$	OFFROAD2011 and ARB/USEPA Engine Standards
Construction On-Road Mobile Sources[2]	Exhaust – Running	$E_R = \Sigma(EF_R * VMT * C)$, where VMT = Trip Length * Trip Number	EMFAC2017
	Exhaust - Idling	$E_I = \Sigma(EF_I * \text{Trip Number} * T_I * C)$	EMFAC2017
Operational On-Road Mobile Sources[3]	Running Exhaust	$E_R = \Sigma(EF_R * VMT * C)$, where VMT = Roadway Link Length * Vehicle Counts	EMFAC2017
	Brake Wear and Tire Wear	$E_{BW,TW} = \Sigma(EF_{BW,TW} * VMT * C)$, where VMT = Roadway Link Length * Vehicle Counts	EMFAC2017
	Running Loss	$E_{RL} = \Sigma(EF_{RL} * VMT * C)$, where VMT = Roadway Link Length * Vehicle Counts	EMFAC2017
Operation[4]	Project Operation (Area, Energy, Traffic)	CalEEMod®	CalEEMod®
	Generators	$E_{SS} = EF_{SS} * HP * Hr$	ARB/USEPA Off-Road Engine Standards

Notes:

1. E_c: off-road equipment exhaust emissions (lb)
   EF_c: emission factor (g/hp-hr). CalEEMod® 2016.3.2. default emission factors used
   HP: equipment horsepower (OFFROAD2011)
   C: unit conversion factor
   Hr: equipment hours
   LF: equipment load factor (OFFROAD2011)
2. On-road mobile sources include truck and passenger vehicle trips. Emissions associated with mobile sources are calculated using the following formulas.

   E_R: running exhaust and running losses emissions (lb)
   EF_R: running emission factor (g/mile); from EMFAC2017. EMFAC reports emissions in tons/day and VMT in miles/day. The emission factor is calculated as the quotient of those outputs.
   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 the truck route or the default length from CalEEMod® or construction contractor.
   c. Trip Number: provided by the Project Sponsor or estimated in CalEEMod®

   E_I: vehicle idling emissions (lb)
   EF_I: vehicle idling emission factor (g/hr-trip); from EMFAC2017
   T_I: idling time
   C: unit conversion factor

Table 4
Emissions Estimation Methodology
The Hub Plan
San Francisco, CA

Notes, Continued:

3. On-road operational mobile sources include all Plan and Project-related traffic. Emissions associated with operational mobile sources are calculated using the following formulas.

E_R: running exhaust emissions (lb)
EF_R: running emission factor (g/mile) from EMFAC2017. EMFAC reports emissions in tons/day and VMT in miles/day. The emission factor is calculated as the quotient of those outputs. Running exhaust emissions are estimated for PM_{10} from diesel-fueled vehicles (DPM), TOG from gasoline-fueled vehicles, and $PM_{2.5}$ from all vehicles.

$E_{BW,TW}$: vehicle brake wear and tire wear emissions (lb)
$EF_{BW, TW}$: vehicle brake wear and tire wear emission factor (g/mile) from EMFAC2017. EMFAC reports emissions in tons/day and VMT in miles/day. The emission factor is calculated as the quotient of those outputs. Brake wear and tire wear emissions are estimated for $PM_{2.5}$ from all vehicles.

E_R: running loss emissions (lb)
EF_{RL}: running loss emission factor (g/mile) from EMFAC2017. EMFAC reports emissions in tons/day and VMT in miles/day. The emission factor is calculated as the quotient of those outputs. Running loss emissions are estimated for non-diesel TOG emissions only.

VMT: vehicle miles traveled
C: unit conversion factor
Roadway Link Length: As indicated in the SFCHAMP output.
Vehicle Counts (Traffic Volumes): As estimated from the SFCHAMP output and turning volume provided by traffic engineers

4. Operational emissions from the generators are calculated using the following formulas:
E_{SS}: Stationary Source emissions (lb)
EF_{SS}: Stationary Source emission factor
C: unit conversion factor
Hr: hours of operation per year (hr)

Abbreviations:

ARB - California Air Resources Board
CalEEMOD® - CALifornia Emissions Estimator MODel
DPM - diesel particulate matter
EF - emission factor
EMFAC - EMission FACtor Model
g - gram
GIS - Geographic Information Systems
HP - horsepower
hr - hour
lb - pound
LF - load factor
mi - mile
$PM_{2.5}$ - fine particulate matter less than 2.5 micrometers in aerodynamic diameter
PM_{10} - particulate matter less than 10 micrometers in aerodynamic diameter
SFEP - San Francisco Department Planning Department, Environmental Planning Division
TOG - total organic gases
USEPA - United States Environmental Protection Agency
VMT - vehicle miles traveled

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Table 5
Plan-Level Emergency Generator TAC Emissions Summary
The Hub Plan
San Francisco, CA

Generator Category	Generator Location	Generator Quantity	Generator Size[1] (kW)	Permitted Non-Emergency Hours (hrs/year)		Annual Emissions[2,3] (ton/yr)				Modeled Emissions (g/s)			
						Uncontrolled		Controlled		Uncontrolled		Controlled	
				Uncontrolled	Controlled	DPM	$PM_{2.5}$	DPM	$PM_{2.5}$	DPM	$PM_{2.5}$	DPM	$PM_{2.5}$
Project-Level	30 Van Ness Avenue[4]	2	1,500	50	20	0.033	0.033	0.0018	0.0018	9.6E-04	9.6E-04	5.1E-05	5.1E-05
	98 Franklin Street	1	1,500	50		0.017	0.017	0.0022	0.0022	4.8E-04	4.8E-04	6.4E-05	6.4E-05
Plan-Level[5]	1 S. Van Ness Avenue	1	2,000	50		0.022	0.022	0.0030	0.0030	6.4E-04	6.4E-04	8.5E-05	8.5E-05
	1500 -1540 Market Street												
	10 S. Van Ness Avenue												
	30 Otis Street												
	42-50 Otis Street												
	99 S. Van Ness Avenue												
	110-194 12th Street												
	154-170 S. Van Ness and 1695 Mission Street												
	33 Gough Street												

Notes:

1. Generator size for the individual projects was provided by the Project Sponsor. Plan-level generators are conservatively assumed to be 2,000 kW.
2. Engine emission factors for PM_{10} and $PM_{2.5}$ (assumed all engines are diesel fueled, and that all PM_{10} is diesel particulate matter) based on ARB Tier 4 standards for engines larger than 1,200 hp. The uncontrolled engine emission factors are the default statewide average from CalEEMod®.
3. Emissions for emergency generators are calculated assuming each engine operates for the specified hours/year of non-emergency testing. Below is the calculation methodology:
   E = EF * HP * Hr
   Where:
   E = generator engine emissions
   EF = compression-ignition engine emission factor
   HP = generator horsepower
   Hr = generator hours
   Note that this analysis conservatively assumes operation at 100% capacity (load factor = 1) during emissions tests.
4. 30 Van Ness Avenue has up to two generators, which were assumed to be colocated and operated simultaneously.
5. Each re-zoned parcel in the plan is assumed to include one 2,000 kW generator per site. Generator parameters reported in this table are for each individual generator.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel
DPM - diesel particulate matter
g/s - grams per second
hrs/year - hours per year
kW - kilowatt
PM_{10} - particulate matter less than 10 micrometers in diameter
$PM_{2.5}$ - particulate matter less than 2.5 micrometers in diameter
ton/yr - tons per year

References:

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Table 6
Van Ness Project Construction CAP Emissions Summary
The Hub Plan
San Francisco, CA

30 Van Ness Project Construction	CAP Emissions[1] (lb)							
	Uncontrolled Scenario[7]				Controlled Scenario[8]			
	ROG	NO_x	PM_{10}	$PM_{2.5}$	ROG	NO_x	PM_{10}	$PM_{2.5}$
Off-Road Emissions[2]	775	6,937	356	336	74	739	13	12
On-Road Emissions[3]	1,513	19,150	1,319	630	1,513	19,150	1,319	630
Paving Off-Gas Emissions[4,5]	0	0	0	0	0	0	0	0
Architectural Coating[4]	11,216	0	0	0	11,216	0	0	0
Total	**13,504**	**26,088**	**1,675**	**966**	**12,803**	**19,889**	**1,332**	**643**
Length of Construction[6] (construction days)	1,149							
Average Daily Emissions (lb/day)	**12**	**23**	**1.5**	**0.84**	**11**	**17**	**1.2**	**0.56**

Notes:

1. CAP emissions were calculated with methodology consistent with CalEEMod® and **Table 4**.
2. Off-road equipment assumptions are presented in **Table B-2.**
3. On-road trip assumptions are presented in **Table B-5**.
4. Paving and architectural coating emissions were calculated with methodology consistent with CalEEMod®.
5. CalEEMod® assumes that enclosed parking structures do not contain asphalt paving. The surfaces are assumed to be unpaved.
6. The length of construction refers to the approximate number of construction work days throughout the project construction, without double-counting overlapping phases.
7. The uncontrolled scenario was estimated using default (i.e. fleet-average) emission factors for off-road equipment, without any control measures.
8. Emission factors for the controlled scenario reflect the use of additional control measures for the construction equipment. Control measures for this scenario are presented in **Table B-2**.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
CalEEMod® - CALifornia Emissions Estimator MODel
CAP - criteria air pollutants
lb - pounds
NO_x - oxides of nitrogen
PM_{10} - particulate matter with a diameter less than 10 µm
$PM_{2.5}$ - particulate matter with a diameter less than 2.5 µm
ROG - reactive organic gases

Table 7
Franklin Project Construction CAP Emissions Summary
The Hub Plan
San Francisco, CA

98 Franklin Construction	CAP Emissions[1] (lb)							
	Uncontrolled Scenario[6]				Controlled Scenario[7]			
	ROG	NO_x	PM_{10}	$PM_{2.5}$	ROG	NO_x	PM_{10}	$PM_{2.5}$
Off-Road Emissions[2]	264	2,387	100	95	39	684	5.1	4.7
On-Road Emissions[3]	345	2,488	280	127	345	2,488	280	127
Paving Off-Gas Emissions[4]	0	0	0	0	0	0	0	0
Architectural Coating[4]	6,299	0	0	0	6,299	0	0	0
Total	**6,907**	**4,874**	**381**	**222**	**6,682**	**3,171**	**285**	**131**
Length of Construction[5] (construction days)	569							
Average Daily Emissions (lb/day)	**12**	**8.6**	**0.67**	**0.39**	**12**	**5.6**	**0.50**	**0.23**

Notes:

1. CAP emissions were calculated with methodology consistent with CalEEMod® and **Table 4**.
2. Off-Road equipment assumptions are presented in **Table B-4.**
3. On-Road trip assumptions are presented in **Table B-6**.
4. Paving and architectural coating emissions were calculated with methodology consistent with CalEEMod®.
5. The length of construction refers to the approximate number of construction work days throughout the project construction, without double-counting overlapping phases.
6. The uncontrolled scenario was estimated using default (i.e. fleet-average) emission factors for off-road equipment, without any control measures.
7. Emission factors for the controlled scenario reflect the use of additional control measures for the construction equipment. Control measures for this scenario are presented in **Table B-4**.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
CalEEMod® - CALifornia Emissions Estimator MODel
CAP - criteria air pollutants
lb - pounds
NO_x - oxides of nitrogen
PM_{10} - particulate matter with a diameter less than 10 μm
$PM_{2.5}$ - particulate matter with a diameter less than 2.5 μm
ROG - reactive organic gases

Table 8
Van Ness Project TAC Emissions Summary
The Hub Plan
San Francisco, CA

30 Van Ness Project	TAC Emissions[1] (g/s)					
	Uncontrolled Scenario[2]			Controlled Scenario[3]		
	DPM	$PM_{2.5}$	TOG[4]	DPM	$PM_{2.5}$	TOG
Demolition	4.6E-04	4.3E-04	0	1.7E-05	1.6E-05	0
Site Preparation	6.2E-04	5.7E-04	0	3.7E-05	3.4E-05	0
Grading	4.7E-04	4.3E-04	0	2.3E-05	2.1E-05	0
Building Construction	0.0031	0.0029	0	3.0E-05	9.2E-05	8.0E-05
Paving	2.7E-04	2.6E-04	0	1.7E-05	1.5E-05	0
Architectural Coating[5]	2.2E-04	2.2E-04	0	0	0	0

Notes:

1. TAC emissions were calculated with methodology consistent with CalEEMod® and **Table 4**.
2. The uncontrolled scenario was estimated using default (i.e. fleet-average) emission factors for off-road diesel-powered equipment, without any control measures.
3. Emission factors for the controlled scenario reflect the use of control measures for the construction equipment. Control measures for this scenario are presented in **Table B-2**.
4. All equipment in the uncontrolled scenario is diesel-fueled, so no TAC emissions were estimated for TOG.
5. All equipment in the controlled scenario for the architectural coating subphase is electric, so no emissions were estimated.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
CalEEMod® - CALifornia Emissions Estimator MODel
DPM - diesel particulate matter
g/s - gram per second
NO_x - oxides of nitrogen
PM_{10} - particulate matter with a diameter less than 10 µm
$PM_{2.5}$ - particulate matter with a diameter less than 2.5 µm
TAC - toxic air contaminants
TOG - total organic gases

Table 9
Franklin Project TAC Emissions Summary
The Hub Plan
San Francisco, CA

98 Franklin Project	TAC Emissions[1] (g/s)					
	Uncontrolled Scenario[2]			Controlled Scenario[3]		
	DPM	$PM_{2.5}$	TOG[4]	DPM	$PM_{2.5}$	TOG
Demolition	5.9E-05	5.5E-05	0	9.0E-06	8.3E-06	0
Shoring	1.4E-04	1.3E-04	0	2.5E-05	2.3E-05	0
Building Construction[5]	7.1E-04	6.6E-04	0	0	8.1E-06	1.0E-05
Excavation	2.2E-04	2.1E-04	0	3.0E-05	2.8E-05	0
Paving	3.4E-06	3.2E-06	0	9.8E-07	9.0E-07	0
Architectural Coating[6]	3.1E-04	3.1E-04	0	0	0	0

Notes:

1. TAC emissions were calculated with methodology consistent with CalEEMod® and **Table 4**.
2. The uncontrolled scenario was estimated using default (i.e. fleet-average) emission factors for off-road equipment, without any control measures.
3. Emission factors for the controlled scenario reflect the use of control measures for the construction equipment. Control measures for this scenario are presented in **Table B-4**.
4. All equipment in the uncontrolled scenario is diesel-fueled, so no TAC emissions were estimated for TOG.
5. None of the controlled equipment for the building construction subphase is diesel-fueled, so no DPM emissions were estimated.
6. All equipment in the controlled scenario for the architectural coating subphase is electric, so no emissions were estimated.

Abbreviations:

BAAQMD - Bay Area Air Quality Management District
CalEEMod® - CALifornia Emissions Estimator MODel
DPM - diesel particulate matter
g/s - grams per second
NO_x - oxides of nitrogen
PM_{10} - particulate matter with a diameter less than 10 µm
$PM_{2.5}$ - particulate matter with a diameter less than 2.5 µm
TAC - toxic air contaminants
TOG - total organic gases

Table 10a
Van Ness Project Operational CAP Emissions Summary: Uncontrolled
The Hub Plan
San Francisco, CA

Modeled Year	Category	Average Daily Operational Emissions[1] [lb/day]			
		ROG	**NO_x**	**PM_{10}**	**$PM_{2.5}$**
2018 Existing[2]	Area[5,6]	4.4	1.1E-04	5.5E-05	5.5E-05
	Energy[7]	0.10	0.94	0.071	0.071
	Mobile[8]	7.2	13	10	3.0
	Generator[9]	--	--	--	--
Total		**12**	**14**	**10**	**3.0**
2024 Full Project Buildout[3]	Area[5,6]	23	0.29	0.14	0.14
	Energy[7]	0.36	3.2	0.25	0.25
	Mobile[8]	9.0	17	30	8.1
	Generator[9]	0.0011	2.2	0.073	0.073
Total		**32**	**22**	**30**	**8.6**
Net Project Emissions[4]	Area[5,6]	18	0.29	0.14	0.14
	Energy[7]	0.26	2.3	0.18	0.18
	Mobile[8]	1.7	3.4	19	5.2
	Generator[9]	0.0011	2.2	0.073	0.073
Total		**20**	**8.2**	**20**	**5.5**

Modeled Year	Annual Operational Emissions[10] [ton/yr]			
	ROG	**NO_x**	**PM_{10}**	**$PM_{2.5}$**
2018 Existing[2]	2.1	2.6	1.9	0.56
2024 Full Project Buildout[3]	5.8	4.1	5.5	1.6
Net Project Emissions[4]	3.7	1.5	3.6	1.0

Notes:

1. Operational emissions from area, energy, and mobile sources were estimated with CalEEMod® version 2016.3.2.
2. Operational emissions from the baseline scenario (existing conditions) were estimated using CalEEMod® default emission factors for 2018.
3. Full project operation was assumed to occur immediately following construction. The emissions were assumed to occur over a full year of operation.
4. The net project emissions were estimated by subtracting the existing emissions from the full project buildout emissions.
5. For consumer products, ROG emissions were calculated based on the average emission factor for the City of San Francisco. San Francisco's ROG emissions from consumer products is projected to be 5.67 tons per day in 2020 (Ref: https://www.arb.ca.gov/app/emsinv/emssumcat.php). San Francisco's building square footage was 539,022,396 square feet based on a survey in 2007 (Ref: DataSF Land Use shapefiles). Therefore, the emission factor was calculated as follows:
(5.67 tons/day * 2000 lbs/ton)/539,022,396 sq. ft. = 2.10 x 10-5 lbs/(sq. ft.-day).
6. Per BAAQMD Rule 6-3-306, no new building construction can include wood-burning devices. Based on communication with Project Sponsor, the Project will not include any natural gas hearths.
7. Energy consumption was assumed to adhere to Title 24 2016.
8. CalEEMod® default vehicle trip generation rate and length were used in generating operational mobile emissions. Emission factors were updated to reflect EMFAC2017 emissions factor for year 2024 (full-build out year)

Table 10a
Van Ness Project Operational CAP Emissions Summary: Uncontrolled
The Hub Plan
San Francisco, CA

Notes, Continued:

9. Emissions for emergency generators were calculated assuming two 1,500 kW engines with fleet-wide average emission factors and 50 hours per year of non-emergency testing per generator. Below is the calculation methodology:

    E = EF * HP * Hr

    Where:

    E = generator engine emissions
    EF = compression-ignition engine emission factor
    HP = generator horsepower
    Hr = generator hours

    Engine emission factors for NOx, PM_{10} and $PM_{2.5}$ (assumed all engines are diesel fueled, and that all PM_{10} is diesel particulate matter) based on CalEEMod® version 2016.3.2. default emission factors for >750-hp engines from Table 12.1. in Appendix D of the User's Guide. Engines are assumed to be at maximum load during testing. Average daily generator emissions are annualized by dividing fifty hours of annual use by 365 days per year.

10. Annual operational emissions are estimated by multiplying average daily emissions by 365 days per year.

Abbreviations:

ARB - California Air Resources Board
BAAQMD - Bay Area Air Quality Management District
CalEEMod® - California Emissions Estimator Model
CAP - criteria air pollutant
CEQA - California Environmental Quality Act
DPF - diesel particulate filter
EMFAC2017 - EMission FACtor Model 2017
hp - horsepower
kW - kilowatt
lb/day - pounds per day
NO_x - nitrogen oxides
PM_{10} - particulate matter less than 10 micrometers in diameter
$PM_{2.5}$ - particulate matter less than 2.5 micrometers in diameter
ROG - reactive organic gases
sqft - square feet
THC - total hydrocarbon

References:

ARB. 2018. ROG Inventory. Available online at: https://www.arb.ca.gov/app/emsinv/emssumcat.php

BAAQMD. 2017. California Environmental Quality Act Air Quality Guidelines. May. Available online at: www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en

DataSF. 2016. San Francisco Land Uses. Available online at: https://data.sfgov.org/Housing-and-Buildings/Land-Use/us3s-fp9q/data

SFEP. 2018. The Hub Plan, 30 Van Ness Avenue Project, 98 Franklin Street Project, and Hub Housing Sustainability District. Project Description. Administrative Draft.

Table 10b
Van Ness Project Operational CAP Emissions Summary: Controlled
The Hub Plan
San Francisco, CA

Modeled Year	Category	Average Daily Operational Emissions[1] [lb/day]			
		ROG	NO_x	PM_{10}	$PM_{2.5}$
2018 Existing[2]	Area[5,6]	4.4	1.1E-04	5.5E-05	5.5E-05
	Energy[7]	0.10	0.94	0.071	0.071
	Mobile[8]	7.2	13	10	3.0
	Generator[9]	--	--	--	--
Total		**12**	**14**	**10**	**3.0**
2024 Full Project Buildout[3]	Area[5,6]	23	0.29	0.14	0.14
	Energy[7]	0.36	3.2	0.25	0.25
	Mobile[8]	9.0	17	30	8.1
	Generator[9]	0.073	0.24	0.010	0.010
Total		**32**	**20**	**30**	**8.5**
Net Project Emissions[4]	Area[5,6]	18	0.29	0.14	0.14
	Energy[7]	0.26	2.3	0.18	0.18
	Mobile[8]	1.7	3.4	19	5.2
	Generator[9]	0.073	0.24	0.010	0.010
Total		**20**	**6.2**	**20**	**5.5**

Modeled Year	Annual Operational Emissions[10] [ton/yr]			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
2018 Existing[2]	2.1	2.6	1.9	0.56
2024 Full Project Buildout[3]	5.8	3.7	5.5	1.6
Net Project Emissions[4]	3.7	1.1	3.6	1.0

Notes:

1. Operational emissions from area, energy, and mobile sources were estimated with CalEEMod® version 2016.3.2.
2. Operational emissions from the baseline scenario (existing conditions) were estimated using CalEEMod® default emission factors for 2018.
3. Full project operation was assumed to occur immediately following construction. The emissions were assumed to occur over a full year of operation.
4. The net project emissions were estimated by subtracting the existing emissions from the full project buildout emissions.
5. For consumer products, ROG emissions were calculated based on the average emission factor for the City of San Francisco. San Francisco's ROG emissions from consumer products is projected to be 5.67 tons per day in 2020 (Ref: https://www.arb.ca.gov/app/emsinv/emssumcat.php). San Francisco's building square footage was 539,022,396 square feet based on a survey in 2007 (Ref: DataSF Land Use shapefiles). Therefore, the emission factor was calculated as follows:
   (5.67 tons/day * 2000 lbs/ton)/539,022,396 sq. ft. = 2.10 x 10-5 lbs/(sq. ft.-day).
6. Per BAAQMD Rule 6-3-306, no new building construction can include wood-burning devices. Based on communication with Project Sponsor, the Project will not include any natural gas hearths.
7. Energy consumption was assumed to adhere to Title 24 2016.
8. CalEEMod® default vehicle trip generation rate and length were used in generating operational mobile emissions. Emission factors were updated to reflect EMFAC2017 emissions factor for year 2024 (full-build out year)

Table 10b
Van Ness Project Operational CAP Emissions Summary: Controlled
The Hub Plan
San Francisco, CA

Notes, Continued:

9. Emissions for emergency generators were calculated assuming two 1,500 kW Tier 4 engines and 20 hours per year of non-emergency testing per generator. Below is the calculation methodology:

   E = EF * HP * Hr

   Where:

   E = generator engine emissions
   EF = compression-ignition engine emission factor
   HP = generator horsepower
   Hr = generator hours

   Engine emission factors for NOx, PM_{10} and $PM_{2.5}$ (assumed all engines are diesel fueled, and that all PM_{10} is diesel particulate matter) based on ARB Tier 4 standards for >750-hp engines. Emission factors for ROG were converted from THC values provided in the Tier standards using EPA hydrocarbon conversion factors. Engines are assumed to be at maximum load during testing.
   Average daily generator emissions are annualized by dividing forty hours of annual use by 365 days per year.

10. Annual operational emissions are estimated by multiplying average daily emissions by 365 days per year.

Abbreviations:

ARB - California Air Resources Board
BAAQMD - Bay Area Air Quality Management District
CalEEMod® - California Emissions Estimator Model
CAP - criteria air pollutant
CEQA - California Environmental Quality Act
DPF - diesel particulate filter
EMFAC2017 - EMission FACtor Model 2017
hp - horsepower
kW - kilowatt
lb/day - pounds per day
NO_x - nitrogen oxides
PM_{10} - particulate matter less than 10 micrometers in diameter
$PM_{2.5}$ - particulate matter less than 2.5 micrometers in diameter
ROG - reactive organic gases
sqft - square feet
THC - total hydrocarbon

References:

ARB. 2018. ROG Inventory. Available online at: https://www.arb.ca.gov/app/emsinv/emssumcat.php

BAAQMD. 2017. California Environmental Quality Act Air Quality Guidelines. May. Available online at: www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en

DataSF. 2016. San Francisco Land Uses. Available online at: https://data.sfgov.org/Housing-and-Buildings/Land-Use/us3s-fp9q/data

SFEP. 2018. The Hub Plan, 30 Van Ness Avenue Project, 98 Franklin Street Project, and Hub Housing Sustainability District. Project Description. Administrative Draft.

Table 11a
Franklin Project Operational CAP Emissions Summary: Uncontrolled
The Hub Plan
San Francisco, CA

Modeled Year	Category	Average Daily Operational Emissions[1] [lb/day]			
		ROG	NO_x	PM_{10}	$PM_{2.5}$
2018 Existing[2]	Area	--	--	--	--
	Energy	--	--	--	--
	Mobile	--	--	--	--
	Generator	--	--	--	--
Total		**--**	**--**	**--**	**--**
2023 Full Project Buildout[3]	Area[5,6]	12	0.16	0.078	0.078
	Energy[7]	0.13	1.1	0.089	0.089
	Mobile[8]	3.3	6.1	11	2.9
	Generator[9]	0.0014	2.8	0.091	0.091
Total		**15**	**10**	**11**	**3.1**
Net Project Emissions[4]	Area[5,6]	12	0.16	0.078	0.078
	Energy[7]	0.13	1.1	0.089	0.089
	Mobile[8]	3.3	6.1	11	2.9
	Generator[9]	0.0014	2.8	0.091	0.091
Total		**15**	**10**	**11**	**3.1**

Modeled Year	Annual Operational Emissions[10] [ton/yr]			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
2018 Existing[2]	--	--	--	--
2023 Full Project Buildout[3]	2.8	1.8	2.0	0.57
Net Project Emissions[4]	2.8	1.8	2.0	0.57

Notes:

1. Operational emissions from area, energy, and mobile sources were estimated with CalEEMod® version 2016.3.2.
2. Operational CAP emissions were assumed to be zero since the existing land use for 98 Franklin is a parking lot.
3. Full project operation was assumed to occur immediately following construction. The emissions were assumed to occur over a full year of operation.
4. The net project emissions were estimated by subtracting the existing emissions from the full project buildout emissions.
5. For consumer products, ROG emissions were calculated based on the average emission factor for the City of San Francisco. San Francisco's ROG emissions from consumer products is projected to be 5.67 tons per day in 2020 (Ref: https://www.arb.ca.gov/app/emsinv/emssumcat.php). San Francisco's building square footage was 539,022,396 square feet based on a survey in 2007 (Ref: DataSF Land Use shapefiles). Therefore, the emission factor was calculated as follows:
(5.67 tons/day * 2000 lbs/ton)/539,022,396 sq. ft. = 2.10 x 10-5 lbs/(sq. ft.-day).
6. Per BAAQMD Rule 6-3-306, no new building construction can include wood-burning devices. Based on communication with Project Sponsor, the Project will not include any natural gas hearths.
7. Energy consumption was assumed to adhere to Title 24 2016.
8. CalEEMod® default vehicle trip generation rate and length were used in generating operational mobile emissions. Emission factors were updated to reflect EMFAC2017 emissions factor for year 2023 (full-build out year)

Table 11a
Franklin Project Operational CAP Emissions Summary: Uncontrolled
The Hub Plan
San Francisco, CA

Notes, Continued:

9. Emissions for emergency generators were calculated assuming a 1,500 kW engine with fleet-wide emission factors and 50 hours per year of non-emergency testing. Below is the calculation methodology:

E = EF * HP * Hr

Where:

E = generator engine emissions
EF = compression-ignition engine emission factor
HP = generator horsepower
Hr = generator hours

Engine emission factors for NOx, PM_{10} and $PM_{2.5}$ (assumed all engines are diesel fueled, and that all PM_{10} is diesel particulate matter) based on CalEEMod® version 2016.3.2. default emission factors for >750-hp engines from Table 12.1. in Appendix D of the User's Guide. Engines are assumed to be at maximum load during testing. Average daily generator emissions are annualized by dividing fifty hours of annual use by 365 days per year.

10. Annual operational emissions are estimated by multiplying average daily emissions by 365 days per year.

Abbreviations:

ARB - California Air Resources Board
BAAQMD - Bay Area Air Quality Management District
CalEEMod® - California Emissions Estimator Model
CAP - criteria air pollutant
CEQA - California Environmental Quality Act
DPF - diesel particulate filter
EMFAC2017 - EMission FACtor Model 2017
hp - horsepower
kW - kilowatt
lbs/day - pounds per day
NO_x - nitrogen oxides
PM_{10} - particulate matter less than 10 micrometers in diameter
$PM_{2.5}$ - particulate matter less than 2.5 micrometers in diameter
ROG - reactive organic gases
sqft - square feet
THC - total hydrocarbon

References:

ARB. 2018. ROG Inventory. Available online at: https://www.arb.ca.gov/app/emsinv/emssumcat.php

BAAQMD. 2017. California Environmental Quality Act Air Quality Guidelines. May. Available online at: www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en

DataSF. 2016. San Francisco Land Uses. Available online at: https://data.sfgov.org/Housing-and-Buildings/Land-Use/us3s-fp9q/data

Table 11b
Franklin Project Operational CAP Emissions Summary: Controlled
The Hub Plan
San Francisco, CA

Modeled Year	Category	Average Daily Operational Emissions[1] [lb/day]			
		ROG	NO_x	PM_{10}	$PM_{2.5}$
2018 Existing[2]	Area	--	--	--	--
	Energy	--	--	--	--
	Mobile	--	--	--	--
	Generator	--	--	--	--
Total		**--**	**--**	**--**	**--**
2023 Full Project Buildout[3]	Area[5,6]	12	0.16	0.078	0.078
	Energy[7]	0.13	1.1	0.089	0.089
	Mobile[8]	3.3	6.1	11	2.9
	Generator[9]	0.091	0.30	0.012	0.012
Total		**15**	**7.7**	**11**	**3.1**
Net Project Emissions[4]	Area[5,6]	12	0.16	0.078	0.078
	Energy[7]	0.13	1.1	0.089	0.089
	Mobile[8]	3.3	6.1	11	2.9
	Generator[9]	0.091	0.30	0.012	0.012
Total		**15**	**7.7**	**11**	**3.1**

Modeled Year	Annual Operational Emissions[10] [ton/yr]			
	ROG	NO_x	PM_{10}	$PM_{2.5}$
2018 Existing[2]	--	--	--	--
2023 Full Project Buildout[3]	2.8	1.4	2.0	0.56
Net Project Emissions[4]	2.8	1.4	2.0	0.56

Notes:

1. Operational emissions from area, energy, and mobile sources were estimated with CalEEMod® version 2016.3.2.
2. Operational CAP emissions were assumed to be zero since the existing land use for 98 Franklin is a parking lot.
3. Full project operation was assumed to occur immediately following construction. The emissions were assumed to occur over a full year of operation.
4. The net project emissions were estimated by subtracting the existing emissions from the full project buildout emissions.
5. For consumer products, ROG emissions were calculated based on the average emission factor for the City of San Francisco. San Francisco's ROG emissions from consumer products is projected to be 5.67 tons per day in 2020 (Ref: https://www.arb.ca.gov/app/emsinv/emssumcat.php). San Francisco's building square footage was 539,022,396 square feet based on a survey in 2007 (Ref: DataSF Land Use shapefiles). Therefore, the emission factor was calculated as follows:
(5.67 tons/day * 2000 lbs/ton)/539,022,396 sq. ft. = 2.10 x 10-5 lbs/(sq. ft.-day).
6. Per BAAQMD Rule 6-3-306, no new building construction can include wood-burning devices. Based on communication with Project Sponsor, the Project will not include any natural gas hearths.
7. Energy consumption was assumed to adhere to Title 24 2016.
8. CalEEMod® default vehicle trip generation rate and length were used in generating operational mobile emissions. Emission factors were updated to reflect EMFAC2017 emissions factor for year 2023 (full-build out year)

Table 11b
Franklin Project Operational CAP Emissions Summary: Controlled
The Hub Plan
San Francisco, CA

Notes, Continued:

9. Emissions for emergency generators were calculated assuming a 1,500 kW Tier 4 engine and 50 hours per year of non-emergency testing. Below is the calculation methodology:

E = EF * HP * Hr

Where:

E = generator engine emissions

EF = compression-ignition engine emission factor

HP = generator horsepower

Hr = generator hours

Engine emission factors for NOx, PM_{10} and $PM_{2.5}$ (assumed all engines are diesel fueled, and that all PM_{10} is diesel particulate matter) based on ARB Tier 4 standards for >750-hp engines. Emission factors for ROG were converted from THC values provided in the Tier standards using EPA hydrocarbon conversion factors. Engines are assumed to be at maximum load during testing.

Average daily generator emissions are annualized by dividing fifty hours of annual use by 365 days per year.

10. Annual operational emissions are estimated by multiplying average daily emissions by 365 days per year.

Abbreviations:

ARB - California Air Resources Board
BAAQMD - Bay Area Air Quality Management District
CalEEMod® - California Emissions Estimator Model
CAP - criteria air pollutant
CEQA - California Environmental Quality Act
DPF - diesel particulate filter
EMFAC2017 - EMission FACtor Model 2017
hp - horsepower
kW - kilowatt
lbs/day - pounds per day
NO_x - nitrogen oxides
PM_{10} - particulate matter less than 10 micrometers in diameter
$PM_{2.5}$ - particulate matter less than 2.5 micrometers in diameter
ROG - reactive organic gases
sqft - square feet
THC - total hydrocarbon

References:

ARB. 2018. ROG Inventory. Available online at: https://www.arb.ca.gov/app/emsinv/emssumcat.php

BAAQMD. 2017. California Environmental Quality Act Air Quality Guidelines. May. Available online at: www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en

DataSF. 2016. San Francisco Land Uses. Available online at: https://data.sfgov.org/Housing-and-Buildings/Land-Use/us3s-fp9q/data

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Table 12
Modeling Parameters for Construction and Operational Sources
The Hub Plan
San Francisco, CA

Analysis Scenario	Period	Source	Source Type[1]	Source Dimension	Number of Sources[2]	Release Height[3]	Exit Temperature	Exit Velocity	Exit Diameter	Initial Vertical Dimension[4]	Initial Lateral Dimension[5]
				[m]		[m]	°F	[m/s]	[m]	[m]	[m]
30 Van Ness Avenue	Construction[6]	Construction Equipment	Area	Project Area	1	5.0				1.4	
	Operational	Generator[7]	Point		2	40	872	45	0.18		
98 Franklin Street	Construction[6]	Construction Equipment	Area	Project Area	1	5.0				1.4	
	Operational	Generator[7]	Point		1	21	872	45	0.18		
The Hub Plan	Operational	On-Road Light Duty Vehicles[8]	Volume	Variable		1.7				1.6	Variable
		On-Road Trucks	Volume	Variable		2.6				2.4	Variable
		Generators[7]	Point		1 per re-zoned parcel	3.7	872	45	0.18		

Notes:

1. Construction off-road equipment is modeled as an area source covering the project site, consistent with the CRRP-HRA (BAAQMD 2012).
2. The number of on-road sources is based on the geometry of the truck or traffic routes.
3. According to the CRRP-HRA methodology, release height of a modeled area source representing construction equipment was set to 5 meters. On-road truck release height is based on USEPA haul road guidance.
4. According to the CRRP-HRA methodology, initial vertical dimension of the modeled construction equipment volume sources was set to 1.4 meters. On-road truck initial vertical dimension is based on USEPA haul road guidance.
5. According to USEPA AERMOD User's Guide, for a line source modeled as adjacent volume sources, the initial lateral dimension is the length of the side divided by 2.15.
6. Consistent with BAAQMD CEQA guidance, construction on-road trucks were not modeled because it did not exceed 500 trucks per day.
7. Generators for the individual projects and the Hub Plan are modeled with default parameters in **Table 12** of the CRRP-HRA technical guidance document. This represents a deviation from the Scope of Work (Appendix A) made because previously assumed information about the generators was incorrect. The Van Ness Project will have up to two colocated generators that were assumed to operate at the same time.
8. The release height and initial vertical dimension for the on-road light duty vehicles deviate from the initial Scope of Work (Appendix A). This update was done to be consistent with the updates to the CRRP.
9. Shaded cells indicate that those parameters are not applicable.

Abbreviations:

AERMOD - Atmospheric Dispersion MODeling
ARB - California Air Resources Board
BAAQMD - Bay Area Air Quality Management District
CEQA - California Environmental Quality Act
CRRP - Community Risk Reduction Plan
°F - Fahrenheit
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: http://www.gsweventcenter.com/Draft_SEIR_References%5C2012_12_BAAQMD_SF_CRRP_Methods_and_Findings_v9.pdf

BAAQMD. 2017. California Environmental Quality Act: Air Quality Guidelines. May. Available at: http://www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa_guidelines_may2017-pdf.pdf?la=en. Accessed November 2018.

