Memo

To: John Davidson and Alexander Abbe, City of Santa Clara

CC: Ray Pendro, MIG, and Chris Butcher, Thomas Law Group

From: Phil Gleason and Chris Dugan

Date: May 12, 2022

SUBJECT: Freedom Circle Focus Area Plan and Greystar General Plan Amendment: Post-Planning Commission EIR Memo for Air Quality Comments

This memorandum addresses the portions of the Adams Broadwell Joseph & Cardozo letter received at the City of Santa Clara Planning Commission Meeting on April 13, 2022, as they relate to the air quality, health risk assessment, and greenhouse gas emissions analyses of the Freedom Circle Focus Area Plan/Greystar General Plan Amendment Environmental Impact Report (EIR) (State Clearinghouse Number 2020060425; City of Santa Clara 2021). The responses provided herein this memorandum correspond to the coded comments contained in Attachment A. This memorandum also contains the results of a quantitative construction health risk assessment (HRA) prepared for the Greystar General Plan Amendment Project as Attachment B.

Coded Responses

General Plan Consistency Response: See the end of this memorandum for a detailed response on this matter.

Response 1: The commenter reiterates their assertion that the City has violated CEQA by failing to conduct a quantitative health risk analysis. As responded to in FEIR Response to Comment L4.30, the Draft EIR utilized a robust, qualitative discussion to assess health risks from construction and operational emissions in order to demonstrate the Project would result in a less-than-significant impact. The Draft EIR's detailed qualitative analysis supports the conclusion that the Project would result in less-than-significant health risks (i.e., the Project would not result in emissions that would exceed the numerical health risk thresholds provided in Draft EIR Table 5-10, including the cancerogenic health risk threshold). The BAAQMD's thresholds of significance constitute a basis for disclosing the magnitude of the Project's health risk impacts. Therefore, the analysis contained in the Project's EIR explained the nature and magnitude of the impact and determined it to be less than significant.

Nonetheless, to further respond to claims made by the commenter, the City prepared a quantitative construction health risk assessment (HRA) for the Greystar Project, which demonstrates that diesel particulate matter (DPM) emissions associated with construction of the Greystar Project would not result in significant cancerogenic or non-cancerogenic health risk impacts, which is the same conclusion reached in the Project's EIR. The construction HRA estimated DPM concentrations at receptor locations utilizing the United States Environmental Protection Agency's (EPA) AERMOD dispersion model, which is an EPA-approved and Bay Area Air Quality Management District (BAAQMD) recommended model for simulating the dispersion of pollutant emissions and estimating concentrations of pollutants at specified receptor locations. Estimated DPM pollutant concentrations were translated into potential health risks utilizing California Office of Environmental Health Hazard Assessment (OEHHA) recommended methodologies and assumptions.

The quantitative construction HRA was prepared for two emissions scenarios and under two sets of meteorological conditions utilizing conservative assumptions. All four of the total scenarios evaluated found potential health risks to be less than significant, further affirming the rationale and findings of the EIR. It should be further noted that when using the meteorological data set recommended by the BAAQMD for the dispersion modeling conducted for the Project, potential cancerogenic health risks estimated for the Project were found to be less than one tenth of the BAAQMD's cancerogenic health risk threshold of 10.0 excess cancers per million population. See the construction HRA memorandum for additional details regarding the methodology and results of the quantitative construction HRA prepared for the Project.

Response 2: The commenter incorrectly asserts that the City's responses in the Final EIR indicated that disclosure of potential health risks is not necessary, and the quote provided by the commenter from Final EIR Response to Comment L4.31 is used out of context. The analysis contained in the Draft EIR and the responses provided in the Final EIR were made on a less-than-significant impact determination for potential health risks that could be posed by the Project. The commenter's excerpt from the Court's explanation in *Sierra Club v. County of Fresno* is not applicable to the Project, because whereas the Project in *Sierra Club v. County of Fresno* was determined to have a significant impact, the Greystar Project was determined to have a less-than-significant impact. As discussed in Response 1, the City prepared a quantitative construction HRA for the Greystar Project that affirms DPM emissions associated with the Project would result in a less-than-significant health risk impact.

Response 3: The commenter references the results of a screening-level HRA prepared by SWAPE. As discussed in Response 1, the City prepared a quantitative construction HRA that determined construction DPM emissions associated with the Greystar Project would not result in a significant health risk impact. The EIR's qualitative analysis of potential health risk impacts, which is based on substantial evidence, is further supported by the results of the construction HRA prepared for the Project.

Response 4: The commenter refers to responses provided in the Final EIR that identify several assumptions made by SWAPE during the preparation of their screening-level HRA that are not appropriate for the Project. The screening-level HRA prepared by SWAPE, as contained in Final EIR Comment Letter L-4, is not considered substantial evidence for the reasons identified in Final EIR Response to Comment L4.124. This is further evidenced by SWAPE's revised screening-level HRA that was submitted with this comment letter, dated April 13, 2022, which acknowledges their initial operational cancer risk estimate was, "overestimated" and "artificially inflated" (SWAPE, pg. 7). Nonetheless, as discussed in Response 1, the City prepared a quantitative construction HRA that determined construction DPM emissions associated with the Greystar Project would not result in a significant health risk impact.