California Air Resources Board (ARB). 2000. Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles. Appendix VII: Risk Characterization Scenarios. October. Available at: https://www.arb.ca.gov/diesel/documents/rrpapp7.PDF

United States Environmental Protection Agency (USEPA). 2012. Haul Road Workgroup Final Report Submission to EPA-OAQPS. U.S. EPA Office of Air Quality and Planning Standards, Research Triangle Park, North Carolina. Available at: https://www3.epa.gov/scram001/reports/Haul_Road_Workgroup-Final_Report_Package-20120302.pdf

USEPA. 2012. Haul Road Workgroup Final Report Submission to EPA-OAQPS. U.S. EPA Office of Air Quality and Planning Standards, Research Triangle Park, North Carolina. Available at: https://www3.epa.gov/scram001/reports/Haul_Road_Workgroup-Final_Report_Package-20120302.pdf

Table 13a
Exposure Duration
The Hub Plan
San Francisco, CA

Analysis Scenario	Receptor Location	Phase	Start Date	End Date	Exposure Duration	
					[days]	[years]
30 Van Ness Avenue	Off-Site Resident	Construction	5/1/2020	12/31/2023	1,340	3.67
		Operation	1/1/2024	1/1/2054	10,959	30
	On-Site Resident	Operation	1/1/2024	1/1/2054	10,959	30
98 Franklin Street	Off-Site Resident	Construction	6/1/2020	3/9/2023	1,012	2.77
		Operation	3/10/2023	3/10/2053	10,959	30
	On-Site Resident	Operation	3/10/2023	3/10/2053	10,959	30
The Hub Plan[2]	Off-Site Resident	Operation	1/1/2020	1/1/2050	10,959	30
	On-Site Resident	Operation	1/1/2020	1/1/2050	10,959	30

Notes:

1. For the individual projects, the start date for the operational phase is assumed to be one day after construction of the project ends.

2. The expected EIR certification date for the Hub Plan is winter of 2019. A start date of 1/1/2020 was assumed, as a conservative, worst-case assessment. The actual emissions from the plan would occur gradually as sites are redeveloped and occupied. Each subsequent project, aside from the Van Ness and Franklin projects would still require building permits and/or entitlements and/or additional environmental review. All of these processes would take time and therefore commencement of any construction or operational emissions resulting from the Plan would not occur in 2020, but more likely in later years, as shown by the schedules for the Van Ness and Franklin street projects. Any development that occurs in years later than that analyzed here (2020), would likely have lower emissions because vehicle emissions and construction equipment emissions would likely be lower in future years due to more stringent emissions standards taking effect.

Table 13b
Exposure Parameters
The Hub Plan
San Francisco, CA

Period	Receptor Type	Analysis Scenario	Receptor Age Group	Exposure Parameters					
				Daily Breathing Rate (DBR)[1]	Exposure Duration (ED)[2,3]	Fraction of Time at Home (FAH)[4]	Exposure Frequency (EF)[5]	Averaging Time (AT)	Intake Factor, Inhalation (IF_{inh})
				[L/kg-day]	[years]	[unitless]	[days/year]	[days]	[m^3/kg-day]
Construction	Off-Site Resident	30 Van Ness Avenue	3rd Trimester	361	0.25	1	350	25,550	0.0012
			Age 0-<2 Years	1,090	2.0	1			0.030
			Age 2-<9 Years	631	1.4	1			0.012
		98 Franklin Street	3rd Trimester	361	0.25	1	350	25,550	0.0012
			Age 0-<2 Years	1,090	2.0	1			0.030
			Age 2-<9 Years	631	0.52	1			0.0045
Operation	On-Site Resident	Individual Projects and Plan	3rd Trimester	361	0.25	1	350	25,550	0.0012
			Age 0-<2 Years	1,090	2.0	1			0.030
			Age 2-<16 Years	572	14	1			0.11
			Age 16-<30 Years	261	14	0.73			0.037
	Off-Site Resident[2]	Individual Projects and Plan	3rd Trimester	361	0.25	1	350	25,550	0.0012
			Age 0-<2 Years	1,090	2.0	1			0.030
			Age 2-<16 Years	572	14	1			0.11
			Age 16-<30 Years	261	14	0.73			0.037

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 guidance).
2. The exposure duration for the off-site resident reflects a conservative scenario analysis: a fetus is at the beginning of its third trimester when construction commences and is exposed to all construction emissions for that project or Plan.
3. The exposure duration for the on-site resident reflects a conservative scenario analysis: a fetus is at the beginning of its third trimester when the residents move in and when the operation of the on-site generators commences after full build-out.

Table 13b
Exposure Parameters
The Hub Plan
San Francisco, CA

Notes, Continued:

4. 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 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).

5. The exposure frequency for residents reflects default residential exposure frequency from OEHHA 2015.

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
FAH - fraction of time at home
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 ProgramHealth Risk Assessment (HRA) Guidelines. January.
OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

Table 14
Carcinogenic Toxicity Value and Speciation Fraction for Toxic Air Contaminants Evaluated
The Hub Plan
San Francisco, CA

Fuel[1]	Source	Chemical	CAS Number	Cancer Potency Factor [mg/kg-day]$^{-1}$	Weight Fraction
Diesel	PM_{10}	Diesel PM	9-90-1	1.1	1.0
Propane[2]	TOG	Acetaldehyde	75-07-0	0.010	3.0E-04
		Benzene	71-43-2	0.10	0.0011
		Ethylbenzene	100-41-4	0.0087	1.0E-04
		Formaldehyde	50-00-0	0.021	0.0081
	PM_{10}	Nickel	7440-02-0	0.91	5.0E-04
Gasoline	TOG	1,3-Butadiene	106-99-0	0.60	0.0071
		Acetaldehyde	75-07-0	0.010	0.010
		Benzene[3]	71-43-2	0.10	0.014
					0.028
		Ethylbenzene[3]	100-41-4	0.0087	0.0093
					0.014
		Formaldehyde	50-00-0	0.021	0.015
		Methyl tert-butyl ether	1634-04-4	0.0018	5.0E-04
		Naphthalene	91-20-3	0.12	6.4E-04

Notes:

1. For the health risk analysis, health effects were evaluated for emissions from construction equipment, emergency generators, and vehicles. Construction equipment consists of diesel and propane-fueled equipment. Emergency generators were assumed to be all diesel-powered. Vehicles were assumed to be diesel and gasoline-fueled.

2. Exact speciation fractions for propane-fueled construction equipment were not available, so weight fractions for natural gas-fueled forklifts were used as a surrogate for propane-fueled forklifts.

3. Benzene and ethylbenzene are produced from catalytic exhaust and evaporative losses from gasoline engines. In both cases, the evaporative loss weight fraction is shown before the exhaust weight fraction.

Abbreviations:

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
PM - particulate matter
TOG - Total Organic Gas

Reference:

Cal/EPA. 2016. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. March. Available at: http://www.arb.ca.gov/toxics/healthval/contable.pdf.

Table 15
Age Sensitivity Factor
The Hub Plan
San Francisco, CA

Receptor Type	Period	Receptor Age Group[1]	Value[2]
All Receptors	Construction and Operation	3rd Trimester	10
		Age 0-<2 Years	10
		Age 2-<9 Years	3
		Age 2-<16 Years	3
		Age 16-<30 Years	1

Notes:

[1] Age sensitivity factors are applicable for the age groups relevant to each receptor type listed in **Table 13b** Exposure Parameters.

[2] Age sensitivity factors are unitless.

Abbreviation:

OEHHA - Office of Environmental Health Hazard Assessment

Reference:

OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

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Table 16a
Baseline (2020) + Plan Excess Lifetime Cancer Risk at MEISR
The Hub Plan
San Francisco, CA

Source Category		Lifetime Excess Cancer Risk (in a million) Uncontrolled	Controlled
Plan Contributions			
Construction of Hub Projects	Van Ness Project	12	0.26
	Franklin Project	21	1.7
Generators[1]		182	24
Plan 2020 Traffic		11	11
Total Plan Contribution		**225**	**37**
Baseline (2020) No Plan Sources			
Baseline (2020) No Plan Traffic		226	226
Rail Sources		0.85	0.85
Maritime Sources		35	35
Existing Stationary Sources		4.7	4.7
Total Excess Cancer Risk at MEISR		**492**	**303**

MEISR by Scenario	MEISR Location Uncontrolled	Controlled
UTMx (m)	551,100	551,100
UTMy (m)	4,181,020	4,181,020

Notes:

1. Generator impacts were evaluated at varying elevations to capture the maximum impacts from generators located above ground. These results are conservatively added to groundlevel impacts from construction and traffic. The Plan generators include the generators from the two Individual Projects.

Abbreviations:

m - meter
MEISR - maximally exposed individual sensitive receptor
tbd - to be determined
UTMx - Universal Transverse Mercator x-coordinate
UTMy - Universal Transverse Mercator y-coordinate

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Table 16b
Baseline (2020) + Plan $PM_{2.5}$ Concentration at MEISR
The Hub Plan
San Francisco, CA

Source Category		**$PM_{2.5}$ Concentration ($\mu g/m^3$)**	
		Uncontrolled	**Controlled**
Plan Contributions			
Construction of Hub Projects	Van Ness Project	0.59	0.0012
	Franklin Project	0.010	0.0094
Generators[1]		0.0077	0.032
Plan 2020 Traffic		0.055	0.076
Total Plan Contribution		**0.67**	**0.12**
Baseline (2020) No Plan Sources			
Baseline (2020) No Plan Traffic		1.6	1.5
Rail Sources		0.0015	0.0016
Maritime Sources		0.048	0.046
Existing Stationary Sources		0.049	0.044
Background Concentration[2]		7.8	7.8
Total $PM_{2.5}$ Concentration at MEISR		**10.2**	**9.5**

	MEISR Location	
MEISR by Scenario	**Uncontrolled**	**Controlled**
UTMx (m)	551,200	551,100
UTMy (m)	4,181,120	4,181,020

Notes:

1. Generator impacts were evaluated at varying elevations to capture the maximum impacts from generators located above ground. These results are conservatively added to groundlevel impacts from construction and traffic. The Plan generators include the generators from the two Individual Projects.

2. Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 $\mu g/m^3$ to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 $\mu g/m^3$ is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station.

Abbreviations:

m - meter
MEISR - maximally exposed individual sensitive receptor
$PM_{2.5}$ - particulate matter less than 2.5 micrometers in diameter
tbd - to be determined
UTMx - Universal Transverse Mercator x-coordinate
UTMy - Universal Transverse Mercator y-coordinate
$\mu g/m^3$ - microgram per cubic meter

Table 17a
Baseline (2020) + Van Ness Project Excess Lifetime Cancer Risk at MEISR
The Hub Plan
San Francisco, CA

Source Category	Lifetime Excess Cancer Risk (in a million)			
	Offsite MEISR		Onsite MEISR	
	Uncontrolled	Controlled	Uncontrolled	Controlled
Project Contributions				
Construction[1]	201	4.4	--	--
Generators[2]	0.90	0.12	21	2.9
Van Ness Project Traffic	0.11	0.11	0.10	0.10
Total Project Contribution	**202**	**4.6**	**22**	**3.0**
Baseline (2020) No Plan Sources				
Baseline (2020) No Plan Traffic	251	251	217	217
Rail Sources	0.80	0.80	0.78	0.78
Maritime Sources	37	37	37	37
Existing Stationary Sources	4.9	4.9	4.7	4.7
Total Excess Cancer Risk at MEISR	**496**	**298**	**281**	**262**

MEISR by Scenario	MEISR Location			
	Offsite MEISR		Onsite MEISR	
	Uncontrolled	Controlled	Uncontrolled	Controlled
UTMx (m)	551,200	551,200	551,160	551,160
UTMy (m)	4,181,120	4,181,120	4,181,140	4,181,140

Notes:

1. Onsite receptors are not exposed to construction emissions.
2. Generator impacts were evaluated at varying elevations to capture the maximum impacts from generators located above ground. These results are conservatively added to ground level impacts from construction and traffic.

Abbreviations:

m - meter
MEISR - maximally exposed individual sensitive receptor
tbd - to be determined
UTMx - Universal Transverse Mercator x-coordinate
UTMy - Universal Transverse Mercator y-coordinate

Table 17b
Baseline (2020) + Van Ness Project $PM_{2.5}$ Concentration at MEISR
The Hub Plan
San Francisco, CA

Source Category	$PM_{2.5}$ Concentration ($\mu g/m^3$)			
	Offsite MEISR		Onsite MEISR	
	Uncontrolled	Controlled	Uncontrolled	Controlled
Project Contributions				
Construction[1]	0.59	0.020	--	--
Generators[2]	0.0024	3.1E-04	0.029	0.0038
Van Ness Project Traffic	7.5E-04	7.5E-04	7.8E-04	7.8E-04
Total Project Contribution	**0.60**	**0.021**	**0.030**	**0.0046**
Baseline (2020) No Plan Sources				
Baseline (2020) No Plan Traffic	1.6	1.6	1.6	1.6
Rail Sources	0.0015	0.0015	0.0015	0.0015
Maritime Sources	0.048	0.048	0.048	0.048
Existing Stationary Sources	0.049	0.049	0.048	0.048
Background Concentration[3]	7.8	7.8	7.8	7.8
Total $PM_{2.5}$ Concentration at MEISR	**10.1**	**9.5**	**9.5**	**9.5**

MEISR by Scenario	MEISR Location			
	Offsite MEISR		Onsite MEISR	
	Uncontrolled	Controlled	Uncontrolled	Controlled
UTMx (m)	551,200	551,200	551,160	551,160
UTMy (m)	4,181,120	4,181,120	4,181,140	4,181,140

Notes:

1. Onsite receptors are not exposed to construction emissions.
2. Generator impacts were evaluated at varying elevations to capture the maximum impacts from generators located above ground. These results are conservatively added to ground level impacts from construction and traffic.
3. Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 $\mu g/m^3$ to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 $\mu g/m^3$ is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station.

Abbreviations:

m - meter
MEISR - maximally exposed individual sensitive receptor
$PM_{2.5}$ - particulate matter less than 2.5 micrometers in diameter
tbd - to be determined
UTMx - Universal Transverse Mercator x-coordinate
UTMy - Universal Transverse Mercator y-coordinate
$\mu g/m^3$ - microgram per cubic meter

Table 18a
Baseline (2020) + Franklin Project Excess Lifetime Cancer Risk at MEISR
The Hub Plan
San Francisco, CA

Source Category	Lifetime Excess Cancer Risk (in a million)			
	Offsite MEISR		Onsite MEISR	
	Uncontrolled	Controlled	Uncontrolled	Controlled
Project Contributions				
Construction[1]	70	5.6	--	--
Generators[2]	1.6	0.22	6.1	0.82
Franklin Project Traffic	0.024	0.024	0.019	0.019
Total Project Contribution	**72**	**5.8**	**6.2**	**0.84**
Baseline (2020) No Plan Sources				
Baseline (2020) No Plan Traffic	193	193	183	183
Rail Sources	0.84	0.84	0.83	0.83
Maritime Sources	35	35	35	35
Existing Stationary Sources	4.3	4.3	4.1	4.1
Total Excess Cancer Risk at MEISR	**305**	**239**	**229**	**224**

MEISR by Scenario	MEISR Location			
	Offsite MEISR		Onsite MEISR	
	Uncontrolled	Controlled	Uncontrolled	Controlled
UTMx (m)	551,060	551,060	551,040	551,040
UTMy (m)	4,181,000	4,181,000	4,181,000	4,181,000

Notes:

1. Onsite receptors are not exposed to construction emissions.
2. Generator impacts were evaluated at varying elevations to capture the maximum impacts from generators located above ground. These results are conservatively added to ground level impacts from construction and traffic.

Abbreviations:

m - meter
MEISR - maximally exposed individual sensitive receptor
tbd - to be determined
UTMx - Universal Transverse Mercator x-coordinate
UTMy - Universal Transverse Mercator y-coordinate

Table 18b
Baseline (2020) + Franklin Project $PM_{2.5}$ Concentration at MEISR
The Hub Plan
San Francisco, CA

Source Category	$PM_{2.5}$ Concentration ($\mu g/m^3$)			
	Offsite MEISR		Onsite MEISR	
	Uncontrolled	Controlled	Uncontrolled	Controlled
Project Contributions				
Construction[1]	0.28	0.032	--	--
Generators[2]	0.0024	3.2E-04	0.0083	0.0011
Franklin Project Traffic	1.8E-04	1.8E-04	1.5E-04	1.5E-04
Total Project Contribution	**0.29**	**0.032**	**0.0084**	**0.0012**
Baseline (2020) No Plan Sources				
Baseline (2020) No Plan Traffic	1.4	1.4	1.4	1.4
Rail Sources	0.0016	0.0016	0.0016	0.0016
Maritime Sources	0.046	0.046	0.045	0.045
Existing Stationary Sources	0.044	0.044	0.043	0.043
Background Concentration[2]	7.8	7.8	7.8	7.8
Total $PM_{2.5}$ Concentration at MEISR	**9.5**	**9.3**	**9.3**	**9.3**

MEISR by Scenario	MEISR Location			
	Offsite MEISR		Onsite MEISR	
	Uncontrolled	Controlled	Uncontrolled	Controlled
UTMx (m)	551,060	551,060	551,040	551,040
UTMy (m)	4,181,000	4,181,000	4,181,000	4,181,000

Notes:

1. Onsite receptors are not exposed to construction emissions.
2. Generator impacts were evaluated at varying elevations to capture the maximum impacts from generators located above ground. These results are conservatively added to ground level impacts from construction and traffic.
3. Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 $\mu g/m^3$ to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 $\mu g/m^3$ is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station.

Abbreviations:

m - meter
MEISR - maximally exposed individual sensitive receptor
$PM_{2.5}$ - particulate matter less than 2.5 micrometers in diameter
tbd - to be determined
UTMx - Universal Transverse Mercator x-coordinate
UTMy - Universal Transverse Mercator y-coordinate
$\mu g/m^3$ - microgram per cubic meter

Table 19a
Cumulative (2040) Excess Lifetime Cancer Risk at the Hub Plan MEISR
The Hub Plan
San Francisco, CA

Source Category		Lifetime Excess Cancer Risk (in a million)	
		Uncontrolled	**Controlled**
Plan Contributions			
Construction of Hub Projects	Van Ness Project	201	0.26
	Franklin Project	2.4	1.7
Generators[1]		13	24
Plan 2040 Traffic		1.5	2.1
Total Plan Contribution		**217**	**28**
Cumulative (2040) Sources			
Cumulative (2040) No Plan Traffic		43	42
Rail Sources		0.80	0.85
Maritime Sources		37	35
Existing Stationary Sources		4.9	4.7
Total Excess Cancer Risk at the Hub Plan MEISR		**303**	**111**

MEISR by Scenario	MEISR Location	
	Uncontrolled	**Controlled**
UTMx (m)	551,200	551,100
UTMy (m)	4,181,120	4,181,020

Notes:

1. Generator impacts were evaluated at varying elevations to capture the maximum impacts from generators located above ground. These results are conservatively added to groundlevel impacts from construction and traffic. The Plan generators include the generators from the two Individual Projects.

Abbreviations:

m - meter
MEISR - maximally exposed individual sensitive receptor
tbd - to be determined
UTMx - Universal Transverse Mercator x-coordinate
UTMy - Universal Transverse Mercator y-coordinate

Table 19b
Cumulative (2040) $PM_{2.5}$ Concentration at the Hub Plan MEISR
The Hub Plan
San Francisco, CA

Source Category		$PM_{2.5}$ Concentration ($\mu g/m^3$) Uncontrolled	Controlled
Plan Contributions			
Construction of Hub Projects	Van Ness Project	0.59	2.5E-05
	Franklin Project	0.010	5.4E-05
Generators[1]		0.0077	7.0E-04
Plan 2040 Traffic		0.028	0.13
Total Plan Contribution		**0.64**	**0.13**
Cumulative (2040) Sources			
Cumulative (2040) No Plan Traffic		0.94	2.4
Rail Sources		0.0015	0.0031
Maritime Sources		0.048	0.045
Existing Stationary Sources		0.049	0.029
Background Concentration[2]		7.8	7.8
Total $PM_{2.5}$ Concentration at the Hub Plan MEISR		**9.5**	**10.4**

MEISR by Scenario	MEISR Location Uncontrolled	Controlled
UTMx (m)	551,200	551,420
UTMy (m)	4,181,120	4,180,440

Notes:

1. Generator impacts were evaluated at varying elevations to capture the maximum impacts from generators located above ground. These results are conservatively added to groundlevel impacts from construction and traffic. The Plan generators include the generators from the two Individual Projects.

2. Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 $\mu g/m^3$ to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 $\mu g/m^3$ is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station.

Abbreviations:

m - meter
MEISR - maximally exposed individual sensitive receptor
$PM_{2.5}$ - particulate matter less than 2.5 micrometers in diameter
tbd - to be determined
UTMx - Universal Transverse Mercator x-coordinate
UTMy - Universal Transverse Mercator y-coordinate
$\mu g/m^3$ - microgram per cubic meter

Table 20a
Cumulative (2040) Excess Lifetime Cancer Risk at the Van Ness Project MEISR
The Hub Plan
San Francisco, CA

Source Category	Lifetime Excess Cancer Risk (in a million)			
	Offsite MEISR		Onsite MEISR	
	Uncontrolled	Controlled	Uncontrolled	Controlled
Van Ness Project Contributions				
Construction[1]	201	4.4	--	--
Van Ness Project Generator[2]	0.90	0.12	21	2.9
Van Ness Project Traffic	0.026	0.026	0.030	0.030
Total Van Ness Project Contribution	**202**	**4.5**	**22**	**2.9**
Cumulative (2040) Sources				
Cumulative (2040) No Plan Traffic	43	43	45	45
Rail Sources	0.80	0.80	0.78	0.78
Maritime Sources	37	37	37	37
Existing Stationary Sources	4.9	4.9	4.7	4.7
2040 Plan Generators[3]	11	1.5	9.2	1.2
2040 Plan Traffic[3]	1.5	1.5	1.8	1.8
Franklin Project Construction[4]	2.4	0.19	0	0
Franklin Project Operations	0.69	0.10	0.55	0.080
Total Excess Cancer Risk at Van Ness Project MEISR	**303**	**93**	**120**	**93**

MEISR by Scenario	MEISR Location			
	Offsite MEISR		Onsite MEISR	
	Uncontrolled	Controlled	Uncontrolled	Controlled
UTMx (m)	551,200	551,200	551,160	551,160
UTMy (m)	4,181,120	4,181,120	4,181,140	4,181,140

Notes:

1. Onsite receptors are not exposed to construction emissions.
2. Generator impacts were evaluated at varying elevations to capture the maximum impacts from generators located above ground. These results are conservatively added to ground level impacts from construction and traffic.
3. The 2040 Plan traffic and generators reported in the Cumulative (2040) sources do not include the traffic and generators from the two Individual Projects.
4. The Franklin Project is expected to be completed before the Van Ness Project, so it is not expected that Van Ness Project onsite residents will be exposed to health impacts from the construction of the Franklin Project.

Abbreviations:

m - meter
MEISR - maximally exposed individual sensitive receptor
tbd - to be determined
UTMx - Universal Transverse Mercator x-coordinate
UTMy - Universal Transverse Mercator y-coordinate

Table 20b
Cumulative (2040) PM2.5 Concentration at the Van Ness Project MEISR
The Hub Plan
San Francisco, CA

Source Category	$PM_{2.5}$ Concentration ($\mu g/m^3$)			
	Offsite MEISR		Onsite MEISR	
	Uncontrolled	Controlled	Uncontrolled	Controlled
Van Ness Project Contributions				
Construction[1]	0.59	0.020	--	--
Generators[2]	0.0024	3.1E-04	0.029	0.0038
Van Ness Project Traffic	4.7E-04	4.7E-04	5.6E-04	5.6E-04
Total Van Ness Project Contribution	**0.60**	**0.021**	**0.029**	**0.0044**
Cumulative (2040) Sources				
Cumulative (2040) No Plan Traffic	0.94	0.94	1.1	1.1
Rail Sources	0.0015	0.0015	0.0015	0.0015
Maritime Sources	0.048	0.048	0.048	0.048
Existing Stationary Sources	0.049	0.049	0.048	0.048
Background Concentration[3]	7.8	7.8	7.8	7.8
2040 Plan Generators[4]	0.0035	4.7E-04	0.0028	3.7E-04
2040 Plan Traffic[4]	0.027	0.027	0.033	0.033
Franklin Project Construction[5]	0.010	0.0011	0	0
Franklin Project Operations	0.0019	3.7E-04	8.8E-04	2.4E-04
Total $PM_{2.5}$ Concentration at Van Ness Project MEISR	**9.5**	**7.9**	**8.0**	**7.9**

MEISR by Scenario	MEISR Location			
	Offsite MEISR		Onsite MEISR	
	Uncontrolled	Controlled	Uncontrolled	Controlled
UTMx (m)	551,200	551,200	551,160	551,160
UTMy (m)	4,181,120	4,181,120	4,181,140	4,181,140

Notes:

1. Onsite receptors are not exposed to construction emissions.
2. Generator impacts were evaluated at varying elevations to capture the maximum impacts from generators located above ground. These results are conservatively added to ground level impacts from construction and traffic.
3. Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 $\mu g/m^3$ to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 $\mu g/m^3$ is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station.
4. The 2040 Plan traffic and generators reported in the Cumulative (2040) sources do not include the traffic and generators from the two Individual Projects.
5. The Franklin Project is expected to be completed before the Van Ness Project, so it is not expected that Van Ness Project onsite residents will be exposed to health impacts from the construction of the Franklin Project.

Abbreviations:

m - meter
MEISR - maximally exposed individual sensitive receptor
$PM_{2.5}$ - particulate matter less than 2.5 micrometers in diameter
tbd - to be determined
UTMx - Universal Transverse Mercator x-coordinate
UTMy - Universal Transverse Mercator y-coordinate
$\mu g/m^3$ - microgram per cubic meter

Table 21a
Cumulative (2040) Excess Lifetime Cancer Risk at the Franklin Project MEISR
The Hub Plan
San Francisco, CA

Source Category	Lifetime Excess Cancer Risk (in a million)			
	Offsite MEISR		Onsite MEISR	
	Uncontrolled	Controlled	Uncontrolled	Controlled
Franklin Project Contributions				
Construction[1]	70	5.6	--	--
Generators[2]	1.6	0.22	6.1	0.82
Franklin Project Traffic	0.0063	0.0063	0.0056	0.0056
Total Franklin Project Contribution	**72**	**5.8**	**6.2**	**0.82**
Cumulative (2040) Sources				
Cumulative (2040) No Plan Traffic	40	40	41	41
Rail Sources	0.84	0.84	0.83	0.83
Maritime Sources	35	35	35	35
Existing Stationary Sources	4.3	4.3	4.1	4.1
2040 Plan Generators[3]	11	1.5	11	1.4
2040 Plan Traffic[3]	1.4	1.4	1.2	1.2
Van Ness Project Construction	7.4	0.16	0.63	0.018
Van Ness Project Operations	1.0	0.15	0.89	0.14
Total Excess Cancer Risk at Franklin Project MEISR	**173**	**89**	**100**	**84**

MEISR by Scenario	MEISR Location			
	Offsite MEISR		Onsite MEISR	
	Uncontrolled	Controlled	Uncontrolled	Controlled
UTMx (m)	551,060	551,060	551,040	551,040
UTMy (m)	4,181,000	4,181,000	4,181,000	4,181,000

Notes:

1. Onsite receptors are not exposed to construction emissions.
2. Generator impacts were evaluated at varying elevations to capture the maximum impacts from generators located above ground. These results are conservatively added to ground level impacts from construction and traffic.
3. The 2040 Plan traffic and generators reported in the Cumulative (2040) sources do not include the traffic and generators from the two Individual Projects.

Abbreviations:

m - meter
MEISR - maximally exposed individual sensitive receptor
tbd - to be determined
UTMx - Universal Transverse Mercator x-coordinate
UTMy - Universal Transverse Mercator y-coordinate

Table 21b
Cumulative (2040) PM2.5 Concentration at the Franklin Project MEISR
The Hub Plan
San Francisco, CA

Source Category	$PM_{2.5}$ Concentration ($\mu g/m^3$)			
	Offsite MEISR		Onsite MEISR	
	Uncontrolled	Controlled	Uncontrolled	Controlled
Franklin Project Contributions				
Construction[1]	0.28	0.032	--	--
Generators[2]	0.0024	3.2E-04	0.0083	0.0011
Franklin Project Traffic	1.2E-04	1.2E-04	1.1E-04	1.1E-04
Total Franklin Project Contribution	**0.29**	**0.032**	**0.0084**	**0.0012**
Cumulative (2040) Sources				
Cumulative (2040) No Plan Traffic	0.89	0.89	0.94	0.94
Rail Sources	0.0016	0.0016	0.0016	0.0016
Maritime Sources	0.046	0.046	0.045	0.045
Existing Stationary Sources	0.044	0.044	0.043	0.043
Background Concentration[2]	7.8	7.8	7.8	7.8
2040 Plan Generators[4]	0.0076	0.0010	0.0051	6.9E-04
2040 Plan Traffic[4]	0.026	0.026	0.023	0.023
Van Ness Project Construction	0.022	7.5E-04	0.0089	5.3E-04
Van Ness Project Operations	0.0030	7.9E-04	0.0016	5.6E-04
Total $PM_{2.5}$ Concentration at Franklin Project MEISR	**8.2**	**8.0**	**7.9**	**7.9**

MEISR by Scenario	MEISR Location			
	Offsite MEISR		Onsite MEISR	
	Uncontrolled	Controlled	Uncontrolled	Controlled
UTMx (m)	551,060	551,060	551,040	551,040
UTMy (m)	4,181,000	4,181,000	4,181,000	4,181,000

Notes:

1. Onsite receptors are not exposed to construction emissions.
2. Generator impacts were evaluated at varying elevations to capture the maximum impacts from generators located above ground. These results are conservatively added to ground level impacts from construction and traffic.
3. Background concentrations also account for ambient $PM_{2.5}$ levels by adding an additional 7.8 $\mu g/m^3$ to the total $PM_{2.5}$ concentration at each receptor point. The ambient $PM_{2.5}$ concentration of 7.8 $\mu g/m^3$ is based on monitored particulate matter levels at the BAAQMD's Arkansas Street monitoring station.
4. The 2040 Plan traffic and generators reported in the Cumulative (2040) sources do not include the traffic and generators from the two Individual Projects.

Abbreviations:

m - meter
MEISR - maximally exposed individual sensitive receptor
$PM_{2.5}$ - particulate matter less than 2.5 micrometers in diameter
tbd - to be determined
UTMx - Universal Transverse Mercator x-coordinate

FIGURES

The Hub Plan and Individual Projects Boundaries

The Hub Plan and Individual Projects

San Francisco, California

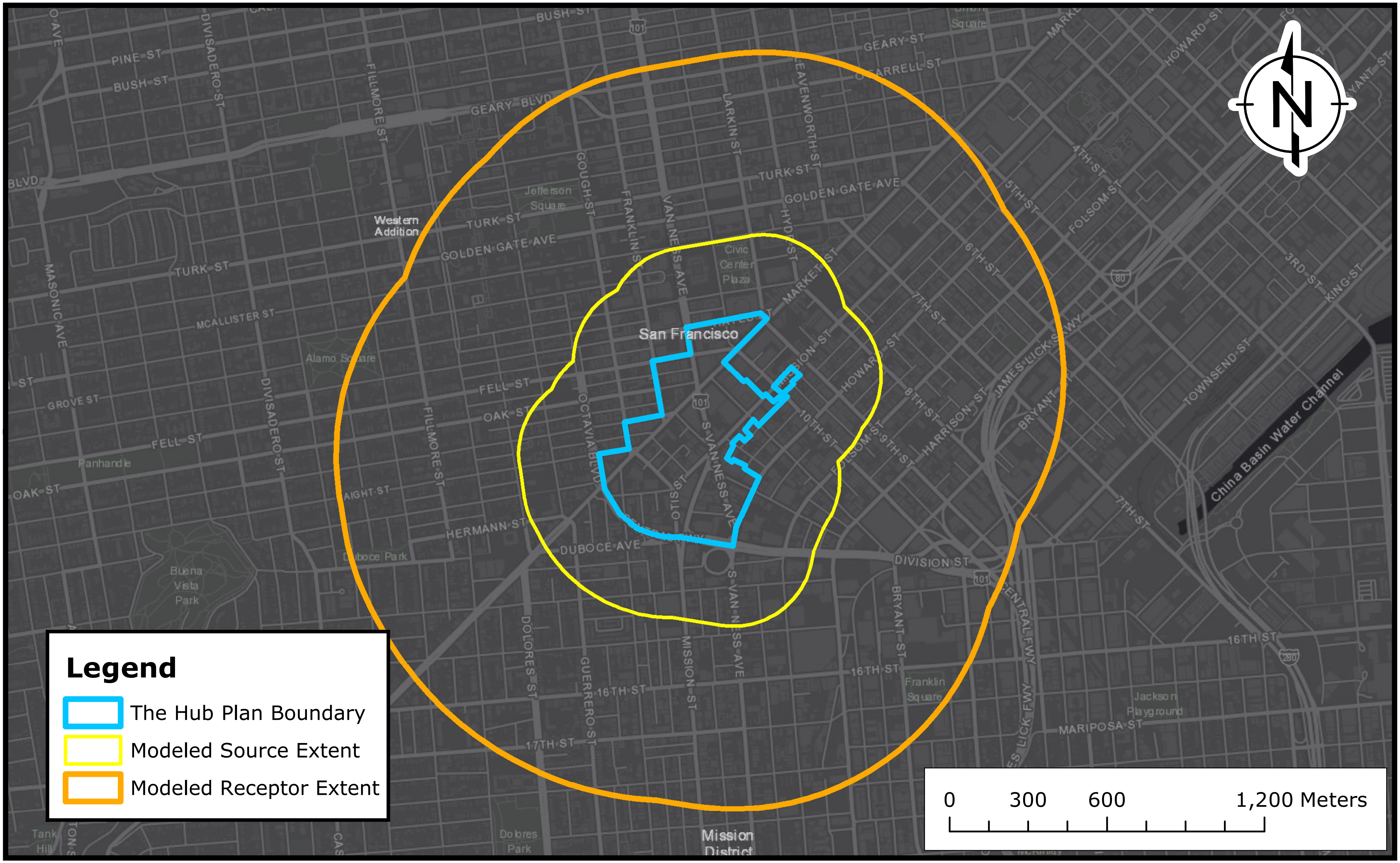
FIGURE

1

DRAFTED BY: LK

DATE: 1/31/2019

PROJECT: 1690006377



RAMBOLL

The Hub Plan Boundary and Modeling Extent

The Hub Plan and Individual Projects
San Francisco, California

FIGURE
2

DRAFTED BY: LK | DATE: 12/18/2018 | PROJECT: 1690006377

Modeled Sources for the Hub Plan

The Hub Plan and Individual Projects
San Francisco, California

FIGURE 3

RAMBOLL

DRAFTED BY: LK | DATE: 12/24/2018 | PROJECT: 1690006377

RAMBOLL

DRAFTED BY: LK

DATE: 12/18/2018

Modeled Receptors for the Hub Plan

The Hub Plan and Individual Projects
San Francisco, California

FIGURE
4A

PROJECT: 1690006377

RAMBOLL

DRAFTED BY: LK | DATE: 12/18/2018

Modeled Onsite Receptors for 30 Van Ness Project and 98 Franklin Project

The Hub Plan and Individual Projects

San Francisco, California

FIGURE

4**B**

PROJECT: 1690006377

RAMBOLL

DRAFTED BY: LK | DATE: 12/18/2018

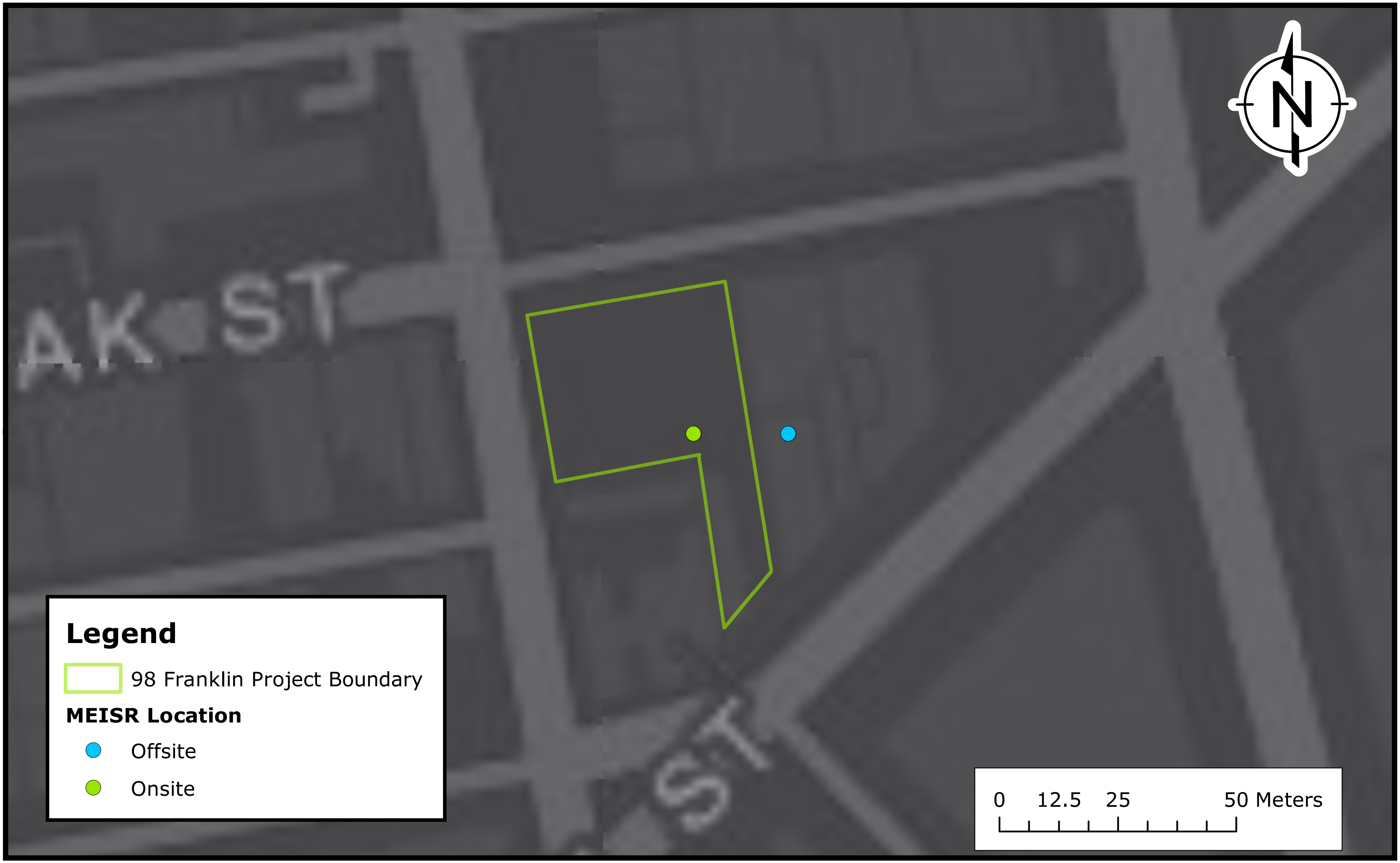
Location of MEISR for the 30 Van Ness Project

The Hub Plan and Individual Projects

San Francisco, California

FIGURE 5

PROJECT: 1690006377



RAMBOLL

DRAFTED BY: LK

DATE: 12/18/2018

Location of MEISR for the 98 Franklin Project

The Hub Plan and Individual Projects

San Francisco, California

FIGURE

6

PROJECT: 1690006377

APPENDIX A
RAMBOLL SCOPE OF WORK

Prepared for
San Francisco Planning Department
San Francisco, California

Prepared by
Ramboll US Corporation
San Francisco, California

Project Number
1690006377

Date
July 9, 2018

CEQA AIR QUALITY AND HEALTH RISK ASSESSMENT METHODOLOGY

HUB PLAN AND INDIVIDUAL PROJECTS
SAN FRANCISCO, CALIFORNIA

PROJECT NAME (SFEP CASE NO.):

HUB PLAN (2015-000940ENV)

30 VAN NESS AVENUE (2017-008051ENV)

98 FRANKLIN STREET (2016-014802ENV)

RAMBOLL

CONTENTS

TABLES

FIGURES

ACRONYMS AND ABBREVIATIONS

AADT	annual average daily traffic
AERMOD	AMS/EPA Regulatory Model
APEZ	air pollution exposure zone
AQ	air quality
AQTR	air quality technical report
ARB	California Air Resources Board
ASF	age sensitivity factor
BAAQMD	Bay Area Air Quality Management District
BACT	best available control technology
Cal/EPA	California Environmental Protection Agency
CalEEMod®	California Emissions Estimator Model
CAP	criteria air pollutant
CAPCOA	California Air Pollution Control Officer's Association
CEQA	California Environmental Quality Act
CO	carbon monoxide
CPF	cancer potency factor
CRRP	Community Risk Reduction Plan
DPM	diesel particulate matter
EIR	Environmental Impact Report
EMFAC	Emission Factors
FAIS	French American International School
g	gram
GIS	geographic information system
HI	hazard index
HRA	health risk assessment
IFinh	intake factor for inhalation
kg	kilogram
kW	kilowatt
L	liter
m^3	cubic meter
µg	microgram

NED	National Elevation Dataset
OEHHA	Office of Environmental Health Hazard Assessment
PM	particulate matter
$PM_{2.5}$	fine particulate matter less than 2.5 micrometer in diameter
s	second
SFCHAMP	San Francisco Chained Activity Modeling Process
SFCTA	San Francisco County Transportation Authority
SFDPH	San Francisco Department of Public Health
SFEP	San Francisco Environmental Planning Department
SUD	special use district
TAC	toxic air contaminant
THC	total hydrocarbons
TOG	total organic gases
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VDECS	verified diesel emissions control strategy
VMT	vehicle miles travelled
χ/Q	"chi over q", also known as a dispersion factor

1. INTRODUCTION

At the request of ICF Jones & Stokes, Inc. (ICF), Ramboll US Corporation (Ramboll) will conduct California Environmental Quality Act (CEQA) analyses of: 1) criteria air pollutants (CAPs) and precursors and 2) local risk and hazard impacts for exposure to toxic air contaminants (TACs), also referred to as a health risk assessment (HRA), for the proposed programmatic Hub Plan ("The Hub" or "Plan") as well as the construction and operation of two individual proposed projects within the Plan located at 30 Van Ness Avenue and 98 Franklin Street in San Francisco, California. The air quality analysis for the proposed Hub Plan will include an evaluation of operational impacts from the increase in traffic in the Plan area as well as from potential generators for parcels that will be rezoned to allow for 75 feet or taller buildings. The air quality analysis for the individual proposed projects will include construction and operational impacts associated with each project separately, and separate from the construction of the projects anticipated by the Hub Plan. The CAPs and precursor emissions and local risk and hazard impacts will be estimated under the guidance of the San Francisco Planning Department's Environmental Planning (SFEP) Division.

1.1 Project Understanding

This section summarizes Ramboll's understanding of the Hub Plan as well as the two individual proposed projects to be located within the Hub Plan. The Plan as well as the two individual proposed projects would be located within an Air Pollution Exposure Zone (APEZ), which is an area designated by the San Francisco Department of Public Health (SFDPH) as an area with poor air quality (SFDPH & SFEP 2014).

1.1.1 The Hub Plan

From the 1880s through the 1950s, intersections of Market Street and Valencia, Haight and Gough Street in San Francisco were well-known districts known as the "Market Street Hub" or simply, "The Hub." In the 2000s, the Hub neighborhoods were included within boundaries of the Market and Octavia Area Plan, adopted in 2008 (SFEP 2017d). In the Market and Octavia Area Plan, the Hub is characterized as "SoMa West" and envisioned as a "vibrant new mixed-use neighborhood." Numerous policies in the Market and Octavia Area Plan support this vision. The Market and Octavia Area Plan also created the Van Ness and Market Downtown Residential Special Use District (SUD) and encourages the development of a transit-oriented, high-density, mixed-use residential neighborhood around the intersections of Market Street and Van Ness Avenue and Mission Street and Van Ness, with towers ranging from 250 to 400 feet and reduced parking.

The proposed Hub Plan is an amendment to the 2008 Market and Octavia Area Plan and includes development of the easternmost potion of the Market and Octavia Area Plan as well as development of two individual projects within the Hub Plan (30 Van Ness Avenue and 98 Franklin Street - see next section). The purpose of the Plan is to encourage housing, including affordable housing; create safer and more walkable streets as well as welcoming and active public spaces; increase transportation options; and create a neighborhood with a range of uses and services to meet neighborhood needs. The Plan also includes public realm improvements to streets and alleys within and adjacent to the Hub Plan area. The Plan defines neighborhood priorities and guides growth and development in the area. The Plan also seeks to capitalize on current economic and development opportunities and allows for potential zoning and policy refinements to better ensure that the area's growth supports the goals of the City and County of San Francisco for housing, transportation, and arts.

The Plan area is indicated in **Figure 1** and comprises over 84 acres. The Plan includes street network changes on 13th Street/Duboce Avenue, from Folsom to Valencia Streets; South Van Ness Avenue, from Mission to 13th Streets; Otis Street, from South Van Ness Avenue to Duboce Avenue; 12th Street, from Market to Mission Streets; Gough Street, from Stevenson to Otis Street; and Mission Street/South Van Ness Avenue intersection. Some of the street network changes include raising crosswalks, developing loading/drop-off zones, reconfiguring streets to accommodate vehicular traffic, improving shading on streets, etc. The Plan includes rezoning which will result in changes to the allowed land uses and physical controls such as building heights, bulk, etc.

1.1.2 Individual Proposed Projects

This section summarizes Ramboll's understanding of the two individual proposed projects: 30 Van Ness Avenue and 98 Franklin Street.

30 Van Ness Avenue

The 30 Van Ness project site currently encompasses an approximately 38,100 square-foot lot. The site currently contains 197,940 square feet of building area. This includes approximately 164,480 square feet of general office area and 3,770 square feet of medical office, approximately 1,050 square feet of restaurants, approximately 12,790 square feet of a pharmacy retail unit, and approximately 15,850 square feet of parking that includes 42 spaces. The parking spaces located in the building are accessible from Fell Street. The site currently does not include any diesel emergency generators or above-ground fuel storage tanks. The existing square footage of office, retail, restaurant and parking would be retained and increased within the layout of the proposed Van Ness Project which would also include new residential development, all as described below.

The proposed project, referred to herein as the Van Ness Project, would be located at 30 Van Ness Avenue on the block bounded by Van Ness Avenue, Market Street and Fell Street. **Figure 2** shows the site extent and the location of the proposed Van Ness Project. The proposed Van Ness Project is a high density mixed-use development providing a range of residential unit types, office, and neighborhood retail services. Development of the Van Ness Project would result in the creation of 25 percent on-site affordable units. In total, the Van Ness Project would include a gross building area of 791,000 square feet with 610 dwelling units that total 520,000 square feet, a 13- story podium with 12 floors of offices that consists of approximately 350,000 square feet of general office floor area and ground floor retail totaling 21,000 square feet. The site would include a total of 243 parking spaces, which will serve residential, office, and retail uses. The proposed Van Ness Project would have a backup emergency generator located on the podium level.

The proposed plan for the Van Ness Project is assumed to include one construction phase. The duration for demolition of existing structure and construction of the proposed Van Ness Project is estimated to be approximately 44 months.

98 Franklin Street

The proposed project, referred to herein as the Franklin Project, would be located on 98 Franklin Street on the block bounded by Franklin Street, Market Street and Oak Street. **Figure 2** shows the site extent and the location of the proposed Franklin Project. The site is approximately 23,750 square feet currently occupied by a surface parking lot with approximately 100 parking spaces.

The proposed Franklin Project includes development of 345 residential units and development of a new high school building for International High School (Grades 9-12 of the French American International School [FAIS]). Development of the FAIS's high school building is in close proximity to other campus buildings located near the intersection of Franklin and Oak Streets in the Civic Center neighborhood and in close proximity to public transportation facilities. In total, the Franklin Project would include construction and development of roughly 469,075 gross square footage of building area that includes approximately 349,163 gross square feet of residential units, approximately 75,000 square feet of educational facilities, approximately 41,800 square feet of garage parking area with 111 parking spaces, and approximately 3,100 square feet of retail. The site also includes 22,410 square feet of common area accessible to residents and 11,530 square feet of privately owned open space area. The Franklin Project would house approximately 380 existing students relocated from a nearby FAIS location and would accommodate an increase in students to approximately 440 total students at the project site. The proposed building structure would include two floors of below ground parking, 5 floors of the International High School on the lower levels of the site, and 30 stories of residential units above the school podium. The proposed Franklin Project includes one emergency generator that would be located on the level 6 podium roof.

According to the Project Description, all the construction is expected to take place in a single phase. Construction activities would begin with demolition of the existing parking structure. Demolition and construction activities are expected to begin in 2020 and last approximately 3 years.

1.2 Report Organization

The document is divided into seven sections as follows:

Section 1.0 – Introduction: describes the purpose and scope of the air quality analysis and outlines the report organization.

Section 2.0 – Objective and Methodology: outlines the objectives and methodology used in the air quality analysis for the Plan and the individual proposed projects.

Section 3.0 – Emissions Estimates: describes the methods used to estimate TAC and CAP emissions from the Plan and the two individual proposed projects.

Section 4.0 – Estimated Air Concentrations: discusses the air dispersion modeling, the selection of the dispersion model, the data used in the dispersion model (e.g., terrain, meteorology, source characterization), and the identification of receptor locations evaluated in the HRA.

Section 5.0 – Risk Characterization Methods: provides an overview of the methodology for conducting the HRA.

Section 6.0 – Existing + Plan and Existing + Project Analyses: summarizes the approach used in the Existing + Plan and Existing + Project HRA analyses for 2020.

Section 7.0 – 2040 Cumulative Analysis: summarizes the approach used in the HRA cumulative analysis for horizon year 2040.

Section 8.0 – Coordination and Documentation: discusses how Ramboll will communicate results to SFEP and document results in an Air Quality Technical Report.

Section 9.0 – References: includes a listing of all references cited in this report.

2. OBJECTIVES AND METHODOLOGY

This section outlines the objectives and methodology of the analysis. It is organized into three parts: Plan-level analysis, individual proposed project analysis, and cumulative analysis.

2.1 Plan-Level Methodology

2.1.1 Hub Plan Zoning Changes

2.1.1.1 Operational CAPs

Ramboll will quantify CAP emissions from emergency generators to be located on parcels that are rezoned for 75 feet or taller. Ramboll will conservatively assume that the proposed engines are 2,000 kilowatts (kW)[1] and operate up to 50 hours per year for maintenance purposes. Since the Plan area is located within an APEZ, Ramboll will assume the emissions from the engines achieve Tier 4 emission standards.

2.1.1.1 Operational TACs

The objective of the Plan-level analysis for emissions of operational TACs is to determine the health risk impacts due to the increase in TAC emissions from traffic sources as the result of the Hub Plan. Additionally, generator operational TAC emissions will be estimated for any parcel within the Plan that would be rezoned to allow buildings taller than 75 feet. Each of these parcels will be analyzed in a way that each site includes a generator in the center of each parcel. Source parameters for the generators are presented in **Table 2**. The HRA will be developed consistent with the methodology used by the City of San Francisco, in conjunction with the BAAQMD, to develop the traffic component of the Community Risk Reduction Plan (CRRP) database.[2] However, where necessary, this HRA will deviate from the methodology used for the CRRP database to account for updates in the regulatory guidance; for example, California Environmental Protection Agency (Cal/EPA) updated its Air Toxics Hot Spots Program Risk Assessment Guidelines since the development of the CRRP database.

The HRA will be conducted consistent with the following guidance:

- *Air Toxics Hot Spots Program Risk Assessment Guidelines* (Cal/EPA 2015);
- *The San Francisco Community Risk Reduction Plan: Technical Support Documentation, V9* (BAAQMD 2012c);
- *BAAQMD Recommended Methods for Screening and Modeling Local Risks and Hazards* (BAAQMD 2012a); and
- California Air Pollution Control Officer's Association (CAPCOA) *Health Risk Assessment for Proposed Land Use Projects* (CAPCOA 2009).

Ramboll will evaluate excess lifetime cancer risks and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) concentrations by implementing the methodology for the scenarios below, based on the results of the traffic analysis. The ultimate objective of this

---

[1] The generator capacity corresponds to the largest generator among the two individual Projects (98 Franklin Street).

[2] SFEP and SFDPH, along with BAAQMD, have prepared a draft San Francisco Community Risk Reduction Plan (CRRP), a comprehensive and citywide plan to protect human health from these negative effects of air pollution within San Francisco. The modeling is documented in *The San Francisco Community Risk Reduction Plan: Technical Support Documentation* (BAAQMD 2012c).

analysis is to determine whether the SFDPH's current APEZ map would need to be expanded due to the Hub Plan.

Existing Plus Plan Traffic at Baseline Year (2020)

Plan traffic emissions will be evaluated based on the turning movement data for approximately 51 study intersections located within and adjacent to the Hub Plan area as well as link-level traffic volume from the San Francisco County Transportation Authority's (SFCTA) San Francisco Chained Activity Modeling Process (SFCHAMP) model. The traffic engineers will provide these datasets for both of the following scenarios: existing traffic for 2020 and existing plus Plan traffic for 2020. Ramboll will convert the turning movement data for the 51 study intersections into link-level traffic volume data to be used in the air dispersion modeling for the HRA. For intersections close to the 51 study intersections, Ramboll will scale the SFCHAMP data using scenario-specific turning movement data provided by the traffic engineers.

Year 2020 is used as the baseline year to be consistent with the transportation CEQA analysis. Ramboll will estimate excess lifetime cancer risks and $PM_{2.5}$ concentrations using 2020 No Plan traffic volumes (replacing the values in the existing CRRP-database) and 2020 with Plan traffic volumes. Then, Plan 2020 incremental impacts will be quantified based on the difference between impacts associated with 2020 traffic volumes with the Plan and impacts associated with 2020 traffic volumes without the Plan. This analysis will analyze impacts for all receptors within 1 kilometer from the Plan area. $PM_{2.5}$ concentrations and excess lifetime cancer risks will be calculated based on 2020 emissions factors (which is conservative because the individual projects analyzed under this CEQA analysis do not start operation until 2023 and 2024) and Office of Environmental Health Hazard Assessment (OEHHA) exposure assumptions assuming a 30-year exposure duration.

2.2 Project Methodology (Individual Proposed Projects)

The objective of the air quality analysis for the individual proposed projects is to assess potential CAP emissions and health risks and hazards that would result from the construction and operation of each proposed project (the 30 Van Ness Project and 98 Franklin Project), consistent with guidelines and methodologies from air quality agencies, as further discussed below. For each project (the 30 Van Ness Project and 98 Franklin Project) the existing plus project baseline will not include the other project, or construction of the other projects in the Hub Plan.

2.2.1 Construction CAPs

Ramboll will perform a detailed assessment of construction emissions for the individual proposed projects using the California Emissions Estimator Model version 2016.3.2 (CalEEMod®), or equivalent methods. Ramboll will analyze average daily and maximum annual CAP emissions from each individual proposed project. Ramboll will present preliminary results to SFEP to determine whether model refinements are necessary and to identify any required control measures that will need to be evaluated. Ramboll will quantitatively evaluate control measures, with the goal of reducing air quality impacts from the construction of individual projects.

2.2.2 Operational CAPs

Ramboll will perform a detailed assessment of operational CAP emissions for each individual proposed project using CalEEMod® version 2016.3.2, or equivalent methods. Ramboll will present preliminary results of the analysis to SFEP to determine whether model refinements are necessary and to identify any required control measures that will need to be evaluated. Ramboll will quantitatively evaluate control measures, with the goal of reducing operational air quality impacts for individual projects.

2.2.3 Construction TACs

The objective of the construction HRA for the individual proposed projects is to evaluate health risks and hazards that would result from the construction of the proposed projects.

For construction vehicles, Ramboll will first conduct a screening level analysis of TAC emissions. For construction-related traffic, if the annual average daily trip rate due to construction of each of the proposed projects exceeds 5,000 passenger vehicles per day or 500 trucks per day, the health risks and hazards from construction traffic will be estimated using the BAAQMD Roadway Screening Analysis Calculator (BAAQMD 2015).[3] Results from this calculator will be added to modeled impacts from off-road equipment. Ramboll will present preliminary results to SFEP to determine whether construction traffic should be modeled using US Environmental Protection Agency's (USEPA's) preferred atmospheric dispersion modeling system (AERMOD) consistent with methodologies used in the CRRP-HRA.

Consistent with guidelines and methodologies from air quality agencies – specifically, BAAQMD, California Air Resources Board (ARB), OEHHA, and USEPA – the HRA will evaluate the estimated incremental increase in health risks and hazards (i.e., excess lifetime cancer risks and $PM_{2.5}$ concentrations) associated with exhaust that would be emitted by off-road construction equipment and, if needed based on the above screening analysis, vehicle traffic and trucks. These risks and hazards will be evaluated at sensitive off-site populations. Please note that sensitive on-site populations will not be evaluated because residents are expected to occupy the units after project-related construction is completed.

Ramboll will present the results of the construction $PM_{2.5}$ analysis to SFEP to determine whether control measures are required for each of the individual projects. If control measures are determined to be required, Ramboll will quantitatively analyze the effectiveness of the control measures for each individual project.

2.2.4 Operational TACs

The objective of the operational HRA for the individual proposed projects is to evaluate health risks and hazards that would result from the operation of the proposed projects, consistent with guidelines and methodologies from air quality agencies, specifically, BAAQMD, ARB, OEHHA, and USEPA. Consistent with guidelines and recommended methods from these agencies, the HRA will evaluate the estimated incremental increase in health risks and hazards (i.e., excess lifetime cancer risks, and $PM_{2.5}$ concentrations) associated with operational TAC emissions, such as traffic and diesel generators. These risks and hazards will be evaluated at sensitive off-site and on-site populations.

For project-related traffic, Ramboll will first identify one street for each project location where the project is expected to result in the greatest increase in daily vehicle trips. As a conservative measure, the total trip generation rate for each project will be assigned to each

[3] Based on the BAAQMD CEQA Guidance, traffic of less than 10,000 vehicles per day or 1,000 trucks per day is considered a minor, low-impact source of TACs (BAAQMD 2012b & 2017b). However, in order to account for updated exposure parameters from OEHHA (2015), Ramboll will analyze impacts from all roads with annual average daily traffic (AADT) of greater than 5,000 vehicles per day or 500 trucks per day.

selected street. The health risks and particulate concentrations due to traffic from each individual project will then be calculated by performing a proportional analysis where the Plan level health risks and hazards (calculated with the methodology described in Section 2.1, which already includes the individual projects) are scaled by the ratio of project traffic volume to overall existing + Plan traffic volume.

For stationary sources such as diesel generators, Ramboll will conduct dispersion modeling and, if required by SFEP based on consultation regarding the results, quantitatively evaluate the effectiveness of control measures.

Ramboll will present the results of the operational $PM_{2.5}$ analysis to SFEP to determine whether control measures are required for each of the individual projects. If control measures are determined to be required, Ramboll will quantitatively analyze the effectiveness of the control measures for each individual project.

2.2.5 Cancer Risk Analysis

Because cancer risk is assessed as a probability of contracting cancer over one's lifetime, it is necessary for the cancer risk from construction to be added to the cancer risk from project operations in order to determine the lifetime cancer risk from each individual project. Ramboll will present the results of the construction and operational cancer risk analysis to SFEP to determine whether control measures are required for each of the individual projects. If control measures are determined to be required, Ramboll will quantitatively analyze the effectiveness of the control measures for each individual project.

2.2.6 Existing Plus Project CRRP-HRA Database

Ramboll will present SFEP with an updated CRRP-HRA database containing the following in and within 1,000 meters of the Plan area:

1. Updated $PM_{2.5}$ and cancer risk values for existing (2020) stationary sources with permits on file with BAAQMD
2. Updated $PM_{2.5}$ and cancer risk values for existing (2020) vehicle traffic
3. New fields in the CRRP-HRA database indicating the $PM_{2.5}$ and cancer risk values associated with Plan-level vehicle traffic
4. New fields in the CRRP-HRA database indicating the $PM_{2.5}$ and cancer risk values from construction and operation of each individual project under controlled and uncontrolled scenarios.
5. Maritime and rail $PM_{2.5}$ and cancer risk values will be assumed to remain the same as the values presented in the existing CRRP-HRA database.

2.3 Cumulative Analysis

2.3.1 CAPs

By its very nature, regional air pollution is largely a cumulative impact in that no single project is sufficient in size to, by itself, result in non-attainment of air quality standards. Instead, a project's individual emissions contribute to existing cumulative air quality impacts. If a project's contribution to cumulative air quality impacts is considerable, then the project's impact on air quality would be considered significant.[4] Therefore, no quantitative cumulative CAP analysis is required, but rather assessed based upon the project level results.

2.3.2 TACs

The cumulative health risk analysis will estimate excess lifetime cancer risks and $PM_{2.5}$ concentrations that are attributable construction and operational sources from the individual proposed projects, traffic and generator sources from the Plan-level analysis (for year 2040), and the other non-traffic sources included in the CRRP database. These risks and hazards will be evaluated at sensitive off-site and on-site populations out to a distance to 1,000 meters from the Plan boundary. The CRRP-HRA was completed before OEHHA updated its Air Toxics Hot Spots Program Risk Assessment Guidelines in 2015, so the CRRP-HRA results will be adjusted to use the 2015 OEHHA Guidance (OEHHA 2015). SFEP is currently updating the stationary source portion of the CRRP database, so Ramboll will use the updated version.

<u>Baseline 2040 Plus Plan Traffic at Project Horizon Year (2040)</u>

Plan traffic in 2040 will be based on cumulative traffic volumes for Plan horizon year (2040) as well as background traffic volumes for the horizon year (2040). Plan and background traffic in 2040 will be provided by the traffic engineer as turning movement volumes for approximately 51 study intersections within the Hub Plan. In addition, the traffic engineer will provide link-level traffic volumes from SFCHAMP for Plan and background traffic in 2040 for areas within the Hub plan and within a 1,000-foot buffer from the Hub Plan. Ramboll will convert the turning movement data to link-level traffic volumes. For intersections close to the 51 study intersections, Ramboll will scale the SFCHAMP data using scenario-specific turning movement data provided by the traffic engineers.

Ramboll will estimate excess lifetime cancer risks and $PM_{2.5}$ concentrations using No Plan (i.e., Baseline) traffic volumes (replacing the values in the existing CRRP-database) and 2040 Plan traffic volumes. Then, Plan 2040 incremental impacts will be quantified based on the difference between impacts associated with the 2040 traffic volumes with the Plan and impacts associated with Baseline 2040 traffic volumes without the Plan. The approach allows for the determination of the Plan's contribution to cumulative air quality impacts. $PM_{2.5}$ concentrations and excess lifetime cancer risks will be calculated based on 2040 emissions and OEHHA exposure assumptions assuming a 30-year exposure duration.

2.3.3 Cumulative Plus Plan CRRP-HRA Database

Ramboll will present SFEP with an updated CRRP-HRA database containing the following in and within 1,000 meters of the Plan Area:

1. Updated $PM_{2.5}$ and cancer risk values for 2040 stationary sources (assuming that there is no change between existing and 2040 stationary sources, except for those associated with individual developments and generators from the rezoned parcels)
2. Updated $PM_{2.5}$ and cancer risk values for 2040 Baseline vehicle traffic (2040 No Plan Traffic)
3. Updated $PM_{2.5}$ and cancer risk values for 2040 Plan increment traffic

[4] Bay Area Air Quality Management District (BAAQMD), *California Environmental Quality Act Air Quality Guidelines,* May 2017, page 2-1.

4. New fields in the CRRP-HRA database indicating the $PM_{2.5}$ and cancer risk values from construction and operation of each individual project under controlled and uncontrolled scenarios.
5. Maritime and rail $PM_{2.5}$ and cancer risk values will be assumed to remain the same as the values presented in the existing CRRP-HRA database.

To the extent that TAC emissions from other projects located within 1,000 feet of the Hub Plan area are not already covered by the CRRP-HRA database, Ramboll will also include a qualitative discussion of those potential health risks and report the quantitative results from those projects where such information exists.

Finally, Ramboll will assess the contribution to the cumulative health risk for each individual project and the Plan, all separately.

3. EMISSIONS ESTIMATES

3.1 Plan-Level Emissions Estimates for Operational HRA

3.1.1 Calculation Methodology for Mobile Sources

The proposed Plan would generate indirect vehicle trips (by proposing changes to allowable land uses and physical development controls), which will be provided by SFEP and/or their traffic consultant(s). Plan traffic will be evaluated using EMFAC2017 for the vehicle fleet mix in San Francisco County. Additionally, specific types of traffic such as delivery trucks and buses will be evaluated using vehicle-type specific emission factors from EMFAC2017.

3.2 Project-Level Emissions Estimates

Emissions of CAPs for the individual proposed projects will be quantified using CalEEMod® version 2016.3.2, or equivalent methods.

3.2.1 Calculation Methodology for Construction Emissions

Ramboll was provided with a detailed construction equipment list by the different project sponsors, which includes the type, quantity, construction schedule and hours of operation anticipated for each piece of equipment for each construction activity. This data will be used to estimate construction emissions using the CalEEMod® version 2016.3.2, or equivalent methods. Ramboll will assume that all construction off-road equipment is diesel powered. In addition, Ramboll will assume that all off-road equipment emissions of PM with an aerodynamic diameter less than 10 microns (PM_{10}) is diesel particulate matter (DPM), which is a TAC.

Construction emission calculation methodologies cover off-road equipment and on-road vehicles. Each of the individual proposed projects has a different construction schedule and construction of each project is expected to take place continuously in one phase (i.e., none of the three projects will be phased). The analysis described here does not rely on the default construction phasing data from CalEEMod®, as the actual schedule and equipment list are known.

Ramboll will use the methodology for each emissions category presented in **Table 1**. Ramboll will use specific construction inputs for the individual proposed projects, where available, such as schedule, equipment list, and counts of on-road vehicle trips.

3.2.1.1 Off-road Equipment

For diesel-powered off-road construction equipment, Ramboll will use CalEEMod® or 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 (OFFROAD2011), which incorporates statewide survey data to develop emission factors based on the fleet average for each year of construction. The OFFROAD2011 model also identifies average horsepower and load factor for each type of equipment. Where project-specific equipment information (e.g. equipment horse power, load factor, and usage hours per day) is not available, CalEEMod® default values from OFFROAD2011 will be used. Load factors for each piece of equipment will be based on the default load factor in OFFROAD2011, which are included in CalEEMod®. The methodology to be used to calculate emissions from off-road equipment is presented in **Table 1**.

If, based on consultation with SFEP, it is determined that control measures are required, a scenario reflecting the effectiveness of control measures determined in consultation with SFEP will be calculated.

3.2.1.2 Construction On-road Mobile Sources

Ramboll has been provided by the project sponsors with estimated worker, vendor, and demolition hauling trip generation rates for construction of certain individual proposed projects. For projects where trip counts are not available, Ramboll will estimate the count of hauling trips based on the total offhaul amount in cubic yards.

The emission factors for running emissions of CAPs will be obtained from EMFAC2017, the ARB Emission Factor model for on-road emissions. The emission factors used for construction of the individual proposed projects will cover calendar years 2020 through 2024, the anticipated years of construction. EMFAC2017 incorporates the Pavley Clean Car Standards and the Advanced Clean Cars program.

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

3.2.2 Calculation Methodology for Operational Emissions

As discussed above, Ramboll will evaluate the post-project and net (project minus existing baseline) CAP and TAC operational emissions for all two individual proposed projects. Sources of operational emissions from the existing sites include emissions from only on-road vehicles; none of the project sites have diesel generators that are currently operational. Sources of operational emissions from the proposed projects include on-road vehicles and stationary sources such as new emergency generators.

3.2.2.1 Operational On-road Mobile Sources

Vehicles on the roadway emit CAPs and TACs in their exhaust and through evaporation of fuel and thus must be evaluated in an off-site risk evaluation. In addition, $PM_{2.5}$ is emitted from brake wear and tire wear. To estimate baseline on-road vehicle emissions, Ramboll will work with the transportation consultant(s) to obtain baseline trip rates. Project traffic will include residential and employee trips as well as service vehicle and vendor trips, retail, commercial, and school (only for the Franklin Project) trips. Ramboll assumes that traffic engineers will provide turning movement volumes for project intersections. Ramboll will convert turning movement volume to link-level traffic volume to estimate project-specific annual average daily traffic (AADT) (i.e., vehicle trips per day). Ramboll will then use EMFAC2017 to estimate emissions from vehicle travel.

3.2.2.2 On-Site Diesel Generators

Project operational emissions for the proposed emergency generators will be calculated assuming a maximum of 50 hours per year of non-emergency operation, consistent with the Airborne Toxic Control Measure for Stationary Toxic Compression Ignition Engines (Section 93115, Title 17, CCR) (ARB 2011). If necessary, a controlled scenario may also be evaluated assuming reduced testing hours. Based on project sponsor input, Van Ness Project will have a 1,500 kilowatt (kW) standby generator and the Franklin Project will have a 2,000 kW standby generator. CAP emissions will be calculated assuming the engine complies with BAAQMD's Best Available Control Technology (BACT) limits, unless project-specific emission factors are available.

3.2.3 Net Operational CAP Emissions

As discussed above, the proposed projects would expand and replace existing land uses. Specifically, the Van Ness Project would retain the square footage of existing offices, restaurants, retail units and parking spaces within the layout of the new Van Ness Project, expand those uses and add new residential uses. The Franklin Project would replace an existing parking lot. Therefore, total operational emissions associated with the individual proposed projects are the difference between emissions from the new sources and emissions from existing baseline sources that would no longer be present. Existing baseline emissions and individual project emissions, including mobile and area sources, will be calculated using CalEEMod® or equivalent methods; the methodology for estimating existing baseline emissions will be consistent with that for estimating project emissions. Existing baseline emissions will be subtracted from post-project emissions to get net emissions for each project. As a conservative measure, Ramboll will initially assume that the baseline emissions at 98 Franklin are zero because the existing parking lot is expected to generate a negligible amount of emissions.

4. ESTIMATED AIR CONCENTRATIONS

Consistent with the CRRP-HRA, the HRA for the Plan and individual proposed projects will evaluate excess lifetime cancer risks and $PM_{2.5}$ concentrations imposed by the Plan on the surrounding community. For the Plan, Ramboll will evaluate Plan-level traffic in both 2020 and 2040. Ramboll will also evaluate impacts from existing baseline traffic in 2020 and cumulative 2040 No Project traffic. Ramboll will also evaluate impacts from potential generators for parcels that will be rezoned to allow for 75 feet or taller buildings. For the individual proposed projects, we will evaluate emissions from construction of the projects, operational traffic (which will not be modeled in a refined HRA but will be assessed, if required, using the BAAQMD screening tables, as discussed in Section 2.2.2), and stationary sources such as diesel generators.

4.1 Plan-Level Air Concentration Estimation for Operational HRA

4.1.1 Chemical Selection

The cancer risk analysis in the Plan-level operational HRA will be based on DPM and TOG concentrations from on-road diesel and gasoline vehicles, respectively.

Diesel exhaust, a complex mixture that includes hundreds of individual constituents (Cal/EPA 1998), is identified by the State of California as a known carcinogen (Cal/EPA 2015). Under California regulatory guidelines, DPM is used as a surrogate measure of carcinogen exposure for the mixture of chemicals that make up diesel exhaust as a whole (Cal/EPA 2015). 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. However, Cal/EPA has concluded that "potential cancer risk from inhalation exposure to whole diesel exhaust will exceed the multi-pathway cancer risk from the speciated components (Cal/EPA 2003)." This HRA will use the surrogate approach, as recommended by Cal/EPA.

TOG emitted from gasoline vehicle exhaust and evaporative losses are composed of a number of toxic components such as benzene, naphthalene and acetaldehyde. Unlike DPM, no surrogate method is currently approved to estimate health impacts from TOG as a whole. Thus, TOG impacts must be calculated using a component based method. Total TOG emissions from roadways will be split into individual toxic components using the BAAQMD's recommended gasoline speciation (BAAQMD 2012a).

4.1.2 Air Dispersion Model

Near-field air dispersion modeling of DPM, TOG, and $PM_{2.5}$ from Plan-level traffic will be conducted using USEPA's AERMOD model.[5] For each receptor location, the model generates average air concentrations (or air dispersion factors as unit emissions will be modeled) that result from emissions from multiple sources.

[5] On November 9, 2005, the USEPA promulgated final revisions to the federal Guideline on Air Quality Models, in which they recommended that AERMOD be used for dispersion modeling evaluations of criteria air pollutant and toxic air pollutant emissions from typical industrial facilities.

Air dispersion models such as AERMOD require a variety of inputs such as source parameters, meteorological parameters, topography information, and receptor parameters. When site-specific information is unknown, Ramboll will use default parameter sets that are designed to produce conservative (i.e. overestimates of) air concentrations. Ramboll will model the area designated in **Figure 3** (Hub Plan Modeling Extent), which represents a region designated as the Plan area, plus a 1 kilometer buffer.

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 area under consideration. For this HRA, BAAQMD's Mission Bay (AERMET V12345) meteorological data for year 2008 will be used, which aligns with the CRRP-HRA methodology (BAAQMD 2012c).

Terrain considerations: Elevation and land use data will be imported from the National Elevation Dataset (NED) maintained by the United States Geological Survey (USGS). An important consideration in an air dispersion modeling analysis is the selection of rural or urban dispersion coefficients. Based on the urban area in which the Plan is located, Ramboll will use urban dispersion coefficients.

Emission rates: Emitting activities will be modeled to reflect the actual hours of traffic operation. Emissions will be modeled using the χ/Q ("chi over q") method, such that each phase has unit emission rates (i.e., 1 gram per second [g/s]), and the model estimates dispersion factors (with units of [ug/m^3]/[g/s]).

In line with CRRP-HRA methodology, Ramboll plans to adjust the hourly traffic activity for San Francisco County by creating a diurnal profile with hourly fractions (relative to peak traffic) representing hourly changes in traffic over the course of a day. Diurnal profiles will be specified for all vehicles (representing cars) and for heavy-duty trucks (representing truck and bus data). As in the CRRP, Ramboll assumes the diurnal profile is constant across all roadways (BAAQMD 2012c).

For annual average ambient air concentrations, the estimated annual average dispersion factors will be multiplied by the annual average emission rates. The emission rates will vary on an hourly and daily basis. Hourly variation in emission rates will be incorporated in the model whereas for simplicity, the model will assume that the emission rate does not change daily.

Source parameters: Source location and parameters are necessary to model the dispersion of air emissions. For operational traffic (on-road mobile sources), following the CRRP-HRA methodology, on-road emissions will be modeled in AERMOD as adjacent volume sources, with the number of sources dependent on the length and width of the roadway segment. For AERMOD modeling, the release height of volume sources for on-road light duty vehicles will be set to 0.6 meters, and the initial vertical dimension will be set to 0.14 meters (ARB 2000). For on-road trucks, the release height of volume sources will be set to 2.55 meters and the initial vertical dimension will be set to 2.4 meters, consistent with USEPA haul road guidance (USEPA 2012).

Receptors: In order to evaluate health impacts, receptors will be placed at locations collocated with the receptors used in the CRRP-HRA and within 1 kilometer of the Plan area. Receptors will be modeled at a height of 1.8 meters above terrain height, a default breathing height for ground-floor receptors, consistent with the CRRP-HRA methodology. As discussed previously, maximum annual average dispersion factors will be estimated for each receptor location. Modeled receptors cover the entire Plan area plus a 1-kilometer radius buffer around the Plan area, as shown in **Figure 3**.

Modeling Adjustment Factors: Cal/EPA (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 operation activities occurring as part of the Plan. The modeling adjustment factors are discussed below.

Receptors, which are assumed to be residents consistent with the CRRP-HRA, are assumed to be exposed to traffic emissions 24 hours per day, 7 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.

4.2 Project-Level Air Concentration Estimation

This section discusses the methodology for estimating project-level impacts from operational diesel equipment (i.e., generators), on-road construction vehicles, and off-road construction equipment. Impacts from on-road gasoline vehicles will be estimated using the BAAQMD Roadway Screening Analysis Calculator (assuming the number of passenger vehicles exceeds 5,000 vehicles per day and the number of trucks exceeds 500 trips per day) so its methodology will be not be discussed in detail in this section. Also, upon reviewing information from project sponsors, on-road construction worker trips are expected to be negligible and will therefore not be included in the HRA analysis.

4.2.1 Chemical Selection

Cancer risk analysis for the project-level HRAs will be based on DPM concentration from diesel equipment (i.e., generators) and off-road construction equipment.

4.2.2 Air Dispersion Model

Concentrations of TACs from both construction equipment and operational stationary source (i.e., generators) emissions for the proposed projects will be estimated using AERMOD. When site-specific information is unknown, Ramboll will use default parameter sets that are designed to produce conservative (i.e., overestimates of) air concentrations.

As discussed earlier, air dispersion models such as AERMOD require a variety of inputs such as source parameters, meteorological parameters, topography information, and receptor parameters. Except for source and receptor parameters, the methodology for the other modeling parameters is identical to that used for the Plan-level analysis (see Section 4.1.2 for a more detailed discussion for those parameters).

For the individual proposed projects, Ramboll will also model the area shown in **Figure 3**, which is conservative because it represents the entire Plan area, plus a 1-kilometer buffer.

Source Parameters

For each individual proposed project, area sources will be used to represent construction on-site activity in AERMOD. The project-level construction area sources will be modeled with the same release parameters used in the CRRP-HRA: a release height of 5 meters and an initial vertical dimension of 1.4 meters (BAAQMD 2012c), covering the entire footprint of the project area.

For operational emissions, all the proposed generators will be modeled as point sources. Ramboll will use project-specific source parameters including stack height, diameter, temperature, and velocity, if available. Otherwise, Ramboll will use default stationary source modeling parameters as provided in the CRRP-HRA. **Table 2** summarizes the modeling parameters to be used in AERMOD.

Receptors

Receptors will be modeled at a height of 1.8 meters above terrain height, a default breathing height for ground-floor receptors, consistent with the CRRP-HRA methodology. In addition, on-site receptors will also be modeled at elevations corresponding the various floors of the buildings. Ramboll will use the same receptor grid used in the CRRP-HRA, out to a distance of 1 kilometer from the Plan boundary. As discussed previously, maximum annual average dispersion factors will be estimated for each receptor location.

5. RISK CHARACTERIZATION METHODS

This section discusses risk characterization methods required to conduct the HRAs.

5.1 Risk Characterization Method for Plan-Level Operational HRA

5.1.1 Sources Evaluated

As discussed in Section 2.3, Ramboll will evaluate excess lifetime cancer risk and $PM_{2.5}$ concentrations for all road segments within 1 kilometer of the Plan for the following four scenarios:

1. Existing baseline traffic emissions in 2020 (without project);
2. 2040 baseline No Project (Project Horizon Year);
3. Plan traffic emissions in 2020 (which reflects Plan traffic emissions minus existing baseline traffic emissions for the 2020)
4. Plan traffic emissions in 2040 (which reflects Plan traffic emissions minus 2040 Baseline, No Project traffic emissions).

For planning purposes, we assume the traffic engineer will provide turning movement data as an Excel file and link-level volumes as a geographical information system (GIS) shapefile for the scenarios presented above. Thus, Ramboll will be able to determine the impacts of Plan-generated traffic as well as existing + Plan traffic in 2020 and 2040 Cumulative baseline + Plan traffic.

In addition, Ramboll will evaluate excess lifetime cancer risk and $PM_{2.5}$ concentrations for generators that will be added to parcels rezoned for structures that are 75 feet or taller.

5.1.2 Exposure Assessment

Ramboll will conservatively model all existing CRRP-HRA grid (20-meter spacing) receptors within the Plan boundary and within 1 kilometer of the proposed Plan boundary. Consistent with the CRRP-HRA, all receptors will be analyzed as residents.

Potentially Exposed Populations: Residents will be assumed to be exposed to traffic emissions for a 30-year lifetime as consistent with the OEHHA 2015 Hot Spots Guidelines. Receptors will be modeled using the existing CRRP grid (20-meter spacing).

Exposure Assumptions: The exposure parameters used to estimate excess lifetime cancer risks for all potentially exposed populations were obtained using risk assessment guidelines from OEHHA (Cal/EPA 2015). **Table 5** shows the proposed exposure parameters that will be used for the HRAs.

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}, will be calculated as follows:

$$IF_{inh} = \frac{DBR * ET * EF * ED * CF}{AT}$$

Where:

IF_{inh}	=	Intake Factor for Inhalation (m^3/kg-day)
DBR	=	Daily Breathing Rate (L/kg-day)
ET	=	Exposure Time (hours/24 hours)
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 OEHHA's Hot Spots guidance (OEHHA 2015).

5.1.3 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 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.

Following the CRRP-HRA methodology for cancer risk calculations, Ramboll will include carcinogenic toxicity for DPM and organic gases from on-road gasoline-powered vehicles. Toxicity values are summarized in **Table 6.**

5.1.4 Age-Specific Sensitivity Factors

The estimated excess lifetime cancer risks for a resident will be 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 2015 Guidance (2015). Cancer risk estimates will be 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) is applied to ages 16 and older. **Table 7** presents the ASF values that will be used for the HRA.

5.1.5 Estimation of $PM_{2.5}$ Concentrations

In line with the CRRP, Ramboll plans to include $PM_{2.5}$ concentrations along with the risk evaluation. $PM_{2.5}$ concentrations will be calculated based on $PM_{2.5}$ emissions and AERMOD dispersion modeling results as follows:

$$C_{PM2.5} = E_{PM2.5} \times Disp$$

Where:

$C_{PM2.5}$	=	$PM_{2.5}$ concentration
$E_{PM2.5}$	=	$PM_{2.5}$ emissions (see Section 3.1 for methodology)
Disp	=	Dispersion factor (direct result from AERMOD, see Section 4.1.2 for methodology)

5.1.6 Estimation of Cancer Risks

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 cancer potency factor (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-day)$^{-1}$
ASF	=	Age Sensitivity Factor (unitless)

5.1.7 Other Hazards

In line with the CRRP, Ramboll will not include an evaluation of acute HI or chronic HI in the HRA for the Plan impacts.

5.2 Risk Characterization Method for Individual Proposed Projects

This section describes in greater detail the sources to be evaluated for the HRA at the project-level and the methodology to perform exposure assessment. The project-level methodology for toxicity assessment, age-specific sensitivity factors, estimation of $PM_{2.5}$

concentration, and estimation of cancer risks is similar to the methodology used for the Plan-level assessment (see Section 5.1 for additional details).

5.2.1 Sources Evaluated

For each of the two individual proposed projects, Ramboll will evaluate health risks and hazards (i.e., excess lifetime cancer risks and $PM_{2.5}$ concentrations) for on-site and off-site sensitive receptors exposed to emissions from project construction as well as project operation (i.e., on-road traffic and generators). Because each of the proposed projects will be completed in a single phase of construction activity (i.e., it is not anticipated for there to be onsite residents while construction is ongoing), construction impacts on on-site residents will not be analyzed. However, impacts from operational emissions (i.e., generators) will be analyzed for on-site residents. The sections below describe the methodology to be used for estimating impacts from these sources.

For project-related traffic, Ramboll will first identify one street for each project location where the project is expected to result in the greatest increase in daily vehicle trips. As a conservative measure, the total trip generation rate for each project will be assigned to each selected street. The health risks and hazards due to traffic from each individual project will then be calculated by performing a proportional analysis where the Plan level health risks and hazards (calculated with the methodology described in Section 2.1, which already includes the individual projects) are scaled by the ratio of project traffic volume to overall existing + Plan traffic volume.

5.2.2 Exposure Assessment

Ramboll will conservatively model all existing CRRP-HRA grid (20-meter spacing) receptors onsite and within 1 kilometer of the larger Plan boundary. Consistent with the CRRP-HRA, all off-site sensitive receptors will be analyzed as residents. The Franklin Project is expected to have on-site school receptors as well as residential receptors within the project boundary. However, all receptors associated with the Franklin Project will be conservatively analyzed with residential exposure assumptions, consistent with the CRRP-HRA. In the event that the calculated impacts based on conservative exposure assumptions need to be reduced, Ramboll will refine the analysis to use on-site school child exposure parameters for the on-site school child receptors. This refinement is expected to lower health risk impacts as on-site school child exposure assumptions have lower exposure duration, age sensitivity, and breathing rate than on-site resident exposure assumptions. Based on information provided by the Project sponsor, Ramboll assumes that there will not be other types of sensitive population (e.g., daycare child) that will occupy the project sites in the future.

Residents will be assumed to be exposed to traffic emissions for a 30-year lifetime, consistent with OEHHA 2015 Hot Spots Guidelines (OEHHA 2015). **Table 5** shows the proposed exposure parameters that will be used for the HRA, which is the same as that used for the Plan-level analysis.

6. EXISTING + PLAN AND EXISTING + PROJECT ANALYSES

6.1 Existing + Plan Analysis

This section discusses the existing + Plan analysis that incorporates the Plan-level HRA results as described in the sections above. The existing + Plan analysis will consist of summary tables and a database similar to that of the CRRP-HRA that includes $PM_{2.5}$ and cancer risk fields for the following:

1. Existing baseline traffic (No Plan)
2. Plan traffic
3. Non-road background sources within the modeling domain, including: non-plan permitted stationary sources, rail, and maritime sources.
4. Generators that will be added to parcels rezoned for structures that are 75 feet or taller.
5. Totals that sum the cancer risk and $PM_{2.5}$ concentrations from the above sources.

Ramboll will rely on updated background existing stationary source $PM_{2.5}$ concentrations and cancer risk that will be provided by BAAQMD. The background cancer risk in the 2014 CRRP-HRA for sources that are not updated (rail and maritime) will be adjusted to be consistent with the 2015 OEHHA guidance. Ramboll will use scaling factors approved by the BAAQMD to convert risks from the CRRP-HRA to be consistent with the 2015 OEHHA guidance. Ramboll will sum the impacts from all the sources listed above for all modelled receptors (see **Figure 3** for the modelling domain). The end product of this analysis is an updated existing + Plan APEZ map (including shape files) for the modelled region to be compared against SFDPH's existing APEZ map. Ramboll will compare the updated map to the existing APEZ map to determine if the APEZ needs to be expanded.

6.2 Existing + Project Analyses

This section discusses the existing + project analyses that incorporate the individual project-level HRA results as described in the sections above. For each individual project (98 Franklin and 30 Van Ness), the existing + project analyses will consist of summary tables and a database similar to that of the CRRP-HRA that includes $PM_{2.5}$ and cancer risk fields for the following:

1. Existing baseline traffic (No project)
2. Project traffic
3. Project stationary source emissions
4. Project construction emissions
5. Non-road background sources within the modeling domain, including: non-project permitted stationary sources, rail, and maritime sources.
6. Totals that sum the cancer risk and $PM_{2.5}$ concentrations from the above sources.

7. 2040 CUMULATIVE ANALYSIS

This section discusses the cumulative analysis that incorporates the Plan-level and project-level HRA results as described in the sections above. The cumulative analysis will include impacts from the following sources:

1. 2040 Baseline traffic (No Plan) as discussed in Section 2.4.2;
2. 2040 Plan traffic (this also accounts for traffic from the individual projects)
3. Project-level construction and operational sources as discussed in Sections 2.2.3 and 2.2.4;
4. Generators that will be added to parcels rezoned for structures that are 75 feet or taller; and
5. Impacts that non-road background sources have at the on- and off-site sensitive receptor locations within the modeling domain. Non-road background sources can include non-project permitted stationary sources, rail, maritime sources, etc.
6. Totals that sum the cancer risk and $PM_{2.5}$ concentrations from the above sources.

The end product of this analysis is an updated 2040 cumulative APEZ map (including shape files) for the modelled region to be compared against SFDPH's existing APEZ map. Ramboll will compare the updated map to the existing APEZ map to determine if the APEZ needs to be expanded.

Ramboll will include a qualitative discussion of TACs from other projects within 1,000 feet of the Hub Plan area that are not already accounted for in this scope of work.

8. COORDINATION AND DOCUMENTATION

Ramboll will present the preliminary results of the analysis to SFEP. At this time, Ramboll will also discuss with SFEP whether refinements are necessary and what types of control measures (if any) are needed.

After completing our analysis, Ramboll will prepare an Air Quality Technical Report (AQTR) that documents the conclusions, assumptions and methods used in the analysis. The AQTR will also contain figures and tables in PDF format. In addition to preparing an AQTR, Ramboll will submit an updated CRRP-HRA database to SFEP that will include updated risk values for existing conditions along with the proposed individual projects and the overall Plan, as well as a 2040 baseline scenario with the overall Plan and the proposed individual projects.

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TABLES

Table 1
Emissions Calculation Methodology
The Hub Plan and Individual Projects
San Francisco, California

Type	Source	Methodology and Formula	Reference
Construction Equipment[1]	Off-Road Equipment	$E_c = \Sigma(EF_c * HP * LF * Hr * C)$	OFFROAD2011 and ARB/USEPA Engine Standards
Construction On-Road Mobile Sources[2]	Exhaust – Running	$E_R = \Sigma(EF_R * VMT * C)$, where VMT = Trip Length * Trip Number	EMFAC2017
	Exhaust - Idling	$E_I = \Sigma(EF_I * \text{Trip Number} * T_I * C)$	EMFAC2017
Operational On-Road Mobile Sources[3]	Running Exhaust	$E_R = \Sigma(EF_R * VMT * C)$, where VMT = Roadway Link Length * Vehicle Counts	EMFAC2017
	Brake Wear and Tire Wear	$E_{BW,TW} = \Sigma(EF_{BW,TW} * VMT * C)$, where VMT = Roadway Link Length * Vehicle Counts	EMFAC2017
	Running Loss	$E_{RL} = \Sigma(EF_{RL} * VMT * C)$, where VMT = Roadway Link Length * Vehicle Counts	EMFAC2017
Operation[4]	Generators	$E_{SS} = EF_{SS} * HP * Hr$	ARB/USEPA Off-Road Engine Standards

Notes:

1. E_c: off-road equipment exhaust emissions (lb).
EF_c: emission factor (g/hp-hr). CalEEMod 2016.3.2. default emission factors used.
HP: equipment horsepower (OFFROAD2011)
C: unit conversion factor
Hr: equipment hours
LF: equipment load factor (OFFROAD2011)

2. On-road mobile sources include truck and passenger vehicle trips. Emissions associated with mobile sources are calculated using the following formulas.

E_R: running exhaust and running losses emissions (lb).
EF_R: running emission factor (g/mile); from EMFAC2017. EMFAC reports emissions in tons/day and VMT in miles/day. The emission factor is calculated as the quotient of those outputs.
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 the truck route or the default length from CalEEMod or construction contractor.
c. Trip Number: provided by the construction contractor or estimated in CalEEMod.

E_I: vehicle idling emissions (lb)
EF_I: vehicle idling emission factor (g/hr-trip); from EMFAC2017
T_I: idling time
C: unit conversion factor
[3.] On-road operational mobile sources include all Plan and project-related traffic. Emissions associated with operational mobile sources are calculated using the following formulas.

E_R: running exhaust emissions (lb).
EF_R: running emission factor (g/mile) from EMFAC2017. EMFAC reports emissions in tons/day and VMT in miles/day. The emission factor is calculated as the quotient of those outputs. Running exhaust emissions are estimated for PM_{10} from diesel-fueled vehicles (DPM), TOG from gasoline-fueled vehicles, and $PM_{2.5}$ from all vehicles.

$E_{BW,TW}$: vehicle brake wear and tire wear emissions (lb).
$EF_{BW, TW}$: vehicle brake wear and tire wear emission factor (g/mile) from EMFAC2017. EMFAC reports emissions in tons/day and VMT in miles/day. The emission factor is calculated as the quotient of those outputs. Brake wear and tire wear emissions are estimated for $PM_{2.5}$ from all vehicles.

E_R: running loss emissions (lb).
EF_{RL}: running loss emission factor (g/mile) from EMFAC2017. EMFAC reports emissions in tons/day and VMT in miles/day. The emission factor is calculated as the quotient of those outputs. Running loss emissions are estimated for non-diesel TOG emissions only.

VMT: vehicle miles traveled
C: unit conversion factor
Roadway Link Length: As indicated in the GIS shapefiles to be provided by SFEP.
Vehicle Counts (Traffic Volumes): As indicated in the GIS shapefiles to be provided by traffic engineers.
[4.] Operational emissions from the generator are calculated using the following formulas:
E_{SS}: Stationary Source emissions (lb).
EF_{SS}: Stationary Source emission factor
C: unit conversion factor
Hr: hours of operation per year (hr)

Abbreviations:

ARB: California Air Resources Board
CalEEMOD: CALifornia Emissions Estimator MODel
DPM - diesel particulate matter
EF: emission factor
EMFAC: EMission FACtor Model
g: gram
GIS - Geographic Information Systems
HP: horsepower
hr - hour
lb: pound
LF: load factor
mi: mile
$PM_{2.5}$ - fine particulate matter less than 2.5 micrometers in aerodynamic diameter
PM_{10} - particulate matter less than 10 micrometers in aerodynamic diameter
SFEP - San Francisco Department of Environmental Planning
TOG - total organic gases
USEPA: United States Environmental Protection Agency
VMT: vehicle miles traveled

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Table 2
Modeling Parameters for Construction and Operational Sources
The Hub Plan and Individual Projects
San Francisco, California

Analysis Scenario	Period	Source	Source Type[1]	Source Dimension	Number of Sources[2]	Release Height[3]	Exit Temperature	Exit Velocity	Exit Diameter	Initial Vertical Dimension[4]	Initial Lateral Dimension[5,6]
				[m]		[m]	°F	[m/s]	[m]	[m]	[m]
30 Van Ness Avenue	Construction	Construction Equipment	Area	Project Area	1	5				1.4	
		On-Road Trucks	Volume	Variable		2.55				2.4	Variable
	Operational	Generator[6]	Point		1	3.66	965	217	0.183		
98 Franklin Street	Construction	Construction Equipment	Area	Project Area	1	5				1.4	
		On-Road Trucks	Volume	Variable		2.55				2.4	Variable
	Operational	Generator[6]	Point		1	3.66	900	276	0.183		
The Hub Plan	Operational	On-Road Light Duty Vehicles	Volume	Variable		0.6				0.14	Variable
		On-Road Trucks	Volume	Variable		2.55				2.4	Variable
		Generators[6]	Point		1 per re-zoned parcel	3.66	872	45	0.183		

Notes:

1. Construction off-road equipment is modeled as an area source covering the project site, consistent with the CRRP-HRA (BAAQMD 2012).
2. The number of on-road sources is based on the geometry of the truck or traffic routes.
3. According to the CRRP-HRA methodology, release height of a modeled area source representing construction equipment was set to 5 meters. On-road truck release height is based on USEPA haul road guidance.
4. According to the CRRP-HRA methodology, initial vertical dimension of the modeled construction equipment volume sources was set to 1.4 meters. On-road truck initial vertical dimension is based on USEPA haul road guidance.
5. According to USEPA AERMOD User's Guide, for a line source modeled as adjacent volume sources, the initial lateral dimension is the length of the side divided by 2.15.
6. Generators for the individual projects are modeled with parameters provided by the project sponsors, where available. Default parameters in Table 13 of the CRRP-HRA technical guidance document are used for Plan-level parcels and for projects where no information is available.
7. Shaded cells indicate that those parameters are not applicable.

Abbreviations:

AERMOD - Atmospheric Dispersion MODeling
ARB - California Air Resources Board
BAAQMD - Bay Area Air Quality Management District
CRRP - Community Risk Reduction Plan
°F - Fahrenheit
HRA - health risk assessment
m - meter
s - second
USEPA - United States Environmental Protection Agency

References:

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Table 3
Phasing Schedule
Individual Projects
San Francisco, California

Month and Year	30 Van Ness Avenue	98 Franklin Street	On-site Receptor Move in Dates
Apr-20			
May-20			
Jun-20			
Jul-20			
Aug-20			
Sep-20			
Oct-20			
Nov-20			
Dec-20			
Jan-21			
Feb-21			
Mar-21			
Apr-21			
May-21			
Jun-21			
Jul-21			
Aug-21			
Sep-21			
Oct-21			
Nov-21			
Dec-21			
Jan-22			
Feb-22			
Mar-22			
Apr-22			
May-22			
Jun-22			
Jul-22			
Aug-22			
Sep-22			
Oct-22			
Nov-22			
Dec-22			
Jan-23			
Feb-23			
Mar-23			Assume 98 Franklin residents move-in 3/10/2023
Apr-23			
May-23			
Jun-23			
Jul-23			
Aug-23			
Sep-23			
Oct-23			
Nov-23			
Dec-23			
Jan-24			Assume 30 Van Ness residents move-in on 1/1/2024
Feb-24			
Mar-24			
Apr-24			
May-24			
Jun-24			
Jul-24			
Aug-24			
Sep-24			
Oct-24			
Nov-24			
Dec-24			
Jan-25			

Notes:

1. Shading indicates construction period.
2. It is assumed that residents associated with each project will move in the day after construction of the project ends.

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Table 4
Exposure Durations
The Hub Plan and Individual Projects
San Francisco, California

Analysis Scenario	Receptor Location	Phase	Start Date	End Date	Exposure Duration	
					[days]	[years]
30 Van Ness Avenue	Off-Site Resident	Construction	5/1/2020	12/31/2023	1,340	3.67
		Operation	1/1/2024	1/1/2054	10,959	30
	On-Site Resident	Operation	1/1/2024	1/1/2054	10,959	30
98 Franklin Street	Off-Site Resident	Construction	6/1/2020	3/9/2023	1,012	2.77
		Operation	3/10/2023	3/10/2053	10,959	30
	On-Site Resident	Operation	3/10/2023	3/10/2053	10,959	30
	On-Site School Child	Operation	3/10/2023	3/10/2027	1,462	4
The Hub Plan[2]	Off-Site Resident	Operation	1/1/2020	1/1/2050	10,959	30
	On-Site Resident	Operation	1/1/2020	1/1/2050	10,959	30

Notes:

1. For the individual proejcts, the start date for the operational phase is assumed to be one day after construction of the project ends.

2. The expected EIR certification date for the Hub Plan is winter of 2019. A start date of 1/1/2020 was assumed, although the exposure start date may get delayed depending on how quickly the Plan is developed.

Table 5
Exposure Parameters
The Hub Plan and Individual Projects
San Francisco, California

Period	Receptor Type	Analysis Scenario	Receptor Age Group	Exposure Parameters					
				Daily Breathing Rate (DBR)[1]	Exposure Duration (ED)[2,3,4]	Fraction of Time at Home (FAH)[5]	Exposure Frequency (EF)[6]	Averaging Time (AT)	Intake Factor, Inhalation (IF_{inh})
				[L/kg-day]	[years]	[unitless]	[days/year]	[days]	[m^3/kg-day]
Construction	Off-Site Resident	30 Van Ness Avenue	3rd Trimester	361	0.25	1	350	25,550	0.0012
			Age 0-<2 Years	1,090	2.00	1			0.0299
			Age 2-<9 Years	631	1.42	1			0.0123
		98 Franklin Street	3rd Trimester	361	0.25	1	350	25,550	0.0012
			Age 0-<2 Years	1,090	2.00	1			0.0299
			Age 2-<9 Years	631	0.52	1			0.0045
Operation	On-Site Resident	Individual Projects and Plan	3rd Trimester	361	0.25	1	350	25,550	0.0012
			Age 0-<2 Years	1,090	2.00	1			0.0299
			Age 2-<16 Years	572	14.00	1			0.1097
			Age 16-<30 Years	261	14.00	0.73			0.0365
	On-Site School Child[7]	98 Franklin Street	Age 2-<16 Years	572	2.00	N/A	180	25,550	0.0081
			Age 16-<18 Years	261	2.00	N/A			0.0037
	Off-Site Resident[2]	Individual Projects and Plan	3rd Trimester	361	0.25	1	350	25,550	0.0012
			Age 0-<2 Years	1,090	2.00	1			0.0299
			Age 2-<16 Years	572	14.00	1			0.1097
			Age 16-<30 Years	261	14.00	0.73			0.0365

Notes:

1. Daily breathing rates for residents and school children 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 guidance).

2. The exposure duration for the off-site resident reflects a conservative scenario analysis: a fetus is at the beginning of its third trimester when construction commences and is exposed to all construction emissions for that project or Plan.
3. The exposure duration for the on-site resident reflects a conservative scenario analysis: a fetus is at the beginning of its third trimester when the residents move in and when the operation of the on-site generators commences after full build-out.
4. The exposure duration for the on-site school child reflects an analysis of a 14 to 18 year old child exposed to operational activities.

[5] 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 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). FAH is not applicable for the on-site school child.

[6] The exposure frequency for residents reflects default residential exposure frequency from OEHHA 2015. For school child receptors, it was assumed that children would attend the school 180 days per year.

[7] Receptors in 98 Franklin will conservatively be analyzed as residential receptors. In the event that refinements are needed, these receptors will be re-analyzed as an on-site school child.

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
FAH - fraction of time at home
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 ProgramHealth Risk Assessment (HRA) Guidelines. January.

OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

Table 6
Carcinogenic Toxicity Value for Toxic Air Contaminants
The Hub Plan and Individual Projects
San Francisco, California

Chemical	CAS Number	Cancer Potency Factor	Chronic REL	Acute REL
		$[mg/kg\text{-}day]^{-1}$	($\mu g/m^3$)	($\mu g/m^3$)
Diesel PM	9901	1.1	5	--
Acetaldehyde	75-07-0	0.01	140	470
Acrolein	107-02-8	--	0.35	2.5
Benzene	71-43-2	0.1	3	27
1,3-Butadiene	106-99-0	0.6	2	660
Ethylbenzene	100-41-4	0.0087	2,000	--
Formaldehyde	50-00-0	0.021	9	55
n-Hexane	110-54-3	--	7,000	--
Methanol	67-56-1	--	4,000	28,000
Methyl ethyl ketone	78-93-3	--	--	13,000
Naphthalene	91-20-3	0.12	9	--

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
PM - particulate matter
REL - reference exposure level

Reference:
Cal/EPA. 2016. OEHHA/ARB Consolidated Table of Approved Risk Assessment Health Values. March. Available at: http://www.arb.ca.gov/toxics/healthval/contable.pdf.

Table 7
Age Sensitivity Factor
The Hub Plan and Individual Projects
San Francisco, California

Receptor Type	Period	Receptor Age Group[1]	Value[2]
All Receptors	Construction and Operation	3rd Trimester	10
		Age 0-<2 Years	10
		Age 2-<9 Years	3
		Age 2-<16 Years	3
		Age 16-<30 Years	1

Notes:

1 Age sensitivity factors are applicable for the age groups relevant to each receptor type listed in Table 5 Exposure Parameters.

2 Age sensitivity factors are unitless.

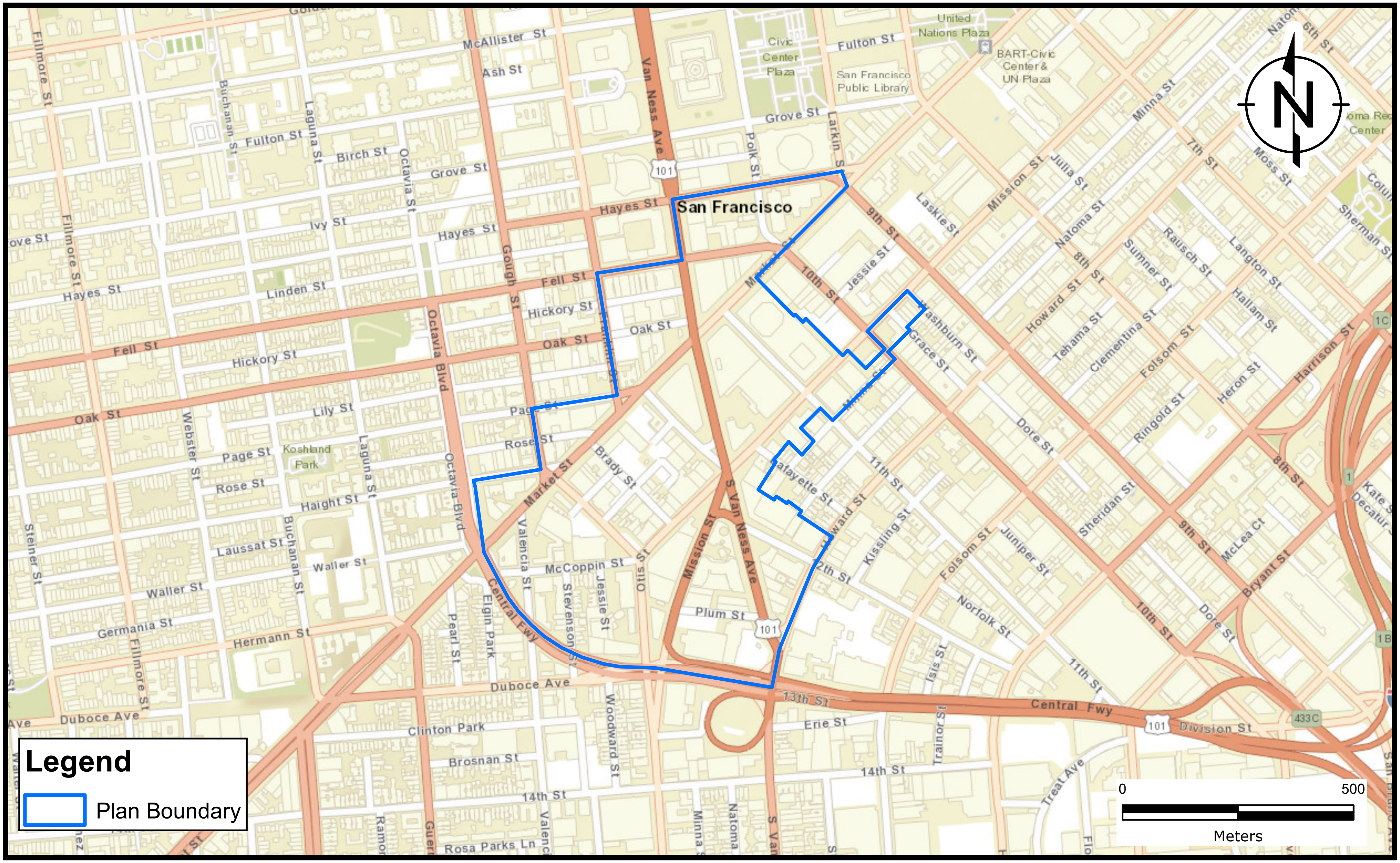
Abbreviation:

OEHHA - Office of Environmental Health Hazard Assessment

Reference:

OEHHA. 2015. Air Toxics Hot Spots Program Risk Assessment Guidelines. Guidance Manual for Preparation of Health Risk Assessments. February.

FIGURES



RAMBØLL

DRAFTED BY: VG

DATE: 3/14/2018

Plan Location

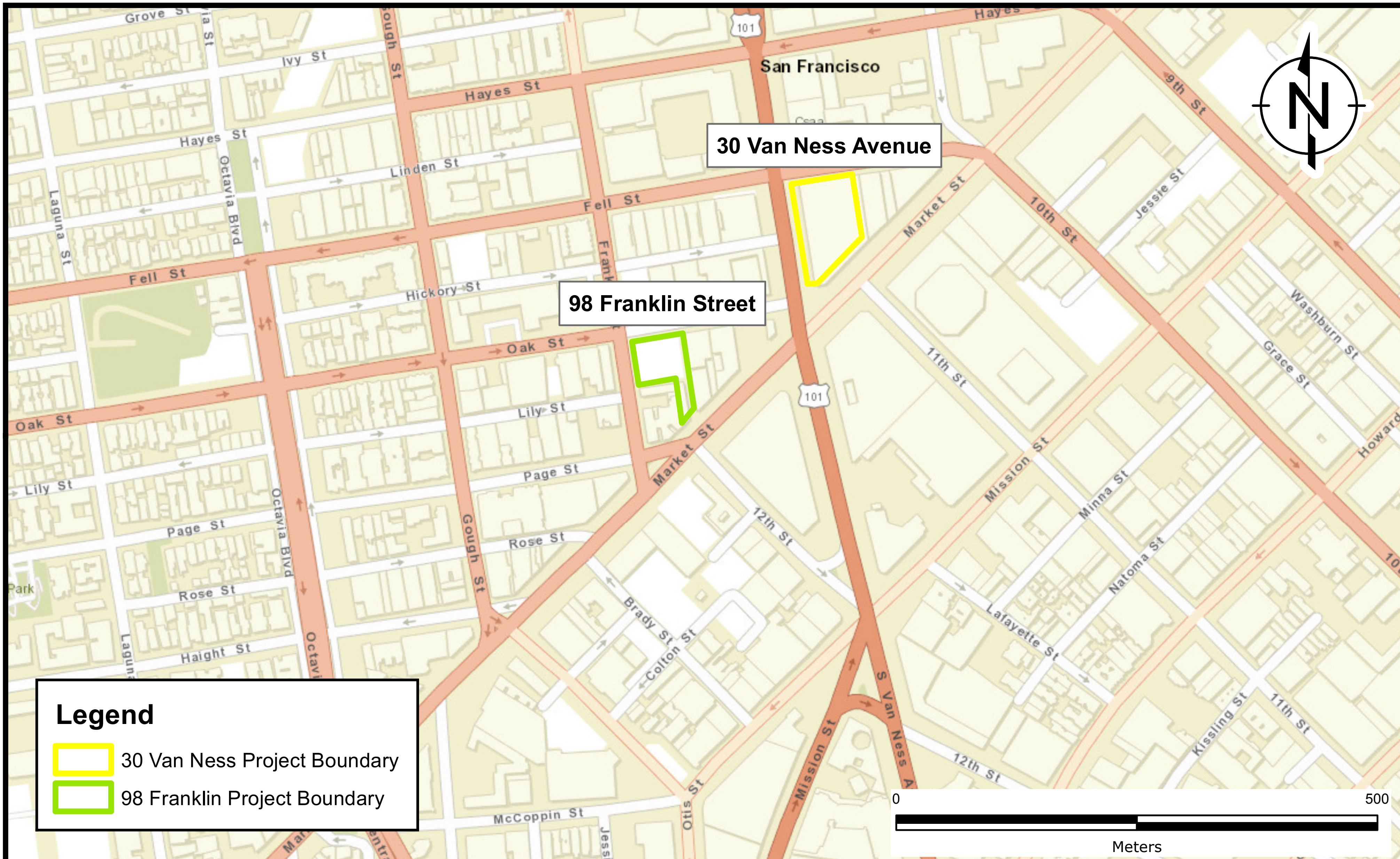
The Hub Plan

San Francisco, California

FIGURE

1

PROJECT: 1690006377



RAMBOLL

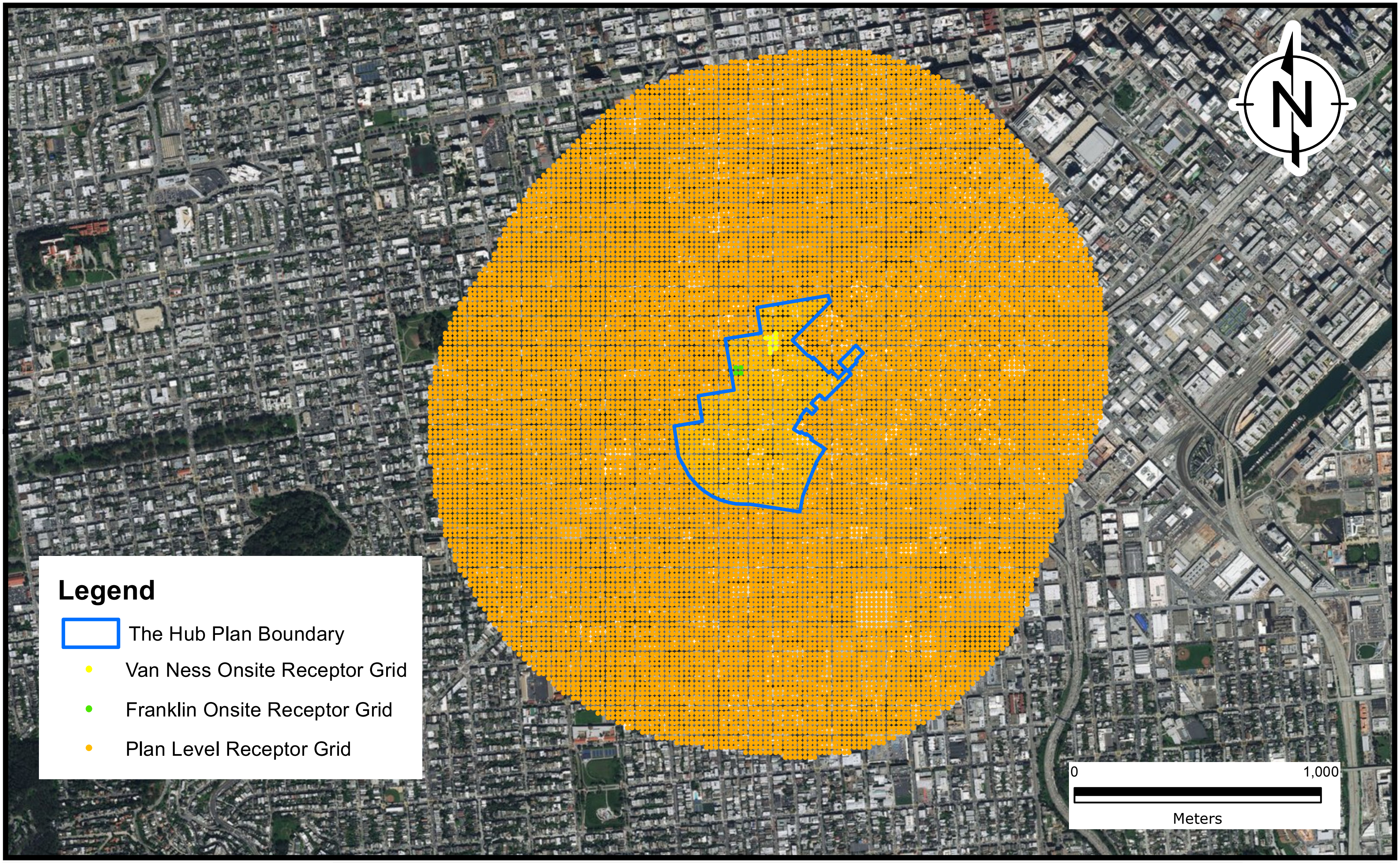
DRAFTED BY: VG

DATE: 4/25/2018

Project Locations
30 Van Ness Avenue and 98 Franklin Street
San Francisco, California

FIGURE
2

PROJECT: 1690006377



RAMBOLL

Plan Boundary and Modeling Extent

The Hub Plan

San Francisco, California

FIGURE

3

DRAFTED BY: VG

DATE: 4/25/2018

PROJECT: 1690006377

RAMBOLL

ENVIRONMENT
& HEALTH

Via Electronic Mail

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SCOPE AMENDMENT FOR THE MARKET/OCTAVIA HUB PLAN CEQA AIR QUALITY ANALYSIS, SAN FRANCISCO, CALIFORNIA

October 12, 2018

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Dear Ms. Efner:

At your request, Ramboll US Corporation (Ramboll) is submitting this scope amendment to ICF to cover additional tasks requested by the San Francisco Environmental Planning department (Planning) for the California Environmental Quality Act (CEQA) air quality analysis that Ramboll is conducting for the proposed Market/Octavia Hub Plan (Hub Plan) and two individual projects within the Hub Plan in San Francisco, California. This scope amendment provides details on the additional tasks along with the estimated costs. In addition, this scope also describes how the reduction in scope for certain aspects of the project (i.e., removal of one individual project) impacts estimated costs.

BACKGROUND

Ramboll is currently under contract to conduct a CEQA air quality analysis for the Hub Plan. The analysis aims to analyze the impacts from the programmatic Hub Plan as well as the construction and operation of two individual proposed projects within the Plan located at 30 Van Ness Avenue and 98 Franklin Street. As part of the overall effort, Ramboll prepared a technical scope of work entitled "CEQA Air Quality and Health Risk Assessment Methodology" (referred to herein as "SOW") detailing the methodology for conducting the air quality and health risk assessment (HRA) analyses. Planning has provided two rounds of comments on the SOW, and they have requested the following tasks that were not included in Ramboll's original proposal dated March 3, 2017:

1. Air dispersion modeling and HRA for potential generators to be located in parcels that will be rezoned to allow buildings taller than 75 feet.
2. Evaluation in the HRA of two additional traffic scenarios: 2020 No Plan Traffic and 2040 No Plan Traffic.
3. Converting turning movement data to be provided by Fehr and Peers (F&P), Planning's traffic consultant, to link level traffic volumes to be used in the air dispersion modeling for the HRA.

In addition, following submittal of the draft SOW, Ramboll was informed that the Project description for 30 Van Ness Avenue has changed and that the land uses have been revised. Ramboll had already started working on the air quality analysis for the projects with the land uses previously provided. As a result of this change, Ramboll will need to update the construction and operational emissions calculations and HRA for the project with the revised land uses.

Finally, preliminary emission estimates and health risk assessments associated with the construction of 98 Franklin Street Project and the 30 Van Ness Project indicate that refinements may be needed in order to reduce project impacts. Thus, this scope amendment also includes a task for updating some of the inputs (e.g., construction equipment list, hours of operation) and evaluating the impact of those updates on the construction analyses.

This scope amendment describes these tasks and their associated costs. In addition, this scope amendment also describes how the reduction in scope for certain aspects of the project (i.e., removal of one individual project) impacts estimated costs.

OUT OF SCOPE TASKS

This section details the out of scope tasks requested by Planning.

Task 1. Generator Air Dispersion Modeling and Health Risk Assessment

For this task, Ramboll will calculate emissions and conduct a HRA for up to nine (9) potential generators in parcels within the Hub Plan that will be rezoned to allow buildings taller than 75 feet. Ramboll's original proposal limited programmatic Plan level analysis to vehicle traffic only; thus, analyzing stationary source (i.e., generator) impacts as part of the Plan-level analysis is considered out of scope.

In order to estimate criteria air pollutant (CAP) and toxic air contaminant (TAC) emissions from these generators, Ramboll will conservatively assume that the proposed engines are 2,000 kilowatts (kW)[1] and operate up to 50 hours per year for maintenance purposes. For purposes of this study, Ramboll will use diesel particulate matter (DPM) as a surrogate for the mixture of chemicals that comprise diesel exhaust, and we assume that DPM is the only TAC that will be evaluated. Since the rezoned parcels are located within the City of San Francisco's existing Air Pollution Exposure Zone, Ramboll will assume that all the emergency generators will have Tier 4 engines.

Once emissions are calculated, Ramboll will set up air dispersion modeling for the generators. For planning purposes, we assume we will utilize the same dispersion model setup we will be establishing for the Plan and individual projects. The generators will be modeled as point sources near the center of each rezoned parcel using the latest version of AERMOD (Version 18081). The modeling parameters for the generators will be the default emergency generator parameters that were used in the SF Community Risk Reduction Plan (CRRP) HRA. Excess lifetime cancer risks and $PM_{2.5}$ concentrations from the generators will be calculated using the Office of Environmental Health Hazard Assessment (OEHHA) 2015 *Air Toxics Hot Spots Program Risk Assessment Guidelines*.

The cost for this out of scope technical analysis as well as documentation in the Air Quality Technical Report is **$12,000**.

Task 2. Evaluation of No Plan Scenarios in HRA

Ramboll originally scoped to perform air dispersion modeling and a HRA for two scenarios: Plan impacts for year 2020 and Plan impacts for year 2040. However, based on comments from Planning

[1] The generator capacity corresponds to the largest generator among the two individual Projects (98 Franklin Street).

in the SOW, in addition to the Plan impact analysis, No Plan impacts for year 2020 and No Plan impacts for year 2040 will need to be evaluated in the HRA as well.

For planning purposes, Ramboll assumes that no new air modeling will be required to obtain cancer risks and $PM_{2.5}$ concentrations associated with the 2020 No Plan and 2040 No Plan scenarios. Rather, we assume that cancer risks and $PM_{2.5}$ concentrations will be obtained from previous HRAs that have already been conducted.

- 2020 No Plan Scenario: For the 2020 No Plan scenario, we assume that cancer risks and $PM_{2.5}$ concentrations associated with traffic will be obtained from the updated CRRP, which Ramboll is currently working on under a separate contract, without incorporating any adjustments to traffic volume that might be reflected in the recent traffic study from F&P.[2] As the updated CRRP is currently being prepared for 2025, some additional effort will be required to update the CRRP results to reflect 2020 traffic volumes and emissions (e.g., basic checks of 2020 emissions provided by Bay Area Air Quality Management District, incorporation of 2020 emissions into modeling).

  Also, since the updated CRRP currently only includes cancer risks and $PM_{2.5}$ concentrations associated with traffic, for planning purposes, we assume that the Bay Area Air Quality Management District (BAAQMD) will be able to provide cancer risks and $PM_{2.5}$ concentrations associated with 2020 emissions from stationary sources. We assume this data will be provided to us in GIS format (e.g., shapefile) for the CRRP receptor grid, which is the grid we plan to use for evaluating all scenarios (out to a distance of 1,000 meters from the Hub Plan). If BAAQMD cannot provide this information by October 17, 2018, we assume that we will use the cancer risks and $PM_{2.5}$ concentrations from stationary sources from the previous CRRP (for calendar year 2014) as a reasonable approximation of the 2020 impacts from stationary sources.

  We will then add the impacts from traffic and stationary sources in order to obtain the total 2020 No Plan HRA results. Given the location of the Hub Plan, which is quite distant from the CalTrain station and maritime ports, we assume that impacts from CalTrain and maritime sources will not be included in this evaluation. In order to meet the current schedule of completing the analysis by October 25, Ramboll would need the updated CRRP data and the stationary source data no later than October 17, 2018.

- 2040 No Plan Scenario: For the 2040 No Plan scenario, we assume that cancer risks and $PM_{2.5}$ concentrations for traffic will be obtained directly from the 2040 city-wide cumulative HRA conducted as part of the Central SoMa Plan. The results we obtain from the city-wide HRA will reflect approval of the Central SoMa Plan. As with the 2020 No Plan scenario, the 2040 No Plan scenario will not incorporate any adjustments to traffic volume that might be reflected in the recent traffic study from F&P. Results will be extracted for the CRRP receptor grid, which is the grid we plan to use for evaluating all scenarios (out to a distance of 1,000 meters from the Hub Plan).

The cost for incorporating these two additional scenarios and for documenting the analysis in the Air Quality Technical Report is **$12,000**.

[2] As discussed in Task 3, Ramboll understands that traffic volumes from F&P's No Plan scenario will be used for the noise analysis, so there is a potential for discrepancies between the traffic volumes that are used for the air quality analysis and the noise analysis.

Task 3. Converting Turning Movements to Link-Level Traffic Volumes

Per discussions with ICF and F&P, Ramboll understands that F&P will be developing turning movement data for approximately 51 intersections located within and adjacent to the Hub Plan area. However, for air dispersion modeling for the HRA, link-level (or street level) traffic volumes are required in order to estimate $PM_{2.5}$ concentrations and cancer risks from traffic on the roadways. We understand that link-level data is also required by ICF for the noise analysis.

For this task, Ramboll will convert the turning movement data to link-level data for up to four scenarios: 2020 without Hub Plan, 2020 with Hub Plan, 2040 without Hub Plan, and 2040 with Hub Plan.[3] Since F&P will not be providing turning movement volumes for all intersections included in the Hub plan, Ramboll will use SFCHAMP data to fill in data gaps. For intersections that are close to the 51 study intersections, we will scale the SFCHAMP data using the scenario-specific turning movement data provided by F&P.

For planning purposes, we assume F&P will provide the turning movement data in spreadsheet format similar to the example data that was provided on June 11, 2018. We also assume that F&P will provide the SFCHAMP data for all of the streets within the Hub plan area plus a 1,000 foot buffer.

The estimated cost for this task is **$21,000**.

Task 4. 30 Van Ness Avenue Project Update – Supplemental Effort

Ramboll understands that the 30 Van Ness Avenue Project sponsor has revised the land uses for the Project. Previously, Ramboll had been conducting the air quality analysis based on the land uses finalized in the Notice of Preparation (NOP) issued on April 24, 2018, and subsequently incorporated into Ramboll's SOW. Thus, to reflect the recent changes, Ramboll will need to update the construction and operational emissions as well as the risk modeling setup. We will also need to update our SOW, which we assume will be finalized upon the next submission without any further comments from Planning.

The estimated cost for these updates is **$4,000**.

Task 5. 30 Van Ness Avenue and 98 Franklin Street Construction Modeling and Health Risk Assessment – Supplemental Effort

Preliminary emission estimates and health risk assessments associated with construction of the 98 Franklin Street Project and the 30 Van Ness Project indicate that further refinements may be needed in order to reduce project impacts. Based on discussions with ICF and Planning, Ramboll proposes to update some of the inputs used for the emissions estimates (e.g., construction equipment list, hours of operation), then re-calculate emissions and health risks for these two projects.

For planning purposes, we assume that Ramboll will prepare a list of data needs/questions, which ICF will forward to the Project Applicants. Upon receipt of a data response, Ramboll will re-calculate emissions and health risks for two scenarios: unmitigated scenario and mitigated scenario. For the unmitigated scenario, Ramboll will use the revised equipment list and hours of operation, but we will use fleet-average emission factors to estimate emissions. For the mitigated scenario, Ramboll will use the revised equipment list and hours of operation, and the emission factors will reflect use of any mitigation measures (e.g., use of Tier 4 Final engines or electrification). Ramboll will also evaluate nearby receptors to ensure they should be categorized as sensitive receptors and therefore included in the health risk assessment.

[3] As noted under Task 2, Ramboll will not be relying upon the traffic volumes for the 2020 No Plan or 2040 No Plan scenario in our air quality analysis.

The estimated cost for these updates is **$10,000.**

SCOPE REDUCTION

Ramboll originally scoped to evaluate the air quality impacts of up to four individual projects. Prior to preparing our first SOW, we were informed that the total number of individual projects had been reduced to three. After we prepared the first draft of our SOW, we learned that another project (33 Gough Street) had been eliminated from our scope of work. The elimination of these two individual projects is estimated to reduce our level of effort by approximately **$4,000**.

While the removal of two of the individual projects does help to reduce cost, there are some fixed costs associated with the individual projects. For example, the cost to prepare the data request and set up the emissions calculations, air dispersion model, and HRA is significantly more for the first project as compared to each subsequent project. This is because many of the tools and calculations developed for the first project can be reused for each subsequent project. In addition, a portion of the cost and effort was incurred for 33 Gough Street prior to the project being removed from the analysis, including preparation of a data request, data validation, and setting up the emissions calculations.

Finally, Ramboll's original proposal assumed one round of data collection for the Hub Plan and the individual projects, and that the process would require two weeks. However, multiple rounds of communications with the Project Sponsors and the City's consultants were required to obtain the needed data. Therefore, some of the reductions in effort from not performing the analysis for two additional individual projects are used to cover the additional effort for data collection.

COST ESTIMATE

Ramboll will conduct this work on a time and materials basis. The estimated costs summarized in Table 1 below represent our best estimate of the expected level of effort to complete this evaluation, and is based on the assumptions described above. We will not exceed the cost estimate listed here without prior authorization from you.

Table 1: Proposed Cost Estimate

Task Number and Description	Cost
Task 1. Generator Air Dispersion Modeling and Health Risk Assessment	$12,000
Task 2. Evaluation of No Plan Scenarios in HRA	$12,000
Task 3. Converting Turning Movements to Link Level Traffic Volumes	$21,000
Task 4. 30 Van Ness Project Update – Supplemental Effort	$4,000
Task 5. 30 Van Ness Avenue and 98 Franklin Street Construction Modeling and Health Risk Assessment – Supplemental Effort	$10,000
Scope Reduction (Removal of 2 Individual Projects)	($4,000)
Subtotal	**$55,000**

CLOSING

Thank you for the opportunity to assist you with this matter. We look forward to working with you to complete this assignment. If you have any questions or need further information, please contact us at your convenience.

Sincerely,

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ENVIRONMENT
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Via Electronic Mail

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November 27, 2018

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SCOPE AMENDMENT #2 FOR THE MARKET/OCTAVIA HUB PLAN CEQA AIR QUALITY ANALYSIS, SAN FRANCISCO, CALIFORNIA

Dear Ms. Efner:

At your request, Ramboll US Corporation (Ramboll) is submitting this scope amendment to ICF to cover additional tasks requested by Project Sponsors and the San Francisco Environmental Planning department (Planning) for the California Environmental Quality Act (CEQA) air quality analysis that Ramboll is conducting for the proposed Market/Octavia Hub Plan (Hub Plan) and two individual projects within the Hub Plan in San Francisco, California. This scope amendment provides details on the additional tasks along with the estimated costs.

BACKGROUND

Ramboll is currently under contract to conduct a CEQA air quality analysis for the Hub Plan. The analysis aims to analyze the impacts from the programmatic Hub Plan as well as the construction and operation of two individual proposed projects within the Plan located at 30 Van Ness Avenue and 98 Franklin Street. Ramboll has recently presented draft results on the Project-level analysis (November 1, 2018) and the Plan-level analysis (November 13, 2018). Based on these draft results and feedback from the Project Sponsors and Planning on the analysis so far, Ramboll has identified several out of scope tasks and tasks that require further revisions or refinements, which are further described below.

SCOPE OF WORK

Task 1. Construction Risk Assessment Refinements for 30 Van Ness Avenue and 98 Franklin Street

As previously discussed in our scope amendment dated October 12, 2018, the initial health risk assessments associated with construction of the 98 Franklin Street Project and the 30 Van Ness Project indicated that refinements would be needed in order to reduce project impacts. However, even after implementing updated construction equipment lists from the Project Sponsors, the predicted impacts were still above relevant thresholds. Over the past several weeks, Ramboll has been working with the Project Sponsors to refine the inputs used for the emissions estimates (e.g., construction equipment list, hours of operation), which we have been referring to as the "Project Sponsor Specified Scenario." However, the revised risk estimates based on these initial refinements indicated that additional controls/refinements would be required, so Ramboll incorporated additional refinements (referred to as the "Controlled Scenario") which included the assumption that all off-road equipment (except those specified as electric or propane) would meet USEPA Tier 4 emission standards.

The "Controlled Scenario" for both projects yields risk estimates that are below applicable thresholds on sensitive receptors. We understand that the controls may be too aggressive or do not accurately reflect what the Project Sponsors intend to use, and that the Project Sponsors would like to revise some of the controls, if possible.

For this task, Ramboll proposes to conduct one additional iteration of the construction emission estimates and risk assessment for each Project. For planning purposes, we assume that the Project Sponsors will provide us with updated inputs (e.g., equipment list, hours of operation, horsepower, etc.) and that they will specify the engine tier for each piece of equipment. To assist the Project Sponsors in this regard, Ramboll has provided the Project Sponsors with a detailed breakdown of the risk-driving sources at the point of maximum impact. We have also provided a summary of the emission factors for different engine tiers (e.g., Tier 4 final, Tier 4 interim, Tier 3, etc.).

Since the new equipment list for Van Ness Avenue includes a significant amount of propane equipment, Ramboll will also include health risks from propane equipment, which represent approximately 20% of the horsepower-hours (hp-hr) for Van Ness Avenue and 7% for Franklin Street. Propane health risks will be estimated for both projects by speciating the total organic gas (TOG) emissions from propane-fueled construction equipment. Ramboll will also estimate $PM_{2.5}$ concentrations based on the propane emissions. The risks and hazards from propane equipment will be added to the risks and hazards from the diesel equipment.

Upon finalization of these construction parameters, Ramboll will recalculate emissions and corresponding risks. We will then summarize the results for Planning and the Project Sponsors in annotated tables and figures. Results will include both uncontrolled and controlled scenarios.

The estimated cost for these updates is **$14,000**.

Task 2. 30 Van Ness Avenue Project Update – Revised Generator Location

Based on discussions with the Project Sponsor for 30 Van Ness Avenue, Ramboll understands that the Project Sponsor would like to move the emergency generator from the 9th floor to the 13th floor. For this task, Ramboll proposes to rerun the air dispersion model and recalculate risks to reflect the new generator location. Due to the new generator location, Ramboll will need to re-run some of the model pre-processing algorithms, including the building downwash module. Upon completion of the modeling, Ramboll will update the Air Quality Technical Report, including tables and figures, to reflect the revised location of this generator. For planning purposes, we assume we will rely upon the construction drawing provided by the Project Sponsor on November 15, 2018, to identify the new location of the generator.

The estimated cost for these updates is **$3,500**.

Task 3. 98 Franklin Street Project Update – Revised Generator Size and Location

Based on discussions with the Project Sponsor for 98 Franklin Street, Ramboll understands that the Project Sponsor plans to use a smaller emergency generator (1,500 kW) compared to the one that the Project Sponsor initially specified (2,000 kW) and has been included in the analysis thus far. For this task, Ramboll would calculate emissions for the smaller (1,500 kW) generator. We would then recalculate risks based on these revised emissions.

From conversations with the Project Sponsor for 98 Franklin Street, Ramboll also understands that the Project Sponsor would like to move the emergency generator from the 6th floor podium to the 2nd floor. Because the generator location is changing, Ramboll will need to re-run the model and some of the model pre-processing algorithms, including the building downwash module. Additionally, because the generator is moved to a floor that is not on a podium, the generator source parameters may need to be adjusted to account for horizontal venting instead of vertical venting (to be confirmed with Project Sponsor). After completing the risk calculations, Ramboll will update the Air Quality Technical Report, including tables and figures, to reflect the use of the smaller generator.

The estimated cost for these updates is **$5,000**.

Task 4. Update Traffic Scenarios for Cumulative Analysis

Based on discussions with Planning and Fehr & Peers (F&P), Ramboll understands that traffic for the 2040 Cumulative Scenario will now be performed using Scenario 7 (Cumulative Plus Combined Land Use) instead of Scenario 8 (Cumulative Plus Proposed Project). Since Ramboll was originally instructed to use Scenario 8 (based on email correspondence from Planning forwarded by ICF on October 10, 2018), much of the work already completed (i.e., turning conversion, emission estimation, and risk assessment) on Scenario 8 will need to be repeated for Scenario 7.

For this task, Ramboll will convert the turning movement data to link-level data for the Cumulative Plus Combined Land Use scenario. Since F&P will not be providing turning movement volumes for all intersections included in the Hub Plan, Ramboll will use SFCHAMP data to fill in data gaps. For intersections that are close to the study intersections, we will scale SFCHAMP data using the scenario-specific turning movement data provided by F&P.

Upon finalization of these traffic volumes, Ramboll will calculate emissions and estimate risks. We will then incorporate these updates into the Air Quality Technical Report.

The estimated cost for these updates is **$10,000**.

Task 5. Existing 2018 Traffic Conversion

Based on communications with the noise expert at ICF (phone call with ICF on November 20, 2018), Ramboll understands that ICF's noise modeling requires link-level traffic volumes for Scenario 1 (Existing Conditions in 2018). Ramboll will calculate link-level traffic volumes for this scenario using the same traffic volume conversion methodology as was done for the other scenarios used in air quality modeling. Note that link-level volumes for Scenario 1 will only be used in the noise analysis. As instructed by Planning, Ramboll will continue estimating risk impacts based on existing conditions from the 2020 CRRP analysis and the 2040 Central SoMa analysis.

At ICF's request, Ramboll will also convert all traffic volumes to Google Earth format (.KMZ) so that ICF can easily incorporate the data into their noise models.

The estimated cost for this task is **$1,600**.

Task 6. Communications and Meetings

Ramboll anticipates that Planning and the Project Sponsors may want to have one additional meeting to discuss the results of the analyses after the above updates/refinements have been incorporated. We assume the meeting will be scheduled in early December, prior to issuance of draft AQTR-1. In addition, Ramboll has participated in conference calls with Project Sponsors to discuss the refinements above, and we anticipate that additional communications will be required in order to finalize the analysis. For planning purposes, we assume up to 12 hours of support for communications and meetings. The estimated cost for this task is **$2,000**.

COST ESTIMATE

Ramboll will conduct this work on a time and materials basis. The estimated costs summarized in Table 1 below represent our best estimate of the expected level of effort to complete this evaluation, and is based on the assumptions described above. We will not exceed the cost estimate listed here without prior authorization from you.

Table 1: Proposed Cost Estimate

Task Number and Description	Cost
Task 1. Construction Risk Assessment Refinements for 30 Van Ness Avenue and 98 Franklin Street	$14,000
Task 2. 30 Van Ness Avenue Project Update – Revised Generator Location	$3,500
Task 3. 98 Franklin Street Project Update – Revised Generator Size and Location	$5,000
Task 4. Update Traffic Scenarios for Cumulative Analysis	$10,000
Task 5. Existing 2018 Traffic Conversion	$1,600
Task 6. Meetings and Communications	$2,000
Subtotal	**$36,100**

CLOSING

Thank you for the opportunity to assist you with this matter. We look forward to working with you to complete this assignment. If you have any questions or need further information, please contact us at your convenience.

Sincerely,

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APPENDIX B
SUPPLEMENTAL TABLES

Table B-1
Van Ness Project Land Use Summary
The Hub Plan
San Francisco, CA

Land Use[1]		Size	Units
Type	CalEEMod® Type[2]		
Existing Conditions			
Office	General Office Building	168,253	sf
Pharmacy	Pharmacy/Drugstore w/o Drive Through	12,787	sf
Fast Food Restaurants	Fast Food Restaurant w/o Drive Through	1,054	sf
Parking	Enclosed Parking Structure	42	spaces
Project Conditions			
Retail	Regional Shopping Center	21,000	sf
Residential Units	Apartment High-Rise	610	DU
Office	General Office Building	350,000	sf
Open Space	City Park	31,180	sf
Parking	Enclosed parking structure	243	spaces

Notes:

1. Land uses analyzed based on Project square footages provided by the Project Sponsor.
2. Land uses as defined in CalEEMod®. When an exact mapping of a land use was not available in CalEEMod® relative to the Project description, a land use with similar emission characteristics was chosen.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel

DU - dwelling units

sf - square feet

Table B-2
Van Ness Project Offroad Construction Equipment List
The Hub Plan
San Francisco, CA

Phase	Project Equipment at Site[1]	Horsepower	Equipment Quantity	Usage Hours per Weekday	Usage Hours per Saturday	Controlled Equipment Details		Equipment Usage Dates	
						Fuel	Control	Start	End
Demolition	Concrete/Industrial Saws	81	1	2.0	2.0	Diesel	Tier 4f	5/1/2020	11/1/2020
	Rubber Tired Dozers	247	1	1.0	1.0	Diesel	Tier 4f	5/1/2020	11/1/2020
	Sweepers/Scrubbers	64	1	2.0	2.0	Diesel	Tier 4f	5/1/2020	11/1/2020
	Excavator	158	1	2.4	2.4	Diesel	Tier 4f	5/1/2020	11/1/2020
Site Preparation	Tractors/Loaders/Backhoes	97	1	8.0	8.0	Diesel	Tier 4f	11/2/2020	1/31/2021
	Excavators	158	3	8.0	8.0	Diesel	Tier 4f	11/2/2020	1/31/2021
	Road Cleaner/Sweeper/Scrubber	64	1	4.0	4.0	Diesel	Tier 4f	11/2/2020	1/31/2021
Grading	Rubber Tired Dozers	247	1	1.0	1.0	Diesel	Tier 4f	2/1/2021	4/30/2021
	Tractors/Loaders/Backhoes	97	2	6.0	6.0	Diesel	Tier 4f	2/1/2021	4/30/2021
	Shoring Equipment (Boring Rigs)	221	2	2.4	2.4	Diesel	Tier 4f	2/1/2021	3/1/2021
	Tie Back Equipment (Drilling Rigs)	221	2	2.4	2.4	Diesel	Tier 4f	3/2/2021	3/30/2021
	Ground Improvement (Drilling Rig)	221	1	2.4	2.4	Diesel	Tier 4f	4/1/2021	4/30/2021
	Sweepers/Scrubbers	64	1	8.0	8.0	Diesel	Tier 4f	2/1/2021	4/30/2021
Building Construction	Cranes	231	1	3.0	3.0	Electric	N/A	8/1/2021	12/1/2022
	Forklifts	89	2	4.5	4.5	Propane	N/A	5/1/2021	12/31/2023
	Tractors/Loaders/Backhoes	97	2	2.0	2.0	Diesel	Tier 4f	5/1/2021	12/31/2023
	Tower Crane	231	1	3.0	3.0	Electric	N/A	9/1/2021	5/1/2022
	Aerial Lifts (#1)	63	1	8.0	8.0	Electric	N/A	11/1/2021	3/1/2023
	Aerial Lifts (#2)	63	1	8.0	8.0	Electric	N/A	11/1/2021	5/1/2022
	Concrete Pumps	84	2	2.0	2.0	Electric	N/A	7/1/2021	10/1/2022
	Welders	46	6	0.80	0.80	Electric	N/A	5/1/2021	12/31/2023
Paving	Tractors/Loaders/Backhoes	97	1	5.3	5.3	Diesel	Tier 4f	11/1/2022	5/1/2023
	Concrete/Industrial Saws	81	2	2.0	2.0	Diesel	Tier 4f	11/1/2022	5/1/2023
Architectural Coating	Air Compressors	78	1	3.0	3.0	Electric	N/A	11/1/2021	1/1/2023

Notes:

1. Project equipment was provided by the Project Sponsor.

Abbreviations:

N/A - not applicable
Tier 4f - Tier 4 Final

Table B-3
Franklin Project Land Use Summary
The Hub Plan
San Francisco, CA

Land Use[1]		Size	Units
Type	CalEEMod® Type[2]		
Existing Conditions			
Parking	Parking Lot	100	spaces
Project Conditions			
Residential	Apartments High Rise	345	DU
Retail	Retail	3,100	sf
Parking	Enclosed Parking Structure	111	spaces
Open Space	City Park	33,940	sf
Educational	High School	440	students

Notes:

1. Land uses analyzed based on Project square footages provided by the Project Sponsor.
2. Land uses as defined in CalEEMod®. When an exact mapping of a land use was not available in CalEEMod® relative to the project description, a land use with similar emission characteristics was chosen.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel

DU - dwelling units

sf - square feet

Table B-4
Franklin Offroad Project Construction Equipment List
The Hub Plan
San Francisco, CA

Phase	Project Equipment at Site[1]	Horsepower	Equipment Quantity	Usage Hours per Weekday	Controlled Equipment Details		Equipment Usage Dates	
					Fuel	Control	Start	End
Demolition	Concrete/Industrial Saws	81	1	8.0	Diesel	Tier 4i	6/1/2021	6/5/2021
	Excavators	67	1	8.0	Diesel	Tier 4i	6/1/2021	6/5/2021
	Rubber Tired Dozers	247	1	8.0	Diesel	Tier 4i	6/1/2021	6/5/2021
	Skid Steer Loaders	73	1	8.0	Diesel	Tier 4i	6/1/2021	6/5/2021
Shoring	Drill Rig	500	1	4.5	Diesel	Tier 4i	6/8/2021	8/7/2021
	Excavators	67	1	1.5	Diesel	Tier 4i	6/8/2021	8/7/2021
	Cranes	275	1	1.0	Diesel	Tier 4i	6/8/2021	8/7/2021
	Tieback rig	250	1	3.0	Diesel	Tier 4i	6/8/2021	8/7/2021
	Rough Terrain Forklift	100	1	1.0	Diesel	Tier 4i	6/8/2021	8/7/2021
	Generator	40	1	4.0	Diesel	Tier 4f	6/8/2021	8/7/2021
Excavation	Excavators	250	3	6.0	Diesel	Tier 4i	8/10/2021	10/30/2021
	Skid Steer Loaders	75	2	6.0	Diesel	Tier 4i	8/10/2021	10/30/2021
Building Construction	Cranes	231	1	3.0	Electric	N/A	11/2/2021	8/5/2023
	Forklifts	89	1	2.1	Propane	N/A	11/2/2021	8/5/2023
	Welders	46	2	0.16	Electric	N/A	11/2/2021	8/5/2023
	Sissor lifts	89	1	1.5	Electric	N/A	11/2/2021	8/5/2023
	Signal Boards	6.0	2	8.0	Electric	N/A	11/2/2021	8/5/2023
Paving	Pavers	130	1	4.0	Diesel	Tier 4i	8/1/2023	8/5/2023
	Rollers	50	1	4.0	Diesel	Tier 4i	8/1/2023	8/5/2023
Architectural Coating	Airless Paint Sprayers	78	3	4.0	Electric	N/A	1/7/2023	8/5/2023

Notes:

1. Project equipment was provided by the Project Sponsor.

Abbreviations:

N/A - not applicable
Tier 4f - Tier 4 Final
Tier 4i - Tier 4 Interim

RAMBOLL

Table B-5
Van Ness Project Construction Trips
The Hub Plan
San Francisco, CA

Phase	Year	Construction Days per Year[1]	Total Roundtrips per Calendar Year (trips/year)[2]			Total Roundtrips per Day (trips/day)[2]		
			Worker[4]	Vendor[4]	Hauling[5]	Worker[4]	Vendor[4]	Hauling[5]
Demolition	2020	159	994	0	1,833	6	0	12
Site Preparation	2020	52	390	0	0	8	0	0
	2021	27	203	0	0	8	0	0
Grading	2021	76	950	0	10,500	13	0	138
Building Construction	2021	210	63,315	15,120	3,042	302	72	14
	2022	313	94,370	22,536	4,534	302	72	14
	2023	313	94,370	22,536	4,534	302	72	14
Paving	2022	52	325	0	0	6	0	0
	2023	104	650	0	0	6	0	0
Architectural Coating	2021	52	3,136	0	0	60	0	0
	2022	313	18,874	0	0	60	0	0
	2023	1	60	0	0	60	0	0

Notes:

1. Construction schedule was provided by the Project Sponsor.
2. The total roundtrips per calendar year were estimated by assuming trips are evenly distributed across a phase.
3. The total roundtrips per day were estimated by dividing the round trips per year by the construction days per year.
4. Worker and vendor trips were estimated using methodologies consistent with CalEEMod® defaults. Total trips for worker and vendors depend on the Project land uses as specified in **Table B-1**.
5. Project hauling trips were provided by the Project Sponsor.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel

Table B-6
Franklin Project Construction Trips
The Hub Plan
San Francisco, CA

Phase	Year	Construction Days per Year[1]	Total Roundtrips per Calendar Year (trips/year)[2]			Total Roundtrips per Calendar Year (trips/year)[2]		
			Worker[4]	Vendor[4]	Hauling[5]	Worker[4]	Vendor[4]	Hauling[5]
Demolition	2021	5	25	0	11	5	0	2
Shoring	2021	43	323	0	30	8	0	1
Excavation	2021	58	363	0	880	6	0	15
Building Construction[2]	2021	42	6,615	1,323	52	158	32	1
	2022	250	39,375	7,875	308	158	32	1
	2023	154	24,255	4,851	190	158	32	1
Paving	2023	3	7.5	0	0	3	0	0
Architectural Coating	2023	150	4,725	0	2	32	0	0

Notes:

1. Construction schedule was provided by the Project Sponsor.
2. The total roundtrips per calendar year were estimated by assuming trips are evenly distributed across the construction phase.
3. The total roundtrips per day were estimated by dividing the round trips per year by the construction days per year.
4. Worker and vendor trips were estimated using methodologies consistent with CalEEMod® defaults. Total trips for worker and vendors depend on the Project land uses as specified in **Table B-2**.
5. Project hauling trips were provided by the Project Sponsor.

Abbreviations:

CalEEMod® - CALifornia Emissions Estimator MODel

APPENDIX C
CALEEMOD® OUTPUT FILES FOR VAN NESS PROJECT

30 Van Ness Existing Land Uses - Operational Phase

San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	168.25	1000sqft	0.75	168,250.00	0
Pharmacy/Drugstore w/o Drive Thru	12.79	1000sqft	0.06	12,790.00	0
Enclosed Parking Structure	42.00	Space	0.00	15,850.00	0
Fast Food Restaurant w/o Drive Thru	1.05	1000sqft	0.07	1,050.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	4.6	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2018
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

30 Van Ness Existing Land Uses - Operational Phase - San Francisco County, Annual

Project Characteristics - Default gas and electricity usage.

Land Use - Land uses from the project description. Default acreage was scaled by the actual site acreage.

Construction Phase - Not estimating construction emissions for existing land uses.

Off-road Equipment - Not estimating construction emissions for existing land uses.

Trips and VMT - Not estimating construction emissions for existing land uses. Not estimating construction emissions for existing land uses.

On-road Fugitive Dust - Not estimating construction emissions for existing land uses.

Demolition - Not estimating construction emissions for existing land uses.

Grading - Not estimating construction emissions for existing land uses.

Architectural Coating - Not estimating construction emissions for existing land uses.

Vehicle Trips - CalEEMod default mobile emissions

Energy Use - Conservatively assuming existing building complies with T-24 2016 standards

Vehicle Emission Factors - Vehicle emission factors from EMFAC2017 for 2018.

Vehicle Emission Factors -

Vehicle Emission Factors -

Road Dust - Road silt loading for San Francisco consistent with AP-42.

Consumer Products - Estimated consumer products emission factor for San Francisco

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tblArchitecturalCoating	EF_Residential_Exterior	150.00	0.00
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tblConstructionPhase	NumDays	8.00	0.00
tblConstructionPhase	NumDays	230.00	0.00
tblConstructionPhase	NumDays	18.00	0.00
tblConstructionPhase	NumDays	18.00	0.00

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tblVehicleEF	LHD1	1.2770e-003	1.0970e-003
tblVehicleEF	LHD1	0.11	0.09
tblVehicleEF	LHD1	0.29	0.20
tblVehicleEF	LHD1	0.35	0.11
tblVehicleEF	LHD1	8.8000e-005	8.7000e-005
tblVehicleEF	LHD1	7.4180e-003	8.9730e-003
tblVehicleEF	LHD1	4.7700e-004	1.5300e-004
tblVehicleEF	LHD1	2.1170e-003	1.8710e-003
tblVehicleEF	LHD1	0.10	0.08
tblVehicleEF	LHD1	0.03	0.04
tblVehicleEF	LHD1	1.2770e-003	1.0970e-003
tblVehicleEF	LHD1	0.14	0.11
tblVehicleEF	LHD1	0.29	0.20
tblVehicleEF	LHD1	0.38	0.12
tblVehicleEF	LHD2	4.6220e-003	4.4830e-003
tblVehicleEF	LHD2	0.01	9.4010e-003
tblVehicleEF	LHD2	0.01	0.01

tblVehicleEF	LHD2	0.13	0.16
tblVehicleEF	LHD2	0.82	0.81
tblVehicleEF	LHD2	2.02	0.97
tblVehicleEF	LHD2	13.95	13.69
tblVehicleEF	LHD2	749.70	870.41
tblVehicleEF	LHD2	28.52	10.91
tblVehicleEF	LHD2	0.11	0.10
tblVehicleEF	LHD2	1.04	1.02
tblVehicleEF	LHD2	0.69	0.27
tblVehicleEF	LHD2	1.3000e-003	1.1910e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.02	0.01
tblVehicleEF	LHD2	6.2600e-004	1.8900e-004
tblVehicleEF	LHD2	1.2430e-003	1.1390e-003
tblVehicleEF	LHD2	2.6480e-003	2.5870e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	5.7700e-004	1.7400e-004
tblVehicleEF	LHD2	1.1420e-003	1.3270e-003
tblVehicleEF	LHD2	0.05	0.06
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	6.3800e-004	7.3300e-004
tblVehicleEF	LHD2	0.12	0.11
tblVehicleEF	LHD2	0.14	0.15
tblVehicleEF	LHD2	0.18	0.07
tblVehicleEF	LHD2	1.3700e-004	1.3100e-004
tblVehicleEF	LHD2	7.3090e-003	8.4460e-003
tblVehicleEF	LHD2	3.2200e-004	1.0800e-004

tblVehicleEF	LHD2	1.1420e-003	1.3270e-003
tblVehicleEF	LHD2	0.05	0.06
tblVehicleEF	LHD2	0.02	0.03
tblVehicleEF	LHD2	6.3800e-004	7.3300e-004
tblVehicleEF	LHD2	0.14	0.14
tblVehicleEF	LHD2	0.14	0.15
tblVehicleEF	LHD2	0.19	0.07
tblVehicleEF	MCY	0.52	0.42
tblVehicleEF	MCY	0.17	0.26
tblVehicleEF	MCY	23.29	22.82
tblVehicleEF	MCY	10.08	8.93
tblVehicleEF	MCY	188.91	230.40
tblVehicleEF	MCY	48.18	63.32
tblVehicleEF	MCY	1.19	1.19
tblVehicleEF	MCY	0.32	0.27
tblVehicleEF	MCY	2.3010e-003	2.1050e-003
tblVehicleEF	MCY	5.6940e-003	3.9890e-003
tblVehicleEF	MCY	2.1670e-003	1.9800e-003
tblVehicleEF	MCY	5.4080e-003	3.7830e-003
tblVehicleEF	MCY	0.79	0.75
tblVehicleEF	MCY	0.89	0.80
tblVehicleEF	MCY	0.52	0.49
tblVehicleEF	MCY	2.99	2.95
tblVehicleEF	MCY	0.98	0.74
tblVehicleEF	MCY	2.37	2.06
tblVehicleEF	MCY	2.3570e-003	2.2800e-003
tblVehicleEF	MCY	7.1700e-004	6.2700e-004

tblVehicleEF	MCY	0.79	0.75
tblVehicleEF	MCY	0.89	0.80
tblVehicleEF	MCY	0.52	0.49
tblVehicleEF	MCY	3.61	3.59
tblVehicleEF	MCY	0.98	0.74
tblVehicleEF	MCY	2.58	2.24
tblVehicleEF	MDV	0.01	7.4070e-003
tblVehicleEF	MDV	0.02	0.10
tblVehicleEF	MDV	1.22	1.27
tblVehicleEF	MDV	3.14	3.64
tblVehicleEF	MDV	551.67	463.22
tblVehicleEF	MDV	110.89	91.54
tblVehicleEF	MDV	0.15	0.13
tblVehicleEF	MDV	0.28	0.43
tblVehicleEF	MDV	2.2120e-003	2.2930e-003
tblVehicleEF	MDV	2.3680e-003	2.2520e-003
tblVehicleEF	MDV	2.0410e-003	2.1170e-003
tblVehicleEF	MDV	2.1800e-003	2.0730e-003
tblVehicleEF	MDV	0.04	0.06
tblVehicleEF	MDV	0.14	0.13
tblVehicleEF	MDV	0.04	0.06
tblVehicleEF	MDV	0.03	0.04
tblVehicleEF	MDV	0.09	0.06
tblVehicleEF	MDV	0.25	0.51
tblVehicleEF	MDV	5.5210e-003	4.5780e-003
tblVehicleEF	MDV	1.1640e-003	9.0600e-004
tblVehicleEF	MDV	0.04	0.06

tblVehicleEF	MDV	0.14	0.13
tblVehicleEF	MDV	0.04	0.06
tblVehicleEF	MDV	0.05	0.05
tblVehicleEF	MDV	0.09	0.06
tblVehicleEF	MDV	0.27	0.56
tblVehicleEF	MH	0.06	0.03
tblVehicleEF	MH	0.04	0.03
tblVehicleEF	MH	5.57	4.87
tblVehicleEF	MH	9.42	3.10
tblVehicleEF	MH	1,219.42	1,602.69
tblVehicleEF	MH	67.79	23.03
tblVehicleEF	MH	1.37	1.74
tblVehicleEF	MH	1.00	0.25
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	0.02	0.03
tblVehicleEF	MH	2.7130e-003	7.0300e-004
tblVehicleEF	MH	3.2140e-003	3.2640e-003
tblVehicleEF	MH	0.02	0.03
tblVehicleEF	MH	2.5350e-003	6.5300e-004
tblVehicleEF	MH	0.91	1.19
tblVehicleEF	MH	0.09	0.12
tblVehicleEF	MH	0.37	0.46
tblVehicleEF	MH	0.22	0.20
tblVehicleEF	MH	0.02	0.03
tblVehicleEF	MH	0.61	0.17
tblVehicleEF	MH	0.01	0.02
tblVehicleEF	MH	8.4500e-004	2.2800e-004

tblVehicleEF	MH	0.91	1.19
tblVehicleEF	MH	0.09	0.12
tblVehicleEF	MH	0.37	0.46
tblVehicleEF	MH	0.28	0.26
tblVehicleEF	MH	0.02	0.03
tblVehicleEF	MH	0.67	0.19
tblVehicleEF	MHD	0.02	3.9090e-003
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	0.07	0.01
tblVehicleEF	MHD	0.50	0.46
tblVehicleEF	MHD	0.92	1.22
tblVehicleEF	MHD	8.75	1.37
tblVehicleEF	MHD	140.44	113.65
tblVehicleEF	MHD	1,217.52	1,226.38
tblVehicleEF	MHD	64.09	10.56
tblVehicleEF	MHD	1.09	1.18
tblVehicleEF	MHD	3.07	4.01
tblVehicleEF	MHD	10.54	0.88
tblVehicleEF	MHD	4.8110e-003	4.2300e-003
tblVehicleEF	MHD	0.08	0.13
tblVehicleEF	MHD	1.2760e-003	1.6100e-004
tblVehicleEF	MHD	4.6030e-003	4.0470e-003
tblVehicleEF	MHD	0.08	0.12
tblVehicleEF	MHD	1.1750e-003	1.4900e-004
tblVehicleEF	MHD	1.2140e-003	5.6800e-004
tblVehicleEF	MHD	0.06	0.03
tblVehicleEF	MHD	0.04	0.03

tblVehicleEF	MHD	6.8000e-004	3.2200e-004
tblVehicleEF	MHD	0.20	0.33
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	0.54	0.07
tblVehicleEF	MHD	1.3530e-003	1.0760e-003
tblVehicleEF	MHD	0.01	0.01
tblVehicleEF	MHD	7.9500e-004	1.0400e-004
tblVehicleEF	MHD	1.2140e-003	5.6800e-004
tblVehicleEF	MHD	0.06	0.03
tblVehicleEF	MHD	0.05	0.04
tblVehicleEF	MHD	6.8000e-004	3.2200e-004
tblVehicleEF	MHD	0.23	0.38
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	0.59	0.07
tblVehicleEF	OBUS	0.01	8.1580e-003
tblVehicleEF	OBUS	0.01	0.02
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.30	0.57
tblVehicleEF	OBUS	0.80	1.50
tblVehicleEF	OBUS	6.35	1.95
tblVehicleEF	OBUS	130.74	99.70
tblVehicleEF	OBUS	1,350.79	1,488.65
tblVehicleEF	OBUS	68.30	15.79
tblVehicleEF	OBUS	0.92	0.85
tblVehicleEF	OBUS	3.02	3.79
tblVehicleEF	OBUS	3.42	0.64
tblVehicleEF	OBUS	5.4500e-004	7.1610e-003

tblVehicleEF	OBUS	0.01	0.13
tblVehicleEF	OBUS	6.8300e-004	1.5400e-004
tblVehicleEF	OBUS	5.2200e-004	6.8520e-003
tblVehicleEF	OBUS	0.01	0.12
tblVehicleEF	OBUS	6.3300e-004	1.4200e-004
tblVehicleEF	OBUS	1.0600e-003	9.2100e-004
tblVehicleEF	OBUS	0.02	0.01
tblVehicleEF	OBUS	0.04	0.07
tblVehicleEF	OBUS	5.4500e-004	4.4900e-004
tblVehicleEF	OBUS	0.10	0.34
tblVehicleEF	OBUS	0.03	0.03
tblVehicleEF	OBUS	0.41	0.10
tblVehicleEF	OBUS	1.2590e-003	9.4700e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.9500e-004	1.5600e-004
tblVehicleEF	OBUS	1.0600e-003	9.2100e-004
tblVehicleEF	OBUS	0.02	0.01
tblVehicleEF	OBUS	0.06	0.09
tblVehicleEF	OBUS	5.4500e-004	4.4900e-004
tblVehicleEF	OBUS	0.12	0.39
tblVehicleEF	OBUS	0.03	0.03
tblVehicleEF	OBUS	0.45	0.11
tblVehicleEF	SBUS	0.87	0.18
tblVehicleEF	SBUS	0.01	4.3050e-003
tblVehicleEF	SBUS	0.07	0.01
tblVehicleEF	SBUS	7.72	6.27
tblVehicleEF	SBUS	0.80	0.33

tblVehicleEF	SBUS	7.69	2.20
tblVehicleEF	SBUS	1,170.16	413.13
tblVehicleEF	SBUS	1,092.70	957.54
tblVehicleEF	SBUS	51.49	13.45
tblVehicleEF	SBUS	11.66	2.49
tblVehicleEF	SBUS	5.36	1.71
tblVehicleEF	SBUS	12.93	0.91
tblVehicleEF	SBUS	0.02	2.4290e-003
tblVehicleEF	SBUS	0.01	9.4480e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	5.0200e-004	1.5500e-004
tblVehicleEF	SBUS	0.01	2.3240e-003
tblVehicleEF	SBUS	2.6650e-003	2.3620e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	4.6200e-004	1.4200e-004
tblVehicleEF	SBUS	1.9020e-003	5.4500e-004
tblVehicleEF	SBUS	0.02	4.5270e-003
tblVehicleEF	SBUS	0.93	0.77
tblVehicleEF	SBUS	9.7200e-004	2.3100e-004
tblVehicleEF	SBUS	0.12	0.04
tblVehicleEF	SBUS	0.01	6.9190e-003
tblVehicleEF	SBUS	0.40	0.08
tblVehicleEF	SBUS	0.01	3.9800e-003
tblVehicleEF	SBUS	0.01	9.2850e-003
tblVehicleEF	SBUS	6.4800e-004	1.3300e-004
tblVehicleEF	SBUS	1.9020e-003	5.4500e-004
tblVehicleEF	SBUS	0.02	4.5270e-003

tblVehicleEF	SBUS	1.34	1.12
tblVehicleEF	SBUS	9.7200e-004	2.3100e-004
tblVehicleEF	SBUS	0.14	0.05
tblVehicleEF	SBUS	0.01	6.9190e-003
tblVehicleEF	SBUS	0.44	0.09
tblVehicleEF	UBUS	0.45	1.19
tblVehicleEF	UBUS	0.07	0.00
tblVehicleEF	UBUS	15.25	8.65
tblVehicleEF	UBUS	10.07	0.00
tblVehicleEF	UBUS	2,359.00	1,762.05
tblVehicleEF	UBUS	56.66	0.00
tblVehicleEF	UBUS	19.67	1.47
tblVehicleEF	UBUS	18.32	0.00
tblVehicleEF	UBUS	0.73	0.07
tblVehicleEF	UBUS	0.01	0.03
tblVehicleEF	UBUS	0.38	6.2100e-003
tblVehicleEF	UBUS	2.5060e-003	0.00
tblVehicleEF	UBUS	0.31	0.03
tblVehicleEF	UBUS	3.0000e-003	8.6540e-003
tblVehicleEF	UBUS	0.36	5.9410e-003
tblVehicleEF	UBUS	2.3620e-003	0.00
tblVehicleEF	UBUS	4.7390e-003	0.00
tblVehicleEF	UBUS	0.15	0.00
tblVehicleEF	UBUS	2.3490e-003	0.00
tblVehicleEF	UBUS	1.79	0.02
tblVehicleEF	UBUS	0.03	0.00
tblVehicleEF	UBUS	0.90	0.00

tblVehicleEF	UBUS	0.02	0.01
tblVehicleEF	UBUS	7.5300e-004	0.00
tblVehicleEF	UBUS	4.7390e-003	0.00
tblVehicleEF	UBUS	0.15	0.00
tblVehicleEF	UBUS	2.3490e-003	0.00
tblVehicleEF	UBUS	2.37	1.22
tblVehicleEF	UBUS	0.03	0.00
tblVehicleEF	UBUS	0.98	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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					
2018	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	**NOx**	**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**

30 Van Ness Existing Land Uses - Operational Phase - San Francisco County, Annual

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
		Highest		

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	0.7944	2.0000e-005	2.0900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	4.0000e-003	4.0000e-003	1.0000e-005	0.0000	4.2800e-003
Energy	0.0188	0.1710	0.1436	1.0300e-003		0.0130	0.0130		0.0130	0.0130	0.0000	870.9362	870.9362	0.0345	9.8200e-003	874.7255
Mobile	1.3213	2.4074	12.1240	0.0262	1.8385	0.0454	1.8839	0.5005	0.0429	0.5434	0.0000	2,442.3677	2,442.3677	0.2113	0.0000	2,447.6508
Waste						0.0000	0.0000		0.0000	0.0000	42.0232	0.0000	42.0232	2.4835	0.0000	104.1107
Water						0.0000	0.0000		0.0000	0.0000	9.8740	68.2366	78.1106	1.0172	0.0246	110.8679
Total	**2.1345**	**2.5784**	**12.2697**	**0.0272**	**1.8385**	**0.0584**	**1.8969**	**0.5005**	**0.0559**	**0.5564**	**51.8972**	**3,381.5444**	**3,433.4416**	**3.7466**	**0.0344**	**3,537.3591**

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	0.7944	2.0000e-005	2.0900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	4.0000e-003	4.0000e-003	1.0000e-005	0.0000	4.2800e-003
Energy	0.0188	0.1710	0.1436	1.0300e-003		0.0130	0.0130		0.0130	0.0130	0.0000	870.9362	870.9362	0.0345	9.8200e-003	874.7255
Mobile	1.3213	2.4074	12.1240	0.0262	1.8385	0.0454	1.8839	0.5005	0.0429	0.5434	0.0000	2,442.3677	2,442.3677	0.2113	0.0000	2,447.6508
Waste						0.0000	0.0000		0.0000	0.0000	42.0232	0.0000	42.0232	2.4835	0.0000	104.1107
Water						0.0000	0.0000		0.0000	0.0000	9.8740	68.2366	78.1106	1.0172	0.0246	110.8679
Total	**2.1345**	**2.5784**	**12.2697**	**0.0272**	**1.8385**	**0.0584**	**1.8969**	**0.5005**	**0.0559**	**0.5564**	**51.8972**	**3,381.5444**	**3,433.4416**	**3.7466**	**0.0344**	**3,537.3591**

	ROG	NOx	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	5/16/2018	5/15/2018	5	0	
2	Site Preparation	Site Preparation	6/13/2018	6/12/2018	5	0	
3	Grading	Grading	6/20/2018	6/19/2018	5	0	
4	Building Construction	Building Construction	6/30/2018	6/29/2018	5	0	
5	Paving	Paving	5/18/2019	5/17/2019	5	0	
6	Architectural Coating	Architectural Coating	6/13/2019	6/12/2019	5	0	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 4

Acres of Paving: 0.004

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 273,135; Non-Residential Outdoor: 91,045; Striped Parking Area: 1,008 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	1	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Cement and Mortar Mixers	2	6.00	9	0.56
Paving	Pavers	1	8.00	130	0.42
Paving	Paving Equipment	2	6.00	132	0.36
Paving	Rollers	2	6.00	80	0.38
Paving	Tractors/Loaders/Backhoes	1	8.00	97	0.37
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	65.00	33.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	13.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2018

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Site Preparation - 2018

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	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Site Preparation - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Site Preparation - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Grading - 2018

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	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Grading - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Grading - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Building Construction - 2018

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Building Construction - 2018

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Building Construction - 2018

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Paving - 2019

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Paving	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Paving - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Paving	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Paving - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.7 Architectural Coating - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.7 Architectural Coating - 2019

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.7 Architectural Coating - 2019

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	1.3213	2.4074	12.1240	0.0262	1.8385	0.0454	1.8839	0.5005	0.0429	0.5434	0.0000	2,442.367 7	2,442.367 7	0.2113	0.0000	2,447.650 8
Unmitigated	1.3213	2.4074	12.1240	0.0262	1.8385	0.0454	1.8839	0.5005	0.0429	0.5434	0.0000	2,442.367 7	2,442.367 7	0.2113	0.0000	2,447.650 8

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Enclosed Parking Structure	0.00	0.00	0.00		
Fast Food Restaurant w/o Drive Thru	751.80	730.80	525.00	1,155,244	1,155,244
General Office Building	1,855.80	413.90	176.66	3,369,396	3,369,396
Pharmacy/Drugstore w/o Drive Thru	1,151.87	1,151.87	1151.87	1,352,047	1,352,047
Total	3,759.46	2,296.56	1,853.53	5,876,687	5,876,687

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
Enclosed Parking Structure	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Fast Food Restaurant w/o Drive	9.50	7.30	7.30	1.50	79.50	19.00	51	37	12
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Pharmacy/Drugstore w/o Drive	9.50	7.30	7.30	7.40	73.60	19.00	41	6	53

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Enclosed Parking Structure	0.601825	0.053690	0.174822	0.089295	0.023914	0.004646	0.022060	0.008399	0.004242	0.006732	0.009066	0.000950	0.000359
Fast Food Restaurant w/o Drive Thru	0.601825	0.053690	0.174822	0.089295	0.023914	0.004646	0.022060	0.008399	0.004242	0.006732	0.009066	0.000950	0.000359
General Office Building	0.601825	0.053690	0.174822	0.089295	0.023914	0.004646	0.022060	0.008399	0.004242	0.006732	0.009066	0.000950	0.000359
Pharmacy/Drugstore w/o Drive Thru	0.601825	0.053690	0.174822	0.089295	0.023914	0.004646	0.022060	0.008399	0.004242	0.006732	0.009066	0.000950	0.000359

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	684.8340	684.8340	0.0310	6.4100e-003	687.5174
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	684.8340	684.8340	0.0310	6.4100e-003	687.5174
NaturalGas Mitigated	0.0188	0.1710	0.1436	1.0300e-003		0.0130	0.0130		0.0130	0.0130	0.0000	186.1022	186.1022	3.5700e-003	3.4100e-003	187.2081
NaturalGas Unmitigated	0.0188	0.1710	0.1436	1.0300e-003		0.0130	0.0130		0.0130	0.0130	0.0000	186.1022	186.1022	3.5700e-003	3.4100e-003	187.2081

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					
Enclosed Parking Structure	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fast Food Restaurant w/o Drive Thru	176316	9.5000e-004	8.6400e-003	7.2600e-003	5.0000e-005		6.6000e-004	6.6000e-004		6.6000e-004	6.6000e-004	0.0000	9.4089	9.4089	1.8000e-004	1.7000e-004	9.4648
General Office Building	3.25227e+006	0.0175	0.1594	0.1339	9.6000e-004		0.0121	0.0121		0.0121	0.0121	0.0000	173.5537	173.5537	3.3300e-003	3.1800e-003	174.5850
Pharmacy/Drugstore w/o Drive Thru	58834	3.2000e-004	2.8800e-003	2.4200e-003	2.0000e-005		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004	0.0000	3.1396	3.1396	6.0000e-005	6.0000e-005	3.1583
Total		**0.0188**	**0.1710**	**0.1436**	**1.0300e-003**		**0.0130**	**0.0130**		**0.0130**	**0.0130**	**0.0000**	**186.1022**	**186.1022**	**3.5700e-003**	**3.4100e-003**	**187.2081**

5.2 Energy by Land Use - NaturalGas

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					
Enclosed Parking Structure	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Fast Food Restaurant w/o Drive Thru	176316	9.5000e-004	8.6400e-003	7.2600e-003	5.0000e-005		6.6000e-004	6.6000e-004		6.6000e-004	6.6000e-004	0.0000	9.4089	9.4089	1.8000e-004	1.7000e-004	9.4648
General Office Building	3.25227e+006	0.0175	0.1594	0.1339	9.6000e-004		0.0121	0.0121		0.0121	0.0121	0.0000	173.5537	173.5537	3.3300e-003	3.1800e-003	174.5850
Pharmacy/Drugstore w/o Drive Thru	58834	3.2000e-004	2.8800e-003	2.4200e-003	2.0000e-005		2.2000e-004	2.2000e-004		2.2000e-004	2.2000e-004	0.0000	3.1396	3.1396	6.0000e-005	6.0000e-005	3.1583
Total		**0.0188**	**0.1710**	**0.1436**	**1.0300e-003**		**0.0130**	**0.0130**		**0.0130**	**0.0130**	**0.0000**	**186.1022**	**186.1022**	**3.5700e-003**	**3.4100e-003**	**187.2081**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Enclosed Parking Structure	89869.5	26.1441	1.1800e-003	2.4000e-004	26.2465
Fast Food Restaurant w/o Drive Thru	30429	8.8522	4.0000e-004	8.0000e-005	8.8868
General Office Building	2.09976e+006	610.8443	0.0276	5.7100e-003	613.2377
Pharmacy/Drugstore w/o Drive Thru	134039	38.9935	1.7600e-003	3.6000e-004	39.1463
Total		**684.8340**	**0.0310**	**6.3900e-003**	**687.5174**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Enclosed Parking Structure	89869.5	26.1441	1.1800e-003	2.4000e-004	26.2465
Fast Food Restaurant w/o Drive Thru	30429	8.8522	4.0000e-004	8.0000e-005	8.8868
General Office Building	2.09976e+006	610.8443	0.0276	5.7100e-003	613.2377
Pharmacy/Drugstore w/o Drive Thru	134039	38.9935	1.7600e-003	3.6000e-004	39.1463
Total		**684.8340**	**0.0310**	**6.3900e-003**	**687.5174**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	0.7944	2.0000e-005	2.0900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	4.0000e-003	4.0000e-003	1.0000e-005	0.0000	4.2800e-003
Unmitigated	0.7944	2.0000e-005	2.0900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	4.0000e-003	4.0000e-003	1.0000e-005	0.0000	4.2800e-003

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.0953					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.6989					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	2.0000e-004	2.0000e-005	2.0900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	4.0000e-003	4.0000e-003	1.0000e-005	0.0000	4.2800e-003
Total	**0.7944**	**2.0000e-005**	**2.0900e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**4.0000e-003**	**4.0000e-003**	**1.0000e-005**	**0.0000**	**4.2800e-003**

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	0.0953					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	0.6989					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	2.0000e-004	2.0000e-005	2.0900e-003	0.0000		1.0000e-005	1.0000e-005		1.0000e-005	1.0000e-005	0.0000	4.0000e-003	4.0000e-003	1.0000e-005	0.0000	4.2800e-003
Total	**0.7944**	**2.0000e-005**	**2.0900e-003**	**0.0000**		**1.0000e-005**	**1.0000e-005**		**1.0000e-005**	**1.0000e-005**	**0.0000**	**4.0000e-003**	**4.0000e-003**	**1.0000e-005**	**0.0000**	**4.2800e-003**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	78.1106	1.0172	0.0246	110.8679
Unmitigated	78.1106	1.0172	0.0246	110.8679

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Enclosed Parking Structure	0 / 0	0.0000	0.0000	0.0000	0.0000
Fast Food Restaurant w/o Drive Thru	0.31871 / 0.0203432	0.6235	0.0104	2.5000e-004	0.9583
General Office Building	29.9037 / 18.3281	75.2206	0.9774	0.0236	106.6949
Pharmacy/Drugstore w/o Drive Thru	0.901024 / 0.55224	2.2665	0.0295	7.1000e-004	3.2148
Total		**78.1106**	**1.0172**	**0.0246**	**110.8680**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Enclosed Parking Structure	0 / 0	0.0000	0.0000	0.0000	0.0000
Fast Food Restaurant w/o Drive Thru	0.31871 / 0.0203432	0.6235	0.0104	2.5000e-004	0.9583
General Office Building	29.9037 / 18.3281	75.2206	0.9774	0.0236	106.6949
Pharmacy/Drugstore w/o Drive Thru	0.901024 / 0.55224	2.2665	0.0295	7.1000e-004	3.2148
Total		**78.1106**	**1.0172**	**0.0246**	**110.8680**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	42.0232	2.4835	0.0000	104.1107
Unmitigated	42.0232	2.4835	0.0000	104.1107

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Enclosed Parking Structure	0	0.0000	0.0000	0.0000	0.0000
Fast Food Restaurant w/o Drive Thru	12.09	2.4542	0.1450	0.0000	6.0801
General Office Building	156.47	31.7620	1.8771	0.0000	78.6890
Pharmacy/Drugstore w/o Drive Thru	38.46	7.8070	0.4614	0.0000	19.3416
Total		**42.0232**	**2.4835**	**0.0000**	**104.1107**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Enclosed Parking Structure	0	0.0000	0.0000	0.0000	0.0000
Fast Food Restaurant w/o Drive Thru	12.09	2.4542	0.1450	0.0000	6.0801
General Office Building	156.47	31.7620	1.8771	0.0000	78.6890
Pharmacy/Drugstore w/o Drive Thru	38.46	7.8070	0.4614	0.0000	19.3416
Total		**42.0232**	**2.4835**	**0.0000**	**104.1107**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

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

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

30 Van Ness Project - Proposed Land Use

San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
General Office Building	350.00	1000sqft	0.33	350,000.00	0
Enclosed Parking Structure	243.00	Space	0.09	76,320.00	0
City Park	0.71	Acre	0.03	31,180.00	0
Apartments High Rise	610.00	Dwelling Unit	0.41	520,000.00	1745
Regional Shopping Center	21.00	1000sqft	0.02	21,000.00	0

1.2 Other Project Characteristics

Urbanization Urban **Wind Speed (m/s)** 4.6 **Precipitation Freq (Days)** 64

Climate Zone 5 **Operational Year** 2024

Utility Company Pacific Gas & Electric Company

CO2 Intensity (lb/MWhr) 641.35 **CH4 Intensity (lb/MWhr)** 0.029 **N2O Intensity (lb/MWhr)** 0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Construction begins May 1, 2020 and ends Dec, 2023.

Land Use - Land use unit amounts from project sponsor. Lot acreage was scaled based on total lot size (0.88 acres)

Construction Phase - Construction emissions calculations outside of CalEEMod.

Off-road Equipment - Construction emissions outside of CalEEMod.

Off-road Equipment - Construction emissions outside of CalEEMod.

Off-road Equipment - Construction emissions outside of CalEEMod.

Off-road Equipment - Construction emissions outside of CalEEMod.

Off-road Equipment - Off-road equipment list based on information from project sponsor.

Off-road Equipment - Construction emissions outside of CalEEMod.

Trips and VMT - Construction emissions outside of CalEEMod.

On-road Fugitive Dust - Construction emissions outside of CalEEMod.

Demolition - Construction emissions outside of CalEEMod.

Grading - Construction emissions outside of CalEEMod.

Architectural Coating - Construction emissions outside of CalEEMod.

Vehicle Trips - Zero out trip rates for city park since this land use should not generate trips. All trips are internal.

Vehicle Emission Factors - Emission factors from EMFAC2017 for 2024.

Vehicle Emission Factors -

Road Dust - Road silt loading factor consistent with AP-42 for San Francisco.

Woodstoves - No natural gas fire places are being installed into residential units

Consumer Products - Consumer product emission factors calculated based on San Francisco's ROG emissions from consumer products and SF's square footage.

Energy Use - Using 2019 T 24 of 50% reduced intensity for lighting.

Water And Wastewater - Only modeling CAP emissions, which are not quantified in CalEEMod for water and wastewater end uses.

Solid Waste - Only modeling CAP emissions, which are not quantified in CalEEMod for waste end uses.

Construction Off-road Equipment Mitigation - Electrical man hoist categorized as Aerial Lift.

Energy Mitigation -

Stationary Sources - Emergency Generators and Fire Pumps - Stationary source emissions will be calculated outside of CalEEMod.

30 Van Ness Project - Proposed Land Use - San Francisco County, Annual

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Parking	4,579.00	5,832.00
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	0.00
tblArchitecturalCoating	EF_Nonresidential_Interior	100.00	0.00
tblArchitecturalCoating	EF_Parking	150.00	0.00
tblArchitecturalCoating	EF_Residential_Exterior	150.00	0.00
tblArchitecturalCoating	EF_Residential_Interior	100.00	0.00
tblAreaCoating	Area_Parking	4579	5832
tblConstEquipMitigation	FuelType	Diesel	Electrical
tblConstEquipMitigation	NumberOfEquipmentMitigated	0.00	2.00
tblConstructionPhase	NumDays	5.00	0.00
tblConstructionPhase	NumDays	100.00	0.00
tblConstructionPhase	NumDays	10.00	0.00
tblConstructionPhase	NumDays	2.00	0.00
tblConstructionPhase	NumDays	5.00	0.00
tblConstructionPhase	NumDays	1.00	0.00
tblConsumerProducts	ROG_EF	2.14E-05	2.1E-05
tblFireplaces	FireplaceDayYear	11.14	0.00
tblFireplaces	FireplaceHourDay	3.50	0.00
tblFireplaces	FireplaceWoodMass	228.80	0.00
tblFireplaces	NumberGas	91.50	0.00
tblFireplaces	NumberNoFireplace	24.40	0.00
tblFireplaces	NumberWood	103.70	0.00
tblFleetMix	HHD	9.2570e-003	8.5740e-003
tblFleetMix	HHD	9.2570e-003	8.5740e-003
tblFleetMix	HHD	9.2570e-003	8.5740e-003
tblFleetMix	HHD	9.2570e-003	8.5740e-003

tblFleetMix	HHD	9.2570e-003	8.5740e-003
tblFleetMix	LDA	0.60	0.58
tblFleetMix	LDA	0.60	0.58
tblFleetMix	LDA	0.60	0.58
tblFleetMix	LDA	0.60	0.58
tblFleetMix	LDA	0.60	0.58
tblFleetMix	LDT1	0.04	0.05
tblFleetMix	LDT1	0.04	0.05
tblFleetMix	LDT1	0.04	0.05
tblFleetMix	LDT1	0.04	0.05
tblFleetMix	LDT1	0.04	0.05
tblFleetMix	LDT2	0.19	0.17
tblFleetMix	LDT2	0.19	0.17
tblFleetMix	LDT2	0.19	0.17
tblFleetMix	LDT2	0.19	0.17
tblFleetMix	LDT2	0.19	0.17
tblFleetMix	LHD1	0.01	0.02
tblFleetMix	LHD1	0.01	0.02
tblFleetMix	LHD1	0.01	0.02
tblFleetMix	LHD1	0.01	0.02
tblFleetMix	LHD1	0.01	0.02
tblFleetMix	LHD2	5.0770e-003	5.5390e-003
tblFleetMix	LHD2	5.0770e-003	5.5390e-003
tblFleetMix	LHD2	5.0770e-003	5.5390e-003
tblFleetMix	LHD2	5.0770e-003	5.5390e-003
tblFleetMix	LHD2	5.0770e-003	5.5390e-003
tblFleetMix	MCY	6.2620e-003	7.1020e-003

tblFleetMix	MCY	6.2620e-003	7.1020e-003
tblFleetMix	MCY	6.2620e-003	7.1020e-003
tblFleetMix	MCY	6.2620e-003	7.1020e-003
tblFleetMix	MCY	6.2620e-003	7.1020e-003
tblFleetMix	MDV	0.09	0.11
tblFleetMix	MDV	0.09	0.11
tblFleetMix	MDV	0.09	0.11
tblFleetMix	MDV	0.09	0.11
tblFleetMix	MDV	0.09	0.11
tblFleetMix	MH	5.1900e-004	5.8400e-004
tblFleetMix	MH	5.1900e-004	5.8400e-004
tblFleetMix	MH	5.1900e-004	5.8400e-004
tblFleetMix	MH	5.1900e-004	5.8400e-004
tblFleetMix	MH	5.1900e-004	5.8400e-004
tblFleetMix	MHD	0.03	0.03
tblFleetMix	MHD	0.03	0.03
tblFleetMix	MHD	0.03	0.03
tblFleetMix	MHD	0.03	0.03
tblFleetMix	MHD	0.03	0.03
tblFleetMix	OBUS	4.2880e-003	3.4080e-003
tblFleetMix	OBUS	4.2880e-003	3.4080e-003
tblFleetMix	OBUS	4.2880e-003	3.4080e-003
tblFleetMix	OBUS	4.2880e-003	3.4080e-003
tblFleetMix	OBUS	4.2880e-003	3.4080e-003
tblFleetMix	SBUS	9.4500e-004	1.0360e-003
tblFleetMix	SBUS	9.4500e-004	1.0360e-003
tblFleetMix	SBUS	9.4500e-004	1.0360e-003

tblFleetMix	SBUS	9.4500e-004	1.0360e-003
tblFleetMix	SBUS	9.4500e-004	1.0360e-003
tblFleetMix	UBUS	3.5530e-003	6.4740e-003
tblFleetMix	UBUS	3.5530e-003	6.4740e-003
tblFleetMix	UBUS	3.5530e-003	6.4740e-003
tblFleetMix	UBUS	3.5530e-003	6.4740e-003
tblFleetMix	UBUS	3.5530e-003	6.4740e-003
tblLandUse	LandUseSquareFeet	97,200.00	76,320.00
tblLandUse	LandUseSquareFeet	30,927.60	31,180.00
tblLandUse	LandUseSquareFeet	610,000.00	520,000.00
tblLandUse	LotAcreage	8.03	0.33
tblLandUse	LotAcreage	2.19	0.09
tblLandUse	LotAcreage	0.71	0.03
tblLandUse	LotAcreage	9.84	0.41
tblLandUse	LotAcreage	0.48	0.02
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00

tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblTripsAndVMT	VendorTripNumber	144.00	0.00
tblTripsAndVMT	WorkerTripLength	10.80	12.40
tblTripsAndVMT	WorkerTripLength	10.80	12.40
tblTripsAndVMT	WorkerTripLength	10.80	12.40
tblTripsAndVMT	WorkerTripLength	10.80	12.40
tblTripsAndVMT	WorkerTripLength	10.80	12.40
tblTripsAndVMT	WorkerTripLength	10.80	12.40
tblTripsAndVMT	WorkerTripNumber	603.00	0.00
tblTripsAndVMT	WorkerTripNumber	121.00	0.00
tblVehicleEF	HHD	0.56	0.05
tblVehicleEF	HHD	0.38	0.35
tblVehicleEF	HHD	0.06	1.0000e-006
tblVehicleEF	HHD	1.74	4.91
tblVehicleEF	HHD	2.21	1.39
tblVehicleEF	HHD	4.51	0.01
tblVehicleEF	HHD	3,134.48	944.78
tblVehicleEF	HHD	1,887.93	1,827.00
tblVehicleEF	HHD	14.15	0.11
tblVehicleEF	HHD	17.68	5.87
tblVehicleEF	HHD	3.02	3.67
tblVehicleEF	HHD	18.99	2.33
tblVehicleEF	HHD	0.03	5.9640e-003
tblVehicleEF	HHD	0.06	0.06

tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.4530e-003	0.02
tblVehicleEF	HHD	1.4500e-004	2.0000e-006
tblVehicleEF	HHD	0.02	5.7060e-003
tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.5310e-003	8.7170e-003
tblVehicleEF	HHD	8.0860e-003	0.02
tblVehicleEF	HHD	1.3300e-004	2.0000e-006
tblVehicleEF	HHD	7.9000e-005	6.0000e-006
tblVehicleEF	HHD	4.0930e-003	3.5600e-004
tblVehicleEF	HHD	0.39	0.33
tblVehicleEF	HHD	5.6000e-005	4.0000e-006
tblVehicleEF	HHD	0.10	0.04
tblVehicleEF	HHD	6.6800e-004	2.4900e-004
tblVehicleEF	HHD	0.09	6.0000e-006
tblVehicleEF	HHD	0.03	7.9910e-003
tblVehicleEF	HHD	0.02	0.01
tblVehicleEF	HHD	2.1500e-004	1.0000e-006
tblVehicleEF	HHD	7.9000e-005	6.0000e-006
tblVehicleEF	HHD	4.0930e-003	3.5600e-004
tblVehicleEF	HHD	0.48	0.40
tblVehicleEF	HHD	5.6000e-005	4.0000e-006
tblVehicleEF	HHD	0.48	0.40
tblVehicleEF	HHD	6.6800e-004	2.4900e-004
tblVehicleEF	HHD	0.10	6.0000e-006
tblVehicleEF	LDA	3.6440e-003	2.0270e-003
tblVehicleEF	LDA	4.2460e-003	0.04

tblVehicleEF	LDA	0.49	0.56
tblVehicleEF	LDA	1.00	2.13
tblVehicleEF	LDA	248.83	249.41
tblVehicleEF	LDA	52.61	49.94
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	0.06	0.17
tblVehicleEF	LDA	2.0930e-003	1.7070e-003
tblVehicleEF	LDA	2.2530e-003	1.7140e-003
tblVehicleEF	LDA	1.9270e-003	1.5720e-003
tblVehicleEF	LDA	2.0710e-003	1.5760e-003
tblVehicleEF	LDA	0.02	0.03
tblVehicleEF	LDA	0.08	0.09
tblVehicleEF	LDA	0.02	0.03
tblVehicleEF	LDA	9.2100e-003	7.6970e-003
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	0.06	0.20
tblVehicleEF	LDA	2.4900e-003	2.4670e-003
tblVehicleEF	LDA	5.4300e-004	4.9400e-004
tblVehicleEF	LDA	0.02	0.03
tblVehicleEF	LDA	0.08	0.09
tblVehicleEF	LDA	0.02	0.03
tblVehicleEF	LDA	0.01	0.01
tblVehicleEF	LDA	0.04	0.03
tblVehicleEF	LDA	0.06	0.22
tblVehicleEF	LDT1	5.9890e-003	3.3460e-003
tblVehicleEF	LDT1	8.2800e-003	0.05
tblVehicleEF	LDT1	0.74	0.77

tblVehicleEF	LDT1	1.81	2.29
tblVehicleEF	LDT1	310.75	301.05
tblVehicleEF	LDT1	66.21	60.36
tblVehicleEF	LDT1	0.06	0.05
tblVehicleEF	LDT1	0.10	0.21
tblVehicleEF	LDT1	2.3520e-003	1.9580e-003
tblVehicleEF	LDT1	2.5880e-003	1.9990e-003
tblVehicleEF	LDT1	2.1640e-003	1.8020e-003
tblVehicleEF	LDT1	2.3800e-003	1.8380e-003
tblVehicleEF	LDT1	0.05	0.05
tblVehicleEF	LDT1	0.16	0.12
tblVehicleEF	LDT1	0.05	0.05
tblVehicleEF	LDT1	0.01	0.01
tblVehicleEF	LDT1	0.13	0.07
tblVehicleEF	LDT1	0.11	0.25
tblVehicleEF	LDT1	3.1140e-003	2.9790e-003
tblVehicleEF	LDT1	6.9300e-004	5.9700e-004
tblVehicleEF	LDT1	0.05	0.05
tblVehicleEF	LDT1	0.16	0.12
tblVehicleEF	LDT1	0.05	0.05
tblVehicleEF	LDT1	0.02	0.02
tblVehicleEF	LDT1	0.13	0.07
tblVehicleEF	LDT1	0.12	0.28
tblVehicleEF	LDT2	5.0070e-003	3.0070e-003
tblVehicleEF	LDT2	5.1920e-003	0.06
tblVehicleEF	LDT2	0.64	0.71
tblVehicleEF	LDT2	1.22	2.68

tblVehicleEF	LDT2	350.14	318.38
tblVehicleEF	LDT2	73.70	64.11
tblVehicleEF	LDT2	0.06	0.05
tblVehicleEF	LDT2	0.08	0.23
tblVehicleEF	LDT2	2.1760e-003	1.7430e-003
tblVehicleEF	LDT2	2.3270e-003	1.6970e-003
tblVehicleEF	LDT2	2.0010e-003	1.6040e-003
tblVehicleEF	LDT2	2.1400e-003	1.5600e-003
tblVehicleEF	LDT2	0.03	0.05
tblVehicleEF	LDT2	0.09	0.10
tblVehicleEF	LDT2	0.03	0.05
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.06	0.06
tblVehicleEF	LDT2	0.07	0.27
tblVehicleEF	LDT2	3.5050e-003	3.1490e-003
tblVehicleEF	LDT2	7.5700e-004	6.3400e-004
tblVehicleEF	LDT2	0.03	0.05
tblVehicleEF	LDT2	0.09	0.10
tblVehicleEF	LDT2	0.03	0.05
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.06	0.06
tblVehicleEF	LDT2	0.08	0.29
tblVehicleEF	LHD1	5.6310e-003	5.7060e-003
tblVehicleEF	LHD1	0.01	6.6600e-003
tblVehicleEF	LHD1	0.02	0.01
tblVehicleEF	LHD1	0.15	0.20
tblVehicleEF	LHD1	0.75	0.58

tblVehicleEF	LHD1	2.33	1.10
tblVehicleEF	LHD1	8.76	8.63
tblVehicleEF	LHD1	690.52	806.60
tblVehicleEF	LHD1	35.12	12.89
tblVehicleEF	LHD1	0.06	0.04
tblVehicleEF	LHD1	0.60	0.34
tblVehicleEF	LHD1	1.03	0.33
tblVehicleEF	LHD1	7.0900e-004	6.8000e-004
tblVehicleEF	LHD1	9.9640e-003	9.5380e-003
tblVehicleEF	LHD1	9.9640e-003	6.6230e-003
tblVehicleEF	LHD1	8.1300e-004	2.4000e-004
tblVehicleEF	LHD1	6.7800e-004	6.5100e-004
tblVehicleEF	LHD1	2.4910e-003	2.3840e-003
tblVehicleEF	LHD1	9.4940e-003	6.2890e-003
tblVehicleEF	LHD1	7.4800e-004	2.2100e-004
tblVehicleEF	LHD1	1.8860e-003	1.4240e-003
tblVehicleEF	LHD1	0.09	0.06
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	1.2420e-003	9.2100e-004
tblVehicleEF	LHD1	0.09	0.07
tblVehicleEF	LHD1	0.28	0.16
tblVehicleEF	LHD1	0.23	0.07
tblVehicleEF	LHD1	8.8000e-005	8.4000e-005
tblVehicleEF	LHD1	6.7840e-003	7.8940e-003
tblVehicleEF	LHD1	3.9500e-004	1.2800e-004
tblVehicleEF	LHD1	1.8860e-003	1.4240e-003
tblVehicleEF	LHD1	0.09	0.06

tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	1.2420e-003	9.2100e-004
tblVehicleEF	LHD1	0.11	0.09
tblVehicleEF	LHD1	0.28	0.16
tblVehicleEF	LHD1	0.26	0.07
tblVehicleEF	LHD2	3.2090e-003	3.3650e-003
tblVehicleEF	LHD2	6.7110e-003	6.0180e-003
tblVehicleEF	LHD2	5.6100e-003	7.6680e-003
tblVehicleEF	LHD2	0.12	0.14
tblVehicleEF	LHD2	0.50	0.52
tblVehicleEF	LHD2	1.11	0.65
tblVehicleEF	LHD2	13.84	13.47
tblVehicleEF	LHD2	698.44	765.11
tblVehicleEF	LHD2	23.92	8.40
tblVehicleEF	LHD2	0.09	0.08
tblVehicleEF	LHD2	0.44	0.47
tblVehicleEF	LHD2	0.40	0.19
tblVehicleEF	LHD2	1.1970e-003	1.3540e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.9100e-004	1.2600e-004
tblVehicleEF	LHD2	1.1450e-003	1.2960e-003
tblVehicleEF	LHD2	2.6920e-003	2.6650e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.5900e-004	1.1600e-004
tblVehicleEF	LHD2	5.8600e-004	8.0100e-004
tblVehicleEF	LHD2	0.03	0.04

tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	3.8300e-004	5.0800e-004
tblVehicleEF	LHD2	0.10	0.10
tblVehicleEF	LHD2	0.06	0.09
tblVehicleEF	LHD2	0.08	0.04
tblVehicleEF	LHD2	1.3500e-004	1.2900e-004
tblVehicleEF	LHD2	6.7910e-003	7.3990e-003
tblVehicleEF	LHD2	2.5900e-004	8.3000e-005
tblVehicleEF	LHD2	5.8600e-004	8.0100e-004
tblVehicleEF	LHD2	0.03	0.04
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	3.8300e-004	5.0800e-004
tblVehicleEF	LHD2	0.11	0.11
tblVehicleEF	LHD2	0.06	0.09
tblVehicleEF	LHD2	0.08	0.04
tblVehicleEF	MCY	0.56	0.40
tblVehicleEF	MCY	0.17	0.25
tblVehicleEF	MCY	20.61	20.63
tblVehicleEF	MCY	10.18	9.07
tblVehicleEF	MCY	193.06	229.85
tblVehicleEF	MCY	46.00	61.66
tblVehicleEF	MCY	1.19	1.19
tblVehicleEF	MCY	0.33	0.28
tblVehicleEF	MCY	2.5080e-003	2.3850e-003
tblVehicleEF	MCY	3.7870e-003	2.9930e-003
tblVehicleEF	MCY	2.3460e-003	2.2300e-003
tblVehicleEF	MCY	3.5710e-003	2.8200e-003

tblVehicleEF	MCY	0.79	0.79
tblVehicleEF	MCY	0.80	0.78
tblVehicleEF	MCY	0.51	0.51
tblVehicleEF	MCY	2.80	2.80
tblVehicleEF	MCY	0.84	0.70
tblVehicleEF	MCY	2.26	1.99
tblVehicleEF	MCY	2.3520e-003	2.2750e-003
tblVehicleEF	MCY	6.9300e-004	6.1000e-004
tblVehicleEF	MCY	0.79	0.79
tblVehicleEF	MCY	0.80	0.78
tblVehicleEF	MCY	0.51	0.51
tblVehicleEF	MCY	3.46	3.47
tblVehicleEF	MCY	0.84	0.70
tblVehicleEF	MCY	2.46	2.16
tblVehicleEF	MDV	7.1350e-003	3.0460e-003
tblVehicleEF	MDV	9.0500e-003	0.06
tblVehicleEF	MDV	0.80	0.69
tblVehicleEF	MDV	1.79	2.72
tblVehicleEF	MDV	460.22	375.26
tblVehicleEF	MDV	94.54	73.63
tblVehicleEF	MDV	0.08	0.05
tblVehicleEF	MDV	0.14	0.23
tblVehicleEF	MDV	2.2400e-003	1.8270e-003
tblVehicleEF	MDV	2.3440e-003	1.7490e-003
tblVehicleEF	MDV	2.0640e-003	1.6850e-003
tblVehicleEF	MDV	2.1550e-003	1.6080e-003
tblVehicleEF	MDV	0.04	0.04

tblVehicleEF	MDV	0.11	0.09
tblVehicleEF	MDV	0.04	0.05
tblVehicleEF	MDV	0.02	0.01
tblVehicleEF	MDV	0.09	0.05
tblVehicleEF	MDV	0.12	0.27
tblVehicleEF	MDV	4.6020e-003	3.7080e-003
tblVehicleEF	MDV	9.7600e-004	7.2900e-004
tblVehicleEF	MDV	0.04	0.04
tblVehicleEF	MDV	0.11	0.09
tblVehicleEF	MDV	0.04	0.05
tblVehicleEF	MDV	0.03	0.02
tblVehicleEF	MDV	0.09	0.05
tblVehicleEF	MDV	0.13	0.30
tblVehicleEF	MH	0.02	7.9410e-003
tblVehicleEF	MH	0.02	0.02
tblVehicleEF	MH	1.01	0.78
tblVehicleEF	MH	4.36	1.96
tblVehicleEF	MH	1,185.81	1,444.02
tblVehicleEF	MH	56.72	17.21
tblVehicleEF	MH	0.83	0.98
tblVehicleEF	MH	0.62	0.23
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	1.0110e-003	2.8400e-004
tblVehicleEF	MH	3.2230e-003	3.2780e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	9.3000e-004	2.6100e-004

tblVehicleEF	MH	0.34	0.38
tblVehicleEF	MH	0.03	0.04
tblVehicleEF	MH	0.15	0.15
tblVehicleEF	MH	0.05	0.05
tblVehicleEF	MH	0.01	9.9170e-003
tblVehicleEF	MH	0.24	0.08
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	6.4300e-004	1.7000e-004
tblVehicleEF	MH	0.34	0.38
tblVehicleEF	MH	0.03	0.04
tblVehicleEF	MH	0.15	0.15
tblVehicleEF	MH	0.07	0.07
tblVehicleEF	MH	0.01	9.9170e-003
tblVehicleEF	MH	0.27	0.09
tblVehicleEF	MHD	0.02	3.1870e-003
tblVehicleEF	MHD	3.4540e-003	1.3420e-003
tblVehicleEF	MHD	0.05	7.5740e-003
tblVehicleEF	MHD	0.31	0.50
tblVehicleEF	MHD	0.30	0.19
tblVehicleEF	MHD	4.66	0.85
tblVehicleEF	MHD	155.32	115.14
tblVehicleEF	MHD	1,179.47	1,042.42
tblVehicleEF	MHD	51.33	7.73
tblVehicleEF	MHD	0.45	0.72
tblVehicleEF	MHD	1.09	1.42
tblVehicleEF	MHD	12.05	1.80
tblVehicleEF	MHD	1.5900e-004	6.2700e-004

tblVehicleEF	MHD	3.1450e-003	6.7340e-003
tblVehicleEF	MHD	7.2000e-004	8.6000e-005
tblVehicleEF	MHD	1.5200e-004	6.0000e-004
tblVehicleEF	MHD	3.0060e-003	6.4390e-003
tblVehicleEF	MHD	6.6200e-004	7.9000e-005
tblVehicleEF	MHD	7.5300e-004	3.0600e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	4.8600e-004	1.9900e-004
tblVehicleEF	MHD	0.04	0.01
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	0.29	0.04
tblVehicleEF	MHD	1.4920e-003	1.0890e-003
tblVehicleEF	MHD	0.01	9.9130e-003
tblVehicleEF	MHD	5.9500e-004	7.7000e-005
tblVehicleEF	MHD	7.5300e-004	3.0600e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	4.8600e-004	1.9900e-004
tblVehicleEF	MHD	0.05	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	0.32	0.04
tblVehicleEF	OBUS	0.01	6.6390e-003
tblVehicleEF	OBUS	5.3460e-003	3.7010e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.24	0.61
tblVehicleEF	OBUS	0.42	0.48

tblVehicleEF	OBUS	4.75	1.70
tblVehicleEF	OBUS	142.11	100.56
tblVehicleEF	OBUS	1,309.44	1,333.01
tblVehicleEF	OBUS	64.09	14.28
tblVehicleEF	OBUS	0.32	0.41
tblVehicleEF	OBUS	1.10	1.59
tblVehicleEF	OBUS	3.67	1.17
tblVehicleEF	OBUS	2.9000e-005	1.3400e-004
tblVehicleEF	OBUS	3.1040e-003	8.1250e-003
tblVehicleEF	OBUS	6.6000e-004	1.4000e-004
tblVehicleEF	OBUS	2.8000e-005	1.2900e-004
tblVehicleEF	OBUS	2.9580e-003	7.7640e-003
tblVehicleEF	OBUS	6.0600e-004	1.2900e-004
tblVehicleEF	OBUS	1.0980e-003	1.0910e-003
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	0.03	0.05
tblVehicleEF	OBUS	6.0200e-004	5.6600e-004
tblVehicleEF	OBUS	0.05	0.03
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.30	0.08
tblVehicleEF	OBUS	1.3670e-003	9.5500e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.2400e-004	1.4100e-004
tblVehicleEF	OBUS	1.0980e-003	1.0910e-003
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	0.05	0.06
tblVehicleEF	OBUS	6.0200e-004	5.6600e-004

tblVehicleEF	OBUS	0.06	0.03
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.33	0.09
tblVehicleEF	SBUS	0.81	0.16
tblVehicleEF	SBUS	9.8340e-003	3.3570e-003
tblVehicleEF	SBUS	0.06	0.01
tblVehicleEF	SBUS	8.09	5.87
tblVehicleEF	SBUS	0.59	0.28
tblVehicleEF	SBUS	7.19	1.80
tblVehicleEF	SBUS	1,103.84	390.07
tblVehicleEF	SBUS	1,057.81	932.50
tblVehicleEF	SBUS	57.01	11.79
tblVehicleEF	SBUS	7.90	2.10
tblVehicleEF	SBUS	3.38	1.47
tblVehicleEF	SBUS	11.83	1.21
tblVehicleEF	SBUS	7.0490e-003	1.4420e-003
tblVehicleEF	SBUS	0.01	9.6480e-003
tblVehicleEF	SBUS	0.02	9.6500e-003
tblVehicleEF	SBUS	6.8100e-004	1.4900e-004
tblVehicleEF	SBUS	6.7440e-003	1.3800e-003
tblVehicleEF	SBUS	2.6370e-003	2.4120e-003
tblVehicleEF	SBUS	0.02	9.2040e-003
tblVehicleEF	SBUS	6.2600e-004	1.3700e-004
tblVehicleEF	SBUS	2.7710e-003	1.1660e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	0.96	0.71
tblVehicleEF	SBUS	1.5500e-003	6.2300e-004

tblVehicleEF	SBUS	0.09	0.03
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	0.38	0.07
tblVehicleEF	SBUS	0.01	3.7520e-003
tblVehicleEF	SBUS	0.01	9.0210e-003
tblVehicleEF	SBUS	6.9400e-004	1.1700e-004
tblVehicleEF	SBUS	2.7710e-003	1.1660e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	1.38	1.03
tblVehicleEF	SBUS	1.5500e-003	6.2300e-004
tblVehicleEF	SBUS	0.11	0.04
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	0.42	0.08
tblVehicleEF	UBUS	0.42	1.38
tblVehicleEF	UBUS	0.05	0.00
tblVehicleEF	UBUS	8.65	10.31
tblVehicleEF	UBUS	9.26	0.00
tblVehicleEF	UBUS	2,259.15	1,709.68
tblVehicleEF	UBUS	65.85	0.00
tblVehicleEF	UBUS	15.81	0.75
tblVehicleEF	UBUS	17.18	0.00
tblVehicleEF	UBUS	0.69	0.07
tblVehicleEF	UBUS	0.01	0.03
tblVehicleEF	UBUS	0.30	5.4620e-003
tblVehicleEF	UBUS	1.1580e-003	0.00
tblVehicleEF	UBUS	0.29	0.03
tblVehicleEF	UBUS	3.0000e-003	8.6540e-003

tblVehicleEF	UBUS	0.29	5.2260e-003
tblVehicleEF	UBUS	1.0650e-003	0.00
tblVehicleEF	UBUS	3.1800e-003	0.00
tblVehicleEF	UBUS	0.08	0.00
tblVehicleEF	UBUS	1.5890e-003	0.00
tblVehicleEF	UBUS	1.27	0.02
tblVehicleEF	UBUS	0.03	0.00
tblVehicleEF	UBUS	0.62	0.00
tblVehicleEF	UBUS	0.02	0.01
tblVehicleEF	UBUS	8.2300e-004	0.00
tblVehicleEF	UBUS	3.1800e-003	0.00
tblVehicleEF	UBUS	0.08	0.00
tblVehicleEF	UBUS	1.5890e-003	0.00
tblVehicleEF	UBUS	1.79	1.41
tblVehicleEF	UBUS	0.03	0.00
tblVehicleEF	UBUS	0.68	0.00
tblVehicleTrips	CC_TL	7.30	0.00
tblVehicleTrips	CNW_TL	7.30	0.00
tblVehicleTrips	CW_TL	9.50	0.00
tblVehicleTrips	ST_TR	22.75	0.00
tblVehicleTrips	SU_TR	16.74	0.00
tblVehicleTrips	WD_TR	1.89	0.00
tblWoodstoves	NumberCatalytic	12.20	0.00
tblWoodstoves	NumberNoncatalytic	12.20	0.00
tblWoodstoves	WoodstoveDayYear	14.12	0.00
tblWoodstoves	WoodstoveWoodMass	582.40	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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					
2020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
		Highest		

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	4.1182	0.0522	4.5331	2.4000e-004		0.0251	0.0251		0.0251	0.0251	0.0000	7.4096	7.4096	7.1300e-003	0.0000	7.5877
Energy	0.0657	0.5818	0.3870	3.5800e-003		0.0454	0.0454		0.0454	0.0454	0.0000	2,860.2100	2,860.2100	0.1124	0.0326	2,872.7336
Mobile	1.6380	3.0330	18.9278	0.0546	5.3859	0.0410	5.4269	1.4452	0.0382	1.4833	0.0000	5,124.7009	5,124.7009	0.3607	0.0000	5,133.7185
Waste						0.0000	0.0000		0.0000	0.0000	127.5210	0.0000	127.5210	7.5363	0.0000	315.9278
Water						0.0000	0.0000		0.0000	0.0000	32.8378	229.0956	261.9334	3.3831	0.0818	370.8820
Total	**5.8219**	**3.6670**	**23.8478**	**0.0584**	**5.3859**	**0.1115**	**5.4974**	**1.4452**	**0.1087**	**1.5539**	**160.3587**	**8,221.4161**	**8,381.7748**	**11.3996**	**0.1144**	**8,700.8497**

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	4.1182	0.0522	4.5331	2.4000e-004		0.0251	0.0251		0.0251	0.0251	0.0000	7.4096	7.4096	7.1300e-003	0.0000	7.5877
Energy	0.0657	0.5818	0.3870	3.5800e-003		0.0454	0.0454		0.0454	0.0454	0.0000	2,577.8341	2,577.8341	0.0996	0.0300	2,589.2513
Mobile	1.6380	3.0330	18.9278	0.0546	5.3859	0.0410	5.4269	1.4452	0.0382	1.4833	0.0000	5,124.7009	5,124.7009	0.3607	0.0000	5,133.7185
Waste						0.0000	0.0000		0.0000	0.0000	127.5210	0.0000	127.5210	7.5363	0.0000	315.9278
Water						0.0000	0.0000		0.0000	0.0000	32.8378	229.0956	261.9334	3.3831	0.0818	370.8820
Total	**5.8219**	**3.6670**	**23.8478**	**0.0584**	**5.3859**	**0.1115**	**5.4974**	**1.4452**	**0.1087**	**1.5539**	**160.3587**	**7,939.0402**	**8,099.3989**	**11.3868**	**0.1117**	**8,417.3673**

	ROG	NOx	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**	**3.43**	**3.37**	**0.11**	**2.31**	**3.26**

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	5/1/2020	4/30/2020	5	0	
2	Site Preparation	Site Preparation	5/15/2020	5/14/2020	5	0	
3	Grading	Grading	5/16/2020	5/15/2020	5	0	
4	Building Construction	Building Construction	5/20/2020	5/19/2020	5	0	
5	Paving	Paving	10/7/2020	10/6/2020	5	0	
6	Architectural Coating	Architectural Coating	10/14/2020	10/13/2020	5	0	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.09

Residential Indoor: 1,053,000; Residential Outdoor: 351,000; Non-Residential Indoor: 556,500; Non-Residential Outdoor: 185,500; Striped Parking Area: 5,832 (Architectural Coating – sqft)

<u>OffRoad Equipment</u>

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition		0		0	
Demolition	Bore/Drill Rigs	0	8.00	221	0.50
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Cranes	0	8.00	231	0.29
Demolition	Off-Highway Trucks	0	8.00	402	0.38
Demolition	Rubber Tired Dozers	0	1.00	247	0.40
Demolition	Sweepers/Scrubbers	0	8.00	64	0.46
Demolition	Tractors/Loaders/Backhoes	0	6.00	97	0.37
Site Preparation	Excavators	0	8.00	158	0.38
Site Preparation	Graders	0	8.00	187	0.41

Site Preparation	Off-Highway Trucks	0	8.00	402	0.38
Site Preparation	Sweepers/Scrubbers	0	8.00	64	0.46
Site Preparation	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Grading	Bore/Drill Rigs	0	8.00	221	0.50
Grading	Concrete/Industrial Saws	0	8.00	81	0.73
Grading	Cranes	0	8.00	231	0.29
Grading	Off-Highway Trucks	0	8.00	402	0.38
Grading	Rubber Tired Dozers	0	1.00	247	0.40
Grading	Sweepers/Scrubbers	0	8.00	64	0.46
Grading	Tractors/Loaders/Backhoes	0	6.00	97	0.37
Building Construction	Aerial Lifts	0	8.00	63	0.31
Building Construction	Cranes	0	4.00	231	0.29
Building Construction	Forklifts	0	6.00	89	0.20
Building Construction	Pumps	0	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction	Welders	0	8.00	46	0.45
Paving	Cement and Mortar Mixers	0	6.00	9	0.56
Paving	Concrete/Industrial Saws	0	8.00	81	0.73
Paving	Pavers	0	7.00	130	0.42
Paving	Rollers	0	7.00	80	0.38
Paving	Tractors/Loaders/Backhoes	0	7.00	97	0.37
Architectural Coating	Air Compressors	0	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	0	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	0	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	0	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	0	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	0	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Use Alternative Fuel for Construction Equipment

3.2 Demolition - 2020

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	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Site Preparation - 2020

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	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Site Preparation - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Site Preparation - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Grading - 2020

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	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Grading - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Grading - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Building Construction - 2020

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Building Construction - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Building Construction - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Paving - 2020

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Paving	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Paving - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Paving	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Paving - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.7 Architectural Coating - 2020

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.7 Architectural Coating - 2020

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.7 Architectural Coating - 2020

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	1.6380	3.0330	18.9278	0.0546	5.3859	0.0410	5.4269	1.4452	0.0382	1.4833	0.0000	5,124.700 9	5,124.700 9	0.3607	0.0000	5,133.718 5
Unmitigated	1.6380	3.0330	18.9278	0.0546	5.3859	0.0410	5.4269	1.4452	0.0382	1.4833	0.0000	5,124.700 9	5,124.700 9	0.3607	0.0000	5,133.718 5

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments High Rise	2,562.00	3,037.80	2226.50	5,963,505	5,963,505
City Park	0.00	0.00	0.00		
Enclosed Parking Structure	0.00	0.00	0.00		
General Office Building	3,860.50	861.00	367.50	7,009,145	7,009,145
Regional Shopping Center	896.70	1,049.37	530.04	1,518,590	1,518,590
Total	7,319.20	4,948.17	3,124.04	14,491,240	14,491,240

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
Apartments High Rise	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3
City Park	0.00	0.00	0.00	33.00	48.00	19.00	66	28	6
Enclosed Parking Structure	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
General Office Building	9.50	7.30	7.30	33.00	48.00	19.00	77	19	4
Regional Shopping Center	9.50	7.30	7.30	16.30	64.70	19.00	54	35	11

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments High Rise	0.580966	0.054933	0.173869	0.105905	0.023720	0.005539	0.027890	0.008574	0.003408	0.006474	0.007102	0.001036	0.000584
City Park	0.580966	0.054933	0.173869	0.105905	0.023720	0.005539	0.027890	0.008574	0.003408	0.006474	0.007102	0.001036	0.000584
Enclosed Parking Structure	0.580966	0.054933	0.173869	0.105905	0.023720	0.005539	0.027890	0.008574	0.003408	0.006474	0.007102	0.001036	0.000584
General Office Building	0.580966	0.054933	0.173869	0.105905	0.023720	0.005539	0.027890	0.008574	0.003408	0.006474	0.007102	0.001036	0.000584
Regional Shopping Center	0.580966	0.054933	0.173869	0.105905	0.023720	0.005539	0.027890	0.008574	0.003408	0.006474	0.007102	0.001036	0.000584

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Install High Efficiency Lighting

	ROG	NOx	CO	SO2	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	1,927.4540	1,927.4540	0.0872	0.0180	1,935.0064
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	2,209.8299	2,209.8299	0.0999	0.0207	2,218.4887
NaturalGas Mitigated	0.0657	0.5818	0.3870	3.5800e-003		0.0454	0.0454		0.0454	0.0454	0.0000	650.3801	650.3801	0.0125	0.0119	654.2450
NaturalGas Unmitigated	0.0657	0.5818	0.3870	3.5800e-003		0.0454	0.0454		0.0454	0.0454	0.0000	650.3801	650.3801	0.0125	0.0119	654.2450

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					
Apartments High Rise	5.32556e+006	0.0287	0.2454	0.1044	1.5700e-003		0.0198	0.0198		0.0198	0.0198	0.0000	284.1923	284.1923	5.4500e-003	5.2100e-003	285.8811
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Enclosed Parking Structure	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
General Office Building	6.7655e+006	0.0365	0.3316	0.2786	1.9900e-003		0.0252	0.0252		0.0252	0.0252	0.0000	361.0328	361.0328	6.9200e-003	6.6200e-003	363.1783
Regional Shopping Center	96600	5.2000e-004	4.7400e-003	3.9800e-003	3.0000e-005		3.6000e-004	3.6000e-004		3.6000e-004	3.6000e-004	0.0000	5.1549	5.1549	1.0000e-004	9.0000e-005	5.1856
Total		**0.0657**	**0.5818**	**0.3870**	**3.5900e-003**		**0.0454**	**0.0454**		**0.0454**	**0.0454**	**0.0000**	**650.3801**	**650.3801**	**0.0125**	**0.0119**	**654.2450**

5.2 Energy by Land Use - NaturalGas

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					
Apartments High Rise	5.32556e+006	0.0287	0.2454	0.1044	1.5700e-003		0.0198	0.0198		0.0198	0.0198	0.0000	284.1923	284.1923	5.4500e-003	5.2100e-003	285.8811
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Enclosed Parking Structure	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
General Office Building	6.7655e+006	0.0365	0.3316	0.2786	1.9900e-003		0.0252	0.0252		0.0252	0.0252	0.0000	361.0328	361.0328	6.9200e-003	6.6200e-003	363.1783
Regional Shopping Center	96600	5.2000e-004	4.7400e-003	3.9800e-003	3.0000e-005		3.6000e-004	3.6000e-004		3.6000e-004	3.6000e-004	0.0000	5.1549	5.1549	1.0000e-004	9.0000e-005	5.1856
Total		**0.0657**	**0.5818**	**0.3870**	**3.5900e-003**		**0.0454**	**0.0454**		**0.0454**	**0.0454**	**0.0000**	**650.3801**	**650.3801**	**0.0125**	**0.0119**	**654.2450**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments High Rise	2.57541e +006	749.2174	0.0339	7.0100e-003	752.1531
City Park	0	0.0000	0.0000	0.0000	0.0000
Enclosed Parking Structure	432734	125.8874	5.6900e-003	1.1800e-003	126.3807
General Office Building	4.368e +006	1,270.701 3	0.0575	0.0119	1,275.680 3
Regional Shopping Center	220080	64.0238	2.8900e-003	6.0000e-004	64.2747
Total		**2,209.829 9**	**0.0999**	**0.0207**	**2,218.488 7**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments High Rise	2.34927e +006	683.4310	0.0309	6.3900e-003	686.1088
City Park	0	0.0000	0.0000	0.0000	0.0000
Enclosed Parking Structure	365954	106.4603	4.8100e-003	1.0000e-003	106.8775
General Office Building	3.7415e +006	1,088.445 3	0.0492	0.0102	1,092.710 1
Regional Shopping Center	168840	49.1175	2.2200e-003	4.6000e-004	49.3100
Total		**1,927.454 0**	**0.0872**	**0.0180**	**1,935.006 4**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	4.1182	0.0522	4.5331	2.4000e-004		0.0251	0.0251		0.0251	0.0251	0.0000	7.4096	7.4096	7.1300e-003	0.0000	7.5877
Unmitigated	4.1182	0.0522	4.5331	2.4000e-004		0.0251	0.0251		0.0251	0.0251	0.0000	7.4096	7.4096	7.1300e-003	0.0000	7.5877

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	0.5615					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	3.4200					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.1367	0.0522	4.5331	2.4000e-004		0.0251	0.0251		0.0251	0.0251	0.0000	7.4096	7.4096	7.1300e-003	0.0000	7.5877
Total	**4.1182**	**0.0522**	**4.5331**	**2.4000e-004**		**0.0251**	**0.0251**		**0.0251**	**0.0251**	**0.0000**	**7.4096**	**7.4096**	**7.1300e-003**	**0.0000**	**7.5877**

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	0.5615					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	3.4200					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.1367	0.0522	4.5331	2.4000e-004		0.0251	0.0251		0.0251	0.0251	0.0000	7.4096	7.4096	7.1300e-003	0.0000	7.5877
Total	**4.1182**	**0.0522**	**4.5331**	**2.4000e-004**		**0.0251**	**0.0251**		**0.0251**	**0.0251**	**0.0000**	**7.4096**	**7.4096**	**7.1300e-003**	**0.0000**	**7.5877**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	261.9334	3.3831	0.0818	370.8820
Unmitigated	261.9334	3.3831	0.0818	370.8820

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments High Rise	39.744 / 25.056	100.6825	1.2990	0.0314	142.5166
City Park	0 / 0.845952	0.8613	4.0000e-005	1.0000e-005	0.8647
Enclosed Parking Structure	0 / 0	0.0000	0.0000	0.0000	0.0000
General Office Building	62.2068 / 38.1268	156.4768	2.0332	0.0491	221.9507
Regional Shopping Center	1.55552 / 0.953385	3.9128	0.0508	1.2300e-003	5.5500
Total		**261.9334**	**3.3831**	**0.0818**	**370.8820**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments High Rise	39.744 / 25.056	100.6825	1.2990	0.0314	142.5166
City Park	0 / 0.845952	0.8613	4.0000e-005	1.0000e-005	0.8647
Enclosed Parking Structure	0 / 0	0.0000	0.0000	0.0000	0.0000
General Office Building	62.2068 / 38.1268	156.4768	2.0332	0.0491	221.9507
Regional Shopping Center	1.55552 / 0.953385	3.9128	0.0508	1.2300e-003	5.5500
Total		**261.9334**	**3.3831**	**0.0818**	**370.8820**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	127.5210	7.5363	0.0000	315.9278
Unmitigated	127.5210	7.5363	0.0000	315.9278

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments High Rise	280.6	56.9593	3.3662	0.0000	141.1142
City Park	0.06	0.0122	7.2000e-004	0.0000	0.0302
Enclosed Parking Structure	0	0.0000	0.0000	0.0000	0.0000
General Office Building	325.5	66.0736	3.9048	0.0000	163.6944
Regional Shopping Center	22.05	4.4760	0.2645	0.0000	11.0890
Total		**127.5210**	**7.5363**	**0.0000**	**315.9278**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments High Rise	280.6	56.9593	3.3662	0.0000	141.1142
City Park	0.06	0.0122	7.2000e-004	0.0000	0.0302
Enclosed Parking Structure	0	0.0000	0.0000	0.0000	0.0000
General Office Building	325.5	66.0736	3.9048	0.0000	163.6944
Regional Shopping Center	22.05	4.4760	0.2645	0.0000	11.0890
Total		**127.5210**	**7.5363**	**0.0000**	**315.9278**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

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

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

APPENDIX D
CALEEMOD® OUTPUT FILES FOR FRANKLIN PROJECT

98 Franklin Proposed Land Uses Operational Emissions
San Francisco County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
High School	440.00	Student	0.08	81,000.00	0
Enclosed Parking with Elevator	111.00	Space	0.06	41,815.00	0
City Park	0.78	Acre	0.05	34,000.00	0
Apartments High Rise	345.00	Dwelling Unit	0.35	384,080.00	987
Regional Shopping Center	3.10	1000sqft	0.00	3,100.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	4.6	**Precipitation Freq (Days)**	64
Climate Zone	5			**Operational Year**	2023
Utility Company	Pacific Gas & Electric Company				
CO2 Intensity (lb/MWhr)	641.35	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - Construction begins on 6/1/2021 and ends on 8/5/2023

Land Use - Square foot amount provided by Project sponsor. Total lot acerage is 0.545 acres. Land use acerage is scaled based on total plot acerage.

Construction Phase - Estimating consturction emissions outside CalEEMod.

Off-road Equipment - Construction emissions are being modeled outside of CalEEMod.

Off-road Equipment - Construction emissions are being modeled outside of CalEEMod.

Off-road Equipment - Construction emissions are being modeled outside of CalEEMod.

Off-road Equipment - Construction emissions are being modeled outside of CalEEMod.

Off-road Equipment - Construction emissions are being modeled outside of CalEEMod.

Off-road Equipment - Construction emissions are being modeled outside of CalEEMod.

Off-road Equipment - Construction emissions are being modeled outside of CalEEMod.

Trips and VMT - Construction emissions are being modeled outside of CalEEMod.

Demolition - Estimating consturction emissions outside CalEEMod.

Grading - Estimating consturction emissions outside CalEEMod.

Vehicle Trips - Zero out trips for City park since this land use will not generate any new trips.

Vehicle Emission Factors - Updated to include emission factors from EMFAC2017 for 2023.

Vehicle Emission Factors -

Vehicle Emission Factors -

Road Dust - San Francisco-specific silt loading content based on AP-42

Woodstoves - Zero wood stoves and no natural gas fire places

Consumer Products - San Francisco specific ROG emission factor

Area Coating - Default emissions rate

Energy Use - 2019 Title 24, reduced intensity for lighting. Calculating this in 'Mitigation' tab.

Water And Wastewater - Not estimating emissions from water and wastewater usage

Solid Waste - Not estimating emissions from Solid waste

Energy Mitigation -

Fleet Mix -

On-road Fugitive Dust - Construction emissions are being modeled outside of CalEEMod.

Architectural Coating - Construction emissions are being modeled outside of CalEEMod.

Table Name	Column Name	Default Value	New Value
tblArchitecturalCoating	ConstArea_Nonresidential_Exterior	42,050.00	39,050.00
tblArchitecturalCoating	ConstArea_Nonresidential_Interior	126,150.00	117,150.00
tblArchitecturalCoating	ConstArea_Parking	2,509.00	2,664.00

tblArchitecturalCoating	ConstArea_Residential_Exterior	259,254.00	235,575.00
tblArchitecturalCoating	ConstArea_Residential_Interior	777,762.00	706,725.00
tblArchitecturalCoating	EF_Nonresidential_Exterior	150.00	0.00
tblArchitecturalCoating	EF_Nonresidential_Interior	100.00	0.00
tblArchitecturalCoating	EF_Parking	150.00	0.00
tblArchitecturalCoating	EF_Residential_Exterior	150.00	0.00
tblArchitecturalCoating	EF_Residential_Interior	100.00	0.00
tblAreaCoating	Area_Nonresidential_Exterior	42050	39050
tblAreaCoating	Area_Nonresidential_Interior	126150	117150
tblAreaCoating	Area_Parking	2509	2664
tblAreaCoating	Area_Residential_Exterior	259254	235575
tblAreaCoating	Area_Residential_Interior	777762	706725
tblConstructionPhase	NumDays	5.00	0.00
tblConstructionPhase	NumDays	100.00	0.00
tblConstructionPhase	NumDays	10.00	0.00
tblConstructionPhase	NumDays	2.00	0.00
tblConstructionPhase	NumDays	5.00	0.00
tblConstructionPhase	NumDays	1.00	0.00
tblConstructionPhase	NumDays	1.00	0.00
tblConsumerProducts	ROG_EF	2.14E-05	2.1E-05
tblFireplaces	FireplaceDayYear	11.14	0.00
tblFireplaces	FireplaceHourDay	3.50	0.00
tblFireplaces	FireplaceWoodMass	228.80	0.00
tblFireplaces	NumberGas	51.75	0.00
tblFireplaces	NumberNoFireplace	13.80	0.00
tblFireplaces	NumberWood	58.65	0.00
tblFleetMix	HHD	9.1810e-003	8.5380e-003

tblFleetMix	HHD	9.1810e-003	8.5380e-003
tblFleetMix	HHD	9.1810e-003	8.5380e-003
tblFleetMix	HHD	9.1810e-003	8.5380e-003
tblFleetMix	HHD	9.1810e-003	8.5380e-003
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tblFleetMix	LDA	0.61	0.58
tblFleetMix	LDA	0.61	0.58
tblFleetMix	LDA	0.61	0.58
tblFleetMix	LDA	0.61	0.58
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tblFleetMix	LDT1	0.04	0.05
tblFleetMix	LDT1	0.04	0.05
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tblFleetMix	LDT2	0.19	0.17
tblFleetMix	LDT2	0.19	0.17
tblFleetMix	LDT2	0.19	0.17
tblFleetMix	LDT2	0.19	0.17
tblFleetMix	LHD1	0.01	0.02
tblFleetMix	LHD1	0.01	0.02
tblFleetMix	LHD1	0.01	0.02
tblFleetMix	LHD1	0.01	0.02
tblFleetMix	LHD1	0.01	0.02
tblFleetMix	LHD2	5.0360e-003	5.4360e-003
tblFleetMix	LHD2	5.0360e-003	5.4360e-003
tblFleetMix	LHD2	5.0360e-003	5.4360e-003

tblFleetMix	LHD2	5.0360e-003	5.4360e-003
tblFleetMix	LHD2	5.0360e-003	5.4360e-003
tblFleetMix	MCY	6.4040e-003	7.3390e-003
tblFleetMix	MCY	6.4040e-003	7.3390e-003
tblFleetMix	MCY	6.4040e-003	7.3390e-003
tblFleetMix	MCY	6.4040e-003	7.3390e-003
tblFleetMix	MCY	6.4040e-003	7.3390e-003
tblFleetMix	MDV	0.09	0.10
tblFleetMix	MDV	0.09	0.10
tblFleetMix	MDV	0.09	0.10
tblFleetMix	MDV	0.09	0.10
tblFleetMix	MDV	0.09	0.10
tblFleetMix	MH	5.0500e-004	5.5900e-004
tblFleetMix	MH	5.0500e-004	5.5900e-004
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tblFleetMix	MHD	0.03	0.03
tblFleetMix	MHD	0.03	0.03
tblFleetMix	MHD	0.03	0.03
tblFleetMix	OBUS	4.3090e-003	3.5180e-003
tblFleetMix	OBUS	4.3090e-003	3.5180e-003
tblFleetMix	OBUS	4.3090e-003	3.5180e-003
tblFleetMix	OBUS	4.3090e-003	3.5180e-003
tblFleetMix	OBUS	4.3090e-003	3.5180e-003

tblFleetMix	SBUS	9.4100e-004	1.0200e-003
tblFleetMix	SBUS	9.4100e-004	1.0200e-003
tblFleetMix	SBUS	9.4100e-004	1.0200e-003
tblFleetMix	SBUS	9.4100e-004	1.0200e-003
tblFleetMix	SBUS	9.4100e-004	1.0200e-003
tblFleetMix	UBUS	3.7680e-003	6.5380e-003
tblFleetMix	UBUS	3.7680e-003	6.5380e-003
tblFleetMix	UBUS	3.7680e-003	6.5380e-003
tblFleetMix	UBUS	3.7680e-003	6.5380e-003
tblFleetMix	UBUS	3.7680e-003	6.5380e-003
tblLandUse	LandUseSquareFeet	58,370.83	81,000.00
tblLandUse	LandUseSquareFeet	44,400.00	41,815.00
tblLandUse	LandUseSquareFeet	33,976.80	34,000.00
tblLandUse	LandUseSquareFeet	345,000.00	384,080.00
tblLandUse	LotAcreage	1.34	0.08
tblLandUse	LotAcreage	1.00	0.06
tblLandUse	LotAcreage	0.78	0.05
tblLandUse	LotAcreage	5.56	0.35
tblLandUse	LotAcreage	0.07	0.00
tblOffRoadEquipment	HorsePower	80.00	50.00
tblOffRoadEquipment	HorsePower	78.00	75.00
tblOffRoadEquipment	HorsePower	221.00	500.00
tblOffRoadEquipment	HorsePower	221.00	500.00
tblOffRoadEquipment	HorsePower	221.00	250.00
tblOffRoadEquipment	HorsePower	231.00	286.00
tblOffRoadEquipment	HorsePower	231.00	275.00
tblOffRoadEquipment	HorsePower	158.00	66.00

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tblOffRoadEquipment	HorsePower	158.00	66.00
tblOffRoadEquipment	HorsePower	158.00	67.00
tblOffRoadEquipment	HorsePower	158.00	250.00
tblOffRoadEquipment	HorsePower	84.00	40.00
tblOffRoadEquipment	HorsePower	65.00	73.00
tblOffRoadEquipment	HorsePower	65.00	75.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	4.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
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tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	PhaseName		Deep Foundations
tblOffRoadEquipment	PhaseName		Deep Foundations

tblOffRoadEquipment	PhaseName		Shoring
tblOffRoadEquipment	PhaseName		Shoring
tblOffRoadEquipment	PhaseName		Deep Foundations
tblOffRoadEquipment	PhaseName		Shoring
tblOffRoadEquipment	PhaseName		Demolition
tblOffRoadEquipment	PhaseName		Deep Foundations
tblOffRoadEquipment	PhaseName		Shoring
tblOffRoadEquipment	PhaseName		Excavation
tblOffRoadEquipment	PhaseName		Shoring
tblOffRoadEquipment	PhaseName		Deep Foundations
tblOffRoadEquipment	PhaseName		Shoring
tblOffRoadEquipment	PhaseName		Building Construction
tblOffRoadEquipment	PhaseName		Demolition
tblOffRoadEquipment	PhaseName		Excavation
tblOffRoadEquipment	PhaseName		Building Construction
tblOffRoadEquipment	UsageHours	7.00	4.00
tblOnRoadDust	RoadSiltLoading	0.10	0.00
tblOnRoadDust	RoadSiltLoading	0.10	0.00
tblOnRoadDust	RoadSiltLoading	0.10	0.00
tblOnRoadDust	RoadSiltLoading	0.10	0.00
tblOnRoadDust	RoadSiltLoading	0.10	0.00
tblOnRoadDust	RoadSiltLoading	0.10	0.00
tblOnRoadDust	RoadSiltLoading	0.10	0.00
tblSolidWaste	SolidWasteGenerationRate	0.07	0.05
tblTripsAndVMT	HaulingTripNumber	2.00	0.00
tblTripsAndVMT	VendorTripNumber	63.00	0.00
tblTripsAndVMT	WorkerTripLength	10.80	12.40

tblTripsAndVMT	WorkerTripLength	10.80	12.40
tblTripsAndVMT	WorkerTripLength	10.80	12.40
tblTripsAndVMT	WorkerTripLength	10.80	12.40
tblTripsAndVMT	WorkerTripLength	10.80	12.40
tblTripsAndVMT	WorkerTripLength	10.80	12.40
tblTripsAndVMT	WorkerTripLength	10.80	12.40
tblTripsAndVMT	WorkerTripNumber	5.00	0.00
tblTripsAndVMT	WorkerTripNumber	18.00	0.00
tblTripsAndVMT	WorkerTripNumber	20.00	0.00
tblTripsAndVMT	WorkerTripNumber	23.00	0.00
tblTripsAndVMT	WorkerTripNumber	315.00	0.00
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tblTripsAndVMT	WorkerTripNumber	63.00	0.00
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tblVehicleEF	HHD	0.37	0.35
tblVehicleEF	HHD	0.08	1.0000e-006
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tblVehicleEF	HHD	2.13	1.38
tblVehicleEF	HHD	4.54	0.01
tblVehicleEF	HHD	3,176.52	957.47
tblVehicleEF	HHD	1,911.35	1,866.84
tblVehicleEF	HHD	13.63	0.16
tblVehicleEF	HHD	18.66	6.02
tblVehicleEF	HHD	3.19	3.80
tblVehicleEF	HHD	19.09	2.30
tblVehicleEF	HHD	0.03	6.4020e-003
tblVehicleEF	HHD	0.06	0.06

tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.7290e-003	0.02
tblVehicleEF	HHD	1.5200e-004	5.0000e-006
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tblVehicleEF	HHD	0.03	0.03
tblVehicleEF	HHD	8.5320e-003	8.7170e-003
tblVehicleEF	HHD	8.3510e-003	0.02
tblVehicleEF	HHD	1.3900e-004	5.0000e-006
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tblVehicleEF	HHD	4.6760e-003	8.8100e-004
tblVehicleEF	HHD	0.40	0.33
tblVehicleEF	HHD	6.2000e-005	1.1000e-005
tblVehicleEF	HHD	0.10	0.05
tblVehicleEF	HHD	9.0300e-004	8.0900e-004
tblVehicleEF	HHD	0.10	6.0000e-006
tblVehicleEF	HHD	0.03	8.1130e-003
tblVehicleEF	HHD	0.02	0.01
tblVehicleEF	HHD	2.1100e-004	2.0000e-006
tblVehicleEF	HHD	9.0000e-005	1.6000e-005
tblVehicleEF	HHD	4.6760e-003	8.8100e-004
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tblVehicleEF	HHD	0.48	0.40
tblVehicleEF	HHD	9.0300e-004	8.0900e-004
tblVehicleEF	HHD	0.11	7.0000e-006
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tblVehicleEF	LDA	4.8370e-003	0.05

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tblVehicleEF	LDA	0.06	0.18
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tblVehicleEF	LDT1	9.3990e-003	0.06
tblVehicleEF	LDT1	0.80	0.84

tblVehicleEF	LDT1	2.00	2.37
tblVehicleEF	LDT1	322.78	309.94
tblVehicleEF	LDT1	68.33	62.06
tblVehicleEF	LDT1	0.07	0.06
tblVehicleEF	LDT1	0.11	0.22
tblVehicleEF	LDT1	2.3880e-003	2.0760e-003
tblVehicleEF	LDT1	2.6430e-003	2.1070e-003
tblVehicleEF	LDT1	2.1980e-003	1.9110e-003
tblVehicleEF	LDT1	2.4300e-003	1.9380e-003
tblVehicleEF	LDT1	0.05	0.06
tblVehicleEF	LDT1	0.17	0.13
tblVehicleEF	LDT1	0.05	0.06
tblVehicleEF	LDT1	0.02	0.02
tblVehicleEF	LDT1	0.13	0.08
tblVehicleEF	LDT1	0.13	0.28
tblVehicleEF	LDT1	3.2350e-003	3.0670e-003
tblVehicleEF	LDT1	7.1800e-004	6.1400e-004
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tblVehicleEF	LDT1	0.17	0.13
tblVehicleEF	LDT1	0.05	0.06
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tblVehicleEF	LDT1	0.13	0.08
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tblVehicleEF	LDT2	1.31	2.76

tblVehicleEF	LDT2	363.74	329.89
tblVehicleEF	LDT2	76.27	66.35
tblVehicleEF	LDT2	0.06	0.06
tblVehicleEF	LDT2	0.09	0.25
tblVehicleEF	LDT2	2.1630e-003	1.7980e-003
tblVehicleEF	LDT2	2.2970e-003	1.7430e-003
tblVehicleEF	LDT2	1.9890e-003	1.6550e-003
tblVehicleEF	LDT2	2.1120e-003	1.6020e-003
tblVehicleEF	LDT2	0.03	0.05
tblVehicleEF	LDT2	0.09	0.10
tblVehicleEF	LDT2	0.03	0.05
tblVehicleEF	LDT2	0.01	0.01
tblVehicleEF	LDT2	0.06	0.06
tblVehicleEF	LDT2	0.08	0.29
tblVehicleEF	LDT2	3.6410e-003	3.2630e-003
tblVehicleEF	LDT2	7.8400e-004	6.5700e-004
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tblVehicleEF	LDT2	0.09	0.10
tblVehicleEF	LDT2	0.03	0.05
tblVehicleEF	LDT2	0.02	0.02
tblVehicleEF	LDT2	0.06	0.06
tblVehicleEF	LDT2	0.08	0.31
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tblVehicleEF	LHD1	0.66	0.38
tblVehicleEF	LHD1	1.08	0.35
tblVehicleEF	LHD1	7.0300e-004	6.5000e-004
tblVehicleEF	LHD1	9.8890e-003	9.4800e-003
tblVehicleEF	LHD1	0.01	6.7960e-003
tblVehicleEF	LHD1	8.5400e-004	2.4800e-004
tblVehicleEF	LHD1	6.7200e-004	6.2200e-004
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tblVehicleEF	LHD1	9.7090e-003	6.4530e-003
tblVehicleEF	LHD1	7.8500e-004	2.2800e-004
tblVehicleEF	LHD1	1.9400e-003	1.4800e-003
tblVehicleEF	LHD1	0.09	0.06
tblVehicleEF	LHD1	0.02	0.02
tblVehicleEF	LHD1	1.2640e-003	9.4500e-004
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tblVehicleEF	LHD1	0.29	0.17
tblVehicleEF	LHD1	0.25	0.07
tblVehicleEF	LHD1	8.8000e-005	8.5000e-005
tblVehicleEF	LHD1	6.8780e-003	8.0660e-003
tblVehicleEF	LHD1	4.0800e-004	1.3100e-004
tblVehicleEF	LHD1	1.9400e-003	1.4800e-003
tblVehicleEF	LHD1	0.09	0.06

tblVehicleEF	LHD1	0.02	0.03
tblVehicleEF	LHD1	1.2640e-003	9.4500e-004
tblVehicleEF	LHD1	0.12	0.09
tblVehicleEF	LHD1	0.29	0.17
tblVehicleEF	LHD1	0.27	0.08
tblVehicleEF	LHD2	3.3940e-003	3.5240e-003
tblVehicleEF	LHD2	7.2700e-003	6.3150e-003
tblVehicleEF	LHD2	6.3740e-003	8.3840e-003
tblVehicleEF	LHD2	0.12	0.15
tblVehicleEF	LHD2	0.52	0.54
tblVehicleEF	LHD2	1.20	0.68
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tblVehicleEF	LHD2	0.51	0.53
tblVehicleEF	LHD2	0.44	0.20
tblVehicleEF	LHD2	1.2260e-003	1.3330e-003
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tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	4.0700e-004	1.3200e-004
tblVehicleEF	LHD2	1.1730e-003	1.2750e-003
tblVehicleEF	LHD2	2.6880e-003	2.6570e-003
tblVehicleEF	LHD2	0.01	0.01
tblVehicleEF	LHD2	3.7400e-004	1.2200e-004
tblVehicleEF	LHD2	6.4300e-004	8.6300e-004
tblVehicleEF	LHD2	0.03	0.04

tblVehicleEF	LHD2	0.01	0.02
tblVehicleEF	LHD2	4.1200e-004	5.3600e-004
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tblVehicleEF	LHD2	0.07	0.10
tblVehicleEF	LHD2	0.09	0.04
tblVehicleEF	LHD2	1.3500e-004	1.3000e-004
tblVehicleEF	LHD2	6.8500e-003	7.5530e-003
tblVehicleEF	LHD2	2.6600e-004	8.6000e-005
tblVehicleEF	LHD2	6.4300e-004	8.6300e-004
tblVehicleEF	LHD2	0.03	0.04
tblVehicleEF	LHD2	0.02	0.02
tblVehicleEF	LHD2	4.1200e-004	5.3600e-004
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tblVehicleEF	LHD2	0.07	0.10
tblVehicleEF	LHD2	0.09	0.05
tblVehicleEF	MCY	0.56	0.40
tblVehicleEF	MCY	0.17	0.25
tblVehicleEF	MCY	20.94	20.92
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tblVehicleEF	MCY	1.19	1.19
tblVehicleEF	MCY	0.33	0.28
tblVehicleEF	MCY	2.4910e-003	2.3420e-003
tblVehicleEF	MCY	4.1620e-003	3.1290e-003
tblVehicleEF	MCY	2.3320e-003	2.1910e-003
tblVehicleEF	MCY	3.9320e-003	2.9510e-003

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tblVehicleEF	MCY	0.82	0.78
tblVehicleEF	MCY	0.52	0.51
tblVehicleEF	MCY	2.82	2.82
tblVehicleEF	MCY	0.88	0.71
tblVehicleEF	MCY	2.28	2.00
tblVehicleEF	MCY	2.3530e-003	2.2750e-003
tblVehicleEF	MCY	6.9700e-004	6.1300e-004
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tblVehicleEF	MCY	0.52	0.51
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tblVehicleEF	MDV	7.8070e-003	3.4620e-003
tblVehicleEF	MDV	0.01	0.06
tblVehicleEF	MDV	0.84	0.75
tblVehicleEF	MDV	1.95	2.85
tblVehicleEF	MDV	476.44	389.00
tblVehicleEF	MDV	97.47	76.44
tblVehicleEF	MDV	0.09	0.06
tblVehicleEF	MDV	0.16	0.26
tblVehicleEF	MDV	2.2530e-003	1.9230e-003
tblVehicleEF	MDV	2.3520e-003	1.8410e-003
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tblVehicleEF	MDV	2.1620e-003	1.6930e-003
tblVehicleEF	MDV	0.04	0.05

tblVehicleEF	MDV	0.12	0.10
tblVehicleEF	MDV	0.04	0.05
tblVehicleEF	MDV	0.02	0.01
tblVehicleEF	MDV	0.09	0.05
tblVehicleEF	MDV	0.14	0.30
tblVehicleEF	MDV	4.7640e-003	3.8440e-003
tblVehicleEF	MDV	1.0080e-003	7.5600e-004
tblVehicleEF	MDV	0.04	0.05
tblVehicleEF	MDV	0.12	0.10
tblVehicleEF	MDV	0.04	0.05
tblVehicleEF	MDV	0.03	0.02
tblVehicleEF	MDV	0.09	0.05
tblVehicleEF	MDV	0.15	0.33
tblVehicleEF	MH	0.02	9.1410e-003
tblVehicleEF	MH	0.02	0.02
tblVehicleEF	MH	1.30	0.96
tblVehicleEF	MH	4.77	2.08
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tblVehicleEF	MH	57.03	17.78
tblVehicleEF	MH	0.88	1.03
tblVehicleEF	MH	0.66	0.23
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	1.0690e-003	3.0100e-004
tblVehicleEF	MH	3.2220e-003	3.2760e-003
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	9.8300e-004	2.7700e-004

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tblVehicleEF	MH	0.04	0.04
tblVehicleEF	MH	0.16	0.18
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tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	0.26	0.09
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	6.5300e-004	1.7600e-004
tblVehicleEF	MH	0.39	0.45
tblVehicleEF	MH	0.04	0.04
tblVehicleEF	MH	0.16	0.18
tblVehicleEF	MH	0.09	0.08
tblVehicleEF	MH	0.01	0.01
tblVehicleEF	MH	0.29	0.10
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tblVehicleEF	MHD	1.8200e-004	7.3700e-004

tblVehicleEF	MHD	3.1590e-003	6.7180e-003
tblVehicleEF	MHD	7.8400e-004	9.3000e-005
tblVehicleEF	MHD	1.7400e-004	7.0500e-004
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tblVehicleEF	MHD	5.1700e-004	2.1600e-004
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tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	0.32	0.04
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tblVehicleEF	MHD	6.2800e-004	8.2000e-005
tblVehicleEF	MHD	8.1900e-004	3.4100e-004
tblVehicleEF	MHD	0.04	0.02
tblVehicleEF	MHD	0.03	0.03
tblVehicleEF	MHD	5.1700e-004	2.1600e-004
tblVehicleEF	MHD	0.05	0.02
tblVehicleEF	MHD	0.02	0.02
tblVehicleEF	MHD	0.35	0.05
tblVehicleEF	OBUS	0.01	6.7120e-003
tblVehicleEF	OBUS	5.7780e-003	4.0240e-003
tblVehicleEF	OBUS	0.03	0.02
tblVehicleEF	OBUS	0.24	0.59
tblVehicleEF	OBUS	0.44	0.51

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tblVehicleEF	OBUS	4.93	1.76
tblVehicleEF	OBUS	137.46	98.38
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tblVehicleEF	OBUS	1.06	1.54
tblVehicleEF	OBUS	3.62	1.15
tblVehicleEF	OBUS	2.8000e-005	1.3000e-004
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tblVehicleEF	OBUS	2.7000e-005	1.2400e-004
tblVehicleEF	OBUS	2.8180e-003	7.3120e-003
tblVehicleEF	OBUS	5.8200e-004	1.2900e-004
tblVehicleEF	OBUS	1.0840e-003	1.0760e-003
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	0.03	0.05
tblVehicleEF	OBUS	5.9100e-004	5.5400e-004
tblVehicleEF	OBUS	0.05	0.03
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.31	0.09
tblVehicleEF	OBUS	1.3230e-003	9.3400e-004
tblVehicleEF	OBUS	0.01	0.01
tblVehicleEF	OBUS	7.3300e-004	1.4500e-004
tblVehicleEF	OBUS	1.0840e-003	1.0760e-003
tblVehicleEF	OBUS	0.02	0.02
tblVehicleEF	OBUS	0.05	0.06
tblVehicleEF	OBUS	5.9100e-004	5.5400e-004

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tblVehicleEF	OBUS	0.06	0.04
tblVehicleEF	OBUS	0.03	0.04
tblVehicleEF	OBUS	0.34	0.10
tblVehicleEF	SBUS	0.82	0.16
tblVehicleEF	SBUS	0.01	3.4700e-003
tblVehicleEF	SBUS	0.06	0.01
tblVehicleEF	SBUS	8.05	5.94
tblVehicleEF	SBUS	0.63	0.29
tblVehicleEF	SBUS	7.30	1.84
tblVehicleEF	SBUS	1,114.46	394.81
tblVehicleEF	SBUS	1,062.76	939.01
tblVehicleEF	SBUS	56.28	12.03
tblVehicleEF	SBUS	8.51	2.16
tblVehicleEF	SBUS	3.69	1.51
tblVehicleEF	SBUS	11.98	1.17
tblVehicleEF	SBUS	8.0990e-003	1.5580e-003
tblVehicleEF	SBUS	0.01	9.6150e-003
tblVehicleEF	SBUS	0.02	9.8310e-003
tblVehicleEF	SBUS	6.5000e-004	1.5000e-004
tblVehicleEF	SBUS	7.7480e-003	1.4900e-003
tblVehicleEF	SBUS	2.6410e-003	2.4040e-003
tblVehicleEF	SBUS	0.02	9.3770e-003
tblVehicleEF	SBUS	5.9800e-004	1.3800e-004
tblVehicleEF	SBUS	2.6200e-003	1.0540e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	0.95	0.72
tblVehicleEF	SBUS	1.4540e-003	5.5000e-004

tblVehicleEF	SBUS	0.09	0.03
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	0.38	0.07
tblVehicleEF	SBUS	0.01	3.7990e-003
tblVehicleEF	SBUS	0.01	9.0870e-003
tblVehicleEF	SBUS	6.8900e-004	1.1900e-004
tblVehicleEF	SBUS	2.6200e-003	1.0540e-003
tblVehicleEF	SBUS	0.03	0.01
tblVehicleEF	SBUS	1.38	1.04
tblVehicleEF	SBUS	1.4540e-003	5.5000e-004
tblVehicleEF	SBUS	0.11	0.04
tblVehicleEF	SBUS	0.02	0.02
tblVehicleEF	SBUS	0.42	0.08
tblVehicleEF	UBUS	0.43	1.38
tblVehicleEF	UBUS	0.04	0.00
tblVehicleEF	UBUS	8.86	10.31
tblVehicleEF	UBUS	9.21	0.00
tblVehicleEF	UBUS	2,277.10	1,709.69
tblVehicleEF	UBUS	61.87	0.00
tblVehicleEF	UBUS	16.41	0.75
tblVehicleEF	UBUS	17.45	0.00
tblVehicleEF	UBUS	0.70	0.07
tblVehicleEF	UBUS	0.01	0.03
tblVehicleEF	UBUS	0.31	5.4620e-003
tblVehicleEF	UBUS	1.1170e-003	0.00
tblVehicleEF	UBUS	0.30	0.03
tblVehicleEF	UBUS	3.0000e-003	8.6540e-003

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tblVehicleEF	UBUS	0.30	5.2260e-003
tblVehicleEF	UBUS	1.0270e-003	0.00
tblVehicleEF	UBUS	3.1360e-003	0.00
tblVehicleEF	UBUS	0.08	0.00
tblVehicleEF	UBUS	1.5400e-003	0.00
tblVehicleEF	UBUS	1.31	0.02
tblVehicleEF	UBUS	0.03	0.00
tblVehicleEF	UBUS	0.60	0.00
tblVehicleEF	UBUS	0.02	0.01
tblVehicleEF	UBUS	7.8200e-004	0.00
tblVehicleEF	UBUS	3.1360e-003	0.00
tblVehicleEF	UBUS	0.08	0.00
tblVehicleEF	UBUS	1.5400e-003	0.00
tblVehicleEF	UBUS	1.84	1.41
tblVehicleEF	UBUS	0.03	0.00
tblVehicleEF	UBUS	0.66	0.00
tblVehicleTrips	CC_TL	7.30	0.00
tblVehicleTrips	CNW_TL	7.30	0.00
tblVehicleTrips	CW_TL	9.50	0.00
tblVehicleTrips	ST_TR	22.75	0.00
tblVehicleTrips	SU_TR	16.74	0.00
tblVehicleTrips	WD_TR	1.89	0.00
tblWater	OutdoorWaterUseRate	929,355.45	631,485.12
tblWoodstoves	NumberCatalytic	6.90	0.00
tblWoodstoves	NumberNoncatalytic	6.90	0.00
tblWoodstoves	WoodstoveDayYear	14.12	0.00
tblWoodstoves	WoodstoveWoodMass	582.40	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
		Highest		

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	2.1623	0.0296	2.5673	1.4000e-004		0.0142	0.0142		0.0142	0.0142	0.0000	4.1944	4.1944	4.0500e-003	0.0000	4.2956
Energy	0.0235	0.2049	0.1146	1.2800e-003		0.0162	0.0162		0.0162	0.0162	0.0000	841.7797	841.7797	0.0320	9.9600e-003	845.5491
Mobile	0.6051	1.1064	6.9800	0.0199	1.9118	0.0150	1.9268	0.5129	0.0140	0.5269	0.0000	1,868.2272	1,868.2272	0.1319	0.0000	1,871.5258
Waste						0.0000	0.0000		0.0000	0.0000	49.1867	0.0000	49.1867	2.9069	0.0000	121.8581
Water						0.0000	0.0000		0.0000	0.0000	7.8190	59.0853	66.9043	0.8058	0.0195	92.8639
Total	**2.7909**	**1.3408**	**9.6619**	**0.0213**	**1.9118**	**0.0454**	**1.9573**	**0.5129**	**0.0444**	**0.5573**	**57.0058**	**2,773.2866**	**2,830.2923**	**3.8806**	**0.0295**	**2,936.0925**

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	2.1623	0.0296	2.5673	1.4000e-004		0.0142	0.0142		0.0142	0.0142	0.0000	4.1944	4.1944	4.0500e-003	0.0000	4.2956
Energy	0.0235	0.2049	0.1146	1.2800e-003		0.0162	0.0162		0.0162	0.0162	0.0000	762.1557	762.1557	0.0284	9.2200e-003	765.6130
Mobile	0.6051	1.1064	6.9800	0.0199	1.9118	0.0150	1.9268	0.5129	0.0140	0.5269	0.0000	1,868.2272	1,868.2272	0.1319	0.0000	1,871.5258
Waste						0.0000	0.0000		0.0000	0.0000	49.1867	0.0000	49.1867	2.9069	0.0000	121.8581
Water						0.0000	0.0000		0.0000	0.0000	7.8190	59.0853	66.9043	0.8058	0.0195	92.8639
Total	**2.7909**	**1.3408**	**9.6619**	**0.0213**	**1.9118**	**0.0454**	**1.9573**	**0.5129**	**0.0444**	**0.5573**	**57.0058**	**2,693.6625**	**2,750.6683**	**3.8770**	**0.0287**	**2,856.1564**

	ROG	NOx	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**	**2.87**	**2.81**	**0.09**	**2.51**	**2.72**

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	6/1/2021	5/31/2021	5	0	
2	Deep Foundations	Site Preparation	6/15/2021	6/14/2021	5	0	
3	Shoring	Site Preparation	6/16/2021	6/15/2021	5	0	
4	Excavation	Grading	6/17/2021	6/16/2021	5	0	
5	Building Construction	Building Construction	6/19/2021	6/18/2021	5	0	
6	Paving	Paving	11/6/2021	11/5/2021	5	0	
7	Architectural Coating	Architectural Coating	11/13/2021	11/12/2021	5	0	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0.06

Residential Indoor: 706,725; Residential Outdoor: 235,575; Non-Residential Indoor: 117,150; Non-Residential Outdoor: 39,050; Striped Parking Area: 2,664 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	66	0.38
Demolition	Rubber Tired Dozers	0	1.00	247	0.40
Demolition	Skid Steer Loaders	0	8.00	73	0.37
Demolition	Tractors/Loaders/Backhoes	0	6.00	97	0.37
Deep Foundations	Air Compressors	0	8.00	75	0.48
Deep Foundations	Bore/Drill Rigs	0	8.00	500	0.50
Deep Foundations	Cranes	0	4.00	286	0.29
Deep Foundations	Excavators	0	4.00	66	0.38

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Deep Foundations	Graders	0	8.00	187	0.41
Deep Foundations	Rough Terrain Forklifts	0	4.00	100	0.40
Deep Foundations	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Shoring	Bore/Drill Rigs	0	6.00	500	0.50
Shoring	Bore/Drill Rigs	0	6.00	250	0.50
Shoring	Cranes	0	4.00	275	0.29
Shoring	Excavators	0	6.00	67	0.38
Shoring	Generator Sets	0	8.00	40	0.74
Shoring	Graders	0	8.00	187	0.41
Shoring	Rough Terrain Forklifts	0	4.00	100	0.40
Shoring	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Excavation	Concrete/Industrial Saws	0	8.00	81	0.73
Excavation	Excavators	0	8.00	250	0.38
Excavation	Rubber Tired Dozers	0	1.00	247	0.40
Excavation	Skid Steer Loaders	0	8.00	75	0.37
Excavation	Tractors/Loaders/Backhoes	0	6.00	97	0.37
Building Construction	Cranes	0	4.00	231	0.29
Building Construction	Forklifts	0	6.00	89	0.20
Building Construction	Forklifts	0	6.00	89	0.20
Building Construction	Signal Boards	0	8.00	6	0.82
Building Construction	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction	Welders	0	8.00	46	0.45
Paving	Cement and Mortar Mixers	0	6.00	9	0.56
Paving	Pavers	0	7.00	130	0.42
Paving	Rollers	0	4.00	50	0.38
Paving	Tractors/Loaders/Backhoes	0	7.00	97	0.37
Architectural Coating	Air Compressors	0	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	2	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Deep Foundations	7	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Shoring	8	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Excavation	9	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	7	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	4	0.00	0.00	0.00	12.40	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Deep Foundations - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Deep Foundations - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Deep Foundations - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Shoring - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Shoring - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Shoring - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Excavation - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Excavation - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Excavation - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Building Construction - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Building Construction - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Building Construction - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.7 Paving - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Paving	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.7 Paving - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Paving	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.7 Paving - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.8 Architectural Coating - 2021

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.8 Architectural Coating - 2021

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.8 Architectural Coating - 2021

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Category	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
	tons/yr										MT/yr					
Mitigated	0.6051	1.1064	6.9800	0.0199	1.9118	0.0150	1.9268	0.5129	0.0140	0.5269	0.0000	1,868.2272	1,868.2272	0.1319	0.0000	1,871.5258
Unmitigated	0.6051	1.1064	6.9800	0.0199	1.9118	0.0150	1.9268	0.5129	0.0140	0.5269	0.0000	1,868.2272	1,868.2272	0.1319	0.0000	1,871.5258

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Apartments High Rise	1,449.00	1,718.10	1259.25	3,372,802	3,372,802
City Park	0.00	0.00	0.00		
Enclosed Parking with Elevator	0.00	0.00	0.00		
High School	752.40	268.40	110.00	1,548,605	1,548,605
Regional Shopping Center	132.37	154.91	78.24	224,173	224,173
Total	2,333.77	2,141.41	1,447.49	5,145,580	5,145,580

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
Apartments High Rise	10.80	4.80	5.70	31.00	15.00	54.00	86	11	3
City Park	0.00	0.00	0.00	33.00	48.00	19.00	66	28	6
Enclosed Parking with Elevator	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
High School	9.50	7.30	7.30	77.80	17.20	5.00	75	19	6
Regional Shopping Center	9.50	7.30	7.30	16.30	64.70	19.00	54	35	11

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
Apartments High Rise	0.583540	0.054774	0.174133	0.103925	0.023773	0.005436	0.026907	0.008538	0.003518	0.006538	0.007339	0.001020	0.000559
City Park	0.583540	0.054774	0.174133	0.103925	0.023773	0.005436	0.026907	0.008538	0.003518	0.006538	0.007339	0.001020	0.000559
Enclosed Parking with Elevator	0.583540	0.054774	0.174133	0.103925	0.023773	0.005436	0.026907	0.008538	0.003518	0.006538	0.007339	0.001020	0.000559
High School	0.583540	0.054774	0.174133	0.103925	0.023773	0.005436	0.026907	0.008538	0.003518	0.006538	0.007339	0.001020	0.000559
Regional Shopping Center	0.583540	0.054774	0.174133	0.103925	0.023773	0.005436	0.026907	0.008538	0.003518	0.006538	0.007339	0.001020	0.000559

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

Install High Efficiency Lighting

	ROG	NOx	CO	SO2	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	529.4719	529.4719	0.0239	4.9500e-003	531.5466
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	609.0960	609.0960	0.0275	5.7000e-003	611.4826
NaturalGas Mitigated	0.0235	0.2049	0.1146	1.2800e-003		0.0162	0.0162		0.0162	0.0162	0.0000	232.6837	232.6837	4.4600e-003	4.2700e-003	234.0665
NaturalGas Unmitigated	0.0235	0.2049	0.1146	1.2800e-003		0.0162	0.0162		0.0162	0.0162	0.0000	232.6837	232.6837	4.4600e-003	4.2700e-003	234.0665

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					
Apartments High Rise	3.012e +006	0.0162	0.1388	0.0591	8.9000e-004		0.0112	0.0112		0.0112	0.0112	0.0000	160.7317	160.7317	3.0800e-003	2.9500e-003	161.6869
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
High School	1.33407e +006	7.1900e-003	0.0654	0.0549	3.9000e-004		4.9700e-003	4.9700e-003		4.9700e-003	4.9700e-003	0.0000	71.1911	71.1911	1.3600e-003	1.3100e-003	71.6141
Regional Shopping Center	14260	8.0000e-005	7.0000e-004	5.9000e-004	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005	0.0000	0.7610	0.7610	1.0000e-005	1.0000e-005	0.7655
Total		**0.0235**	**0.2049**	**0.1146**	**1.2800e-003**		**0.0162**	**0.0162**		**0.0162**	**0.0162**	**0.0000**	**232.6837**	**232.6837**	**4.4500e-003**	**4.2700e-003**	**234.0665**

5.2 Energy by Land Use - NaturalGas

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					
Apartments High Rise	3.012e +006	0.0162	0.1388	0.0591	8.9000e-004		0.0112	0.0112		0.0112	0.0112	0.0000	160.7317	160.7317	3.0800e-003	2.9500e-003	161.6869
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
High School	1.33407e +006	7.1900e-003	0.0654	0.0549	3.9000e-004		4.9700e-003	4.9700e-003		4.9700e-003	4.9700e-003	0.0000	71.1911	71.1911	1.3600e-003	1.3100e-003	71.6141
Regional Shopping Center	14260	8.0000e-005	7.0000e-004	5.9000e-004	0.0000		5.0000e-005	5.0000e-005		5.0000e-005	5.0000e-005	0.0000	0.7610	0.7610	1.0000e-005	1.0000e-005	0.7655
Total		**0.0235**	**0.2049**	**0.1146**	**1.2800e-003**		**0.0162**	**0.0162**		**0.0162**	**0.0162**	**0.0000**	**232.6837**	**232.6837**	**4.4500e-003**	**4.2700e-003**	**234.0665**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments High Rise	1.45659e+006	423.7377	0.0192	3.9600e-003	425.3981
City Park	0	0.0000	0.0000	0.0000	0.0000
Enclosed Parking with Elevator	245036	71.2838	3.2200e-003	6.7000e-004	71.5631
High School	359640	104.6234	4.7300e-003	9.8000e-004	105.0334
Regional Shopping Center	32488	9.4511	4.3000e-004	9.0000e-005	9.4882
Total		**609.0960**	**0.0275**	**5.7000e-003**	**611.4826**

5.3 Energy by Land Use - Electricity

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Apartments High Rise	1.32869e +006	386.5306	0.0175	3.6200e-003	388.0452
City Park	0	0.0000	0.0000	0.0000	0.0000
Enclosed Parking with Elevator	208448	60.6399	2.7400e-003	5.7000e-004	60.8775
High School	257985	75.0508	3.3900e-003	7.0000e-004	75.3449
Regional Shopping Center	24924	7.2507	3.3000e-004	7.0000e-005	7.2791
Total		**529.4719**	**0.0239**	**4.9600e-003**	**531.5466**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	2.1623	0.0296	2.5673	1.4000e-004		0.0142	0.0142		0.0142	0.0142	0.0000	4.1944	4.1944	4.0500e-003	0.0000	4.2956
Unmitigated	2.1623	0.0296	2.5673	1.4000e-004		0.0142	0.0142		0.0142	0.0142	0.0000	4.1944	4.1944	4.0500e-003	0.0000	4.2956

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	0.2873					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.7973					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0777	0.0296	2.5673	1.4000e-004		0.0142	0.0142		0.0142	0.0142	0.0000	4.1944	4.1944	4.0500e-003	0.0000	4.2956
Total	**2.1623**	**0.0296**	**2.5673**	**1.4000e-004**		**0.0142**	**0.0142**		**0.0142**	**0.0142**	**0.0000**	**4.1944**	**4.1944**	**4.0500e-003**	**0.0000**	**4.2956**

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	0.2873					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	1.7973					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.0777	0.0296	2.5673	1.4000e-004		0.0142	0.0142		0.0142	0.0142	0.0000	4.1944	4.1944	4.0500e-003	0.0000	4.2956
Total	**2.1623**	**0.0296**	**2.5673**	**1.4000e-004**		**0.0142**	**0.0142**		**0.0142**	**0.0142**	**0.0000**	**4.1944**	**4.1944**	**4.0500e-003**	**0.0000**	**4.2956**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	66.9043	0.8058	0.0195	92.8639
Unmitigated	66.9043	0.8058	0.0195	92.8639

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments High Rise	22.4781 / 14.171	56.9434	0.7347	0.0178	80.6037
City Park	0 / 0.631485	0.6430	3.0000e-005	1.0000e-005	0.6455
Enclosed Parking with Elevator	0 / 0	0.0000	0.0000	0.0000	0.0000
High School	1.93818 / 4.9839	8.7404	0.0635	1.5700e-003	10.7955
Regional Shopping Center	0.229625 / 0.140738	0.5776	7.5100e-003	1.8000e-004	0.8193
Total		**66.9043**	**0.8058**	**0.0195**	**92.8639**

7.2 Water by Land Use

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Apartments High Rise	22.4781 / 14.171	56.9434	0.7347	0.0178	80.6037
City Park	0 / 0.631485	0.6430	3.0000e-005	1.0000e-005	0.6455
Enclosed Parking with Elevator	0 / 0	0.0000	0.0000	0.0000	0.0000
High School	1.93818 / 4.9839	8.7404	0.0635	1.5700e-003	10.7955
Regional Shopping Center	0.229625 / 0.140738	0.5776	7.5100e-003	1.8000e-004	0.8193
Total		**66.9043**	**0.8058**	**0.0195**	**92.8639**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Mitigated	49.1867	2.9069	0.0000	121.8581
Unmitigated	49.1867	2.9069	0.0000	121.8581

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments High Rise	158.7	32.2147	1.9038	0.0000	79.8105
City Park	0.05	0.0102	6.0000e-004	0.0000	0.0252
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000
High School	80.3	16.3002	0.9633	0.0000	40.3830
Regional Shopping Center	3.26	0.6618	0.0391	0.0000	1.6395
Total		**49.1867**	**2.9069**	**0.0000**	**121.8581**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Apartments High Rise	158.7	32.2147	1.9038	0.0000	79.8105
City Park	0.05	0.0102	6.0000e-004	0.0000	0.0252
Enclosed Parking with Elevator	0	0.0000	0.0000	0.0000	0.0000
High School	80.3	16.3002	0.9633	0.0000	40.3830
Regional Shopping Center	3.26	0.6618	0.0391	0.0000	1.6395
Total		**49.1867**	**2.9069**	**0.0000**	**121.8581**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

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

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

APPENDIX E
AERMOD MODELING FILES

APPENDIX F
BASELINE (2020) + PLAN HRA GEODATABASE

APPENDIX G
BASELINE (2020) + VAN NESS
HRA GEODATABASE

APPENDIX H
BASELINE (2020) + FRANKLIN
HRA GEODATABASE

APPENDIX I
CUMULATIVE (2040) + PLAN
HRA GEODATABASE