Response 5: The commenter incorrectly suggests that the utilization of off-road equipment meeting U.S. EPA / CARB Tier III or Tier IV emissions standards, as was analyzed in the Draft EIR based on information provided by the Project Applicant, should have been incorporated as a mitigation measure to avoid a significant impact. As described in Response 1, a quantitative construction HRA was prepared for the Greystar Project. The quantitative construction HRA evaluated two emissions scenarios: Scenario 1, which was based on the equipment type and engine classification provided by the Applicant and analyzed in the Draft EIR, and Scenario 2, which was based on average county-wide emissions rates derived from CARB's OFFROAD2021 emission factor database for the various pieces of off-road equipment that are anticipated for use on the Project. Scenario 2 evaluated the same equipment type (e.g., scraper, grader, etc.), runtime hours, engine horsepower, etc., as Scenario 1. The only difference being that the equipment's emissions rates for Scenario 2 are based on county-wide data (obtained from CARB's official off-road diesel equipment emissions inventory/model) as opposed to the specific U.S. EPA / CARB Tier III or Tier IV standards identified in the EIR. The results of the emissions analysis between Scenario 1 and Scenario 2 revealed that the average county-wide off-road emissions factor in the Santa Clara Sub-Area for Year 2022 was between U.S. EPA / CARB Tier III and Tier IV standards (see more on this under the "Discussion of Scaling Health Risk Values" subheading on page 10 of the construction HRA memorandum). As such, the engine tier classification data provided by the Project Applicant is consistent with what is expected to be used for a typical project occurring in the Santa Clara Sub-Area for Year 2022. As detailed in the construction HRA memorandum, potential health risks associated with Greystar Project were found to be less than significant based on both emissions scenarios. Thus, it can be reasonably inferred that even if the specific engine tier equipment identified by the Project Applicant were not used for the Project – which is not anticipated to be the case – that the use of average engine tier of equipment operating in the Santa Clara Sub-Area also would result in a less-than-significant impact. The commenter, therefore, is incorrect that the EIR needs to incorporate the use of equipment meet U.S. EPA / CARB Tier III or Tier IV emissions standards as a mitigation measure, because no significant impact would occur with the use of other construction equipment typically used in the Project's region, in the year during which construction activities would be occurring. Regardless, because the applicant proposed using Tier III and Tier IV equipment as part of the project, such equipment will be required as part of the conditions of approval.

Response 6: The commenter summarizes that the EIR's analysis of the Greystar Project's construction emissions are based on a list of heavy-duty off-road equipment that would be used during construction, as provided by the Project Applicant, including the engine tier classification. This comment is introductory and does not require further response.

Response 7: The commenter summarizes the commenter's interpretation of the Court's holding in *Lotus v. Department of Transportation*. This comment is introductory and does not require further response.

Response 8: The commenter incorrectly asserts that the EIR, by incorporating the use of Tier III and Tier IV off-road construction equipment into the EIR's analysis, has compressed the analysis of impacts and mitigation measures into a single issue. The proposed Project is not like the *Lotus* case for several reasons, and has not compressed the analysis of impacts into a single issue.

First, as described in Response 5, the quantitative construction HRA memorandum prepared for the Greystar Project analyzed emissions from two scenarios, and found that the average county-wide off-road emissions factor in the Santa Clara Sub-Area for Year 2022 was between U.S. EPA / CARB Tier III and Tier IV standards. It should be further noted that the Tier III and Tier IV emissions standards for new equipment started being phased-in in 2006 and 2008, respectively, approximately 17 and 15 years prior to when construction activities associated with the Greystar Project are anticipated to start. To phrase this differently – Tier III and Tier IV equipment have been on the market for almost two decades at this point, and most, if not all, Tier I and Tier II equipment have been phased out of the construction fleets operating in the Santa Clara region (based on the emissions profile reflected in OFFROAD2021). While some older equipment may still be in use in the area, even when it is assumed that such lower tier equipment may be included in the construction fleet for a project, the average emission factor for construction equipment in the region nevertheless exceeds Tier III standards (given that more Tier III and Tier IV equipment is in circulation than older, lower tier equipment) and, for that reason, standard modeling (i.e., that evaluated in Scenario 2 of the quantitative construction HRA) accounts for an off-road equipment emissions profile above Tier III. Thus, even if, as OFFROAD2021 assumes, some lower tier equipment may be included in the construction fleet, the Project's potential impact would remain less than significant. As the developer committed not to use any lower tier equipment, the emission profile for the Project has the potential to be even lower than using standard modeling assumptions. The use of Tier III and Tier IV equipment is not unique or special to this Project or region; rather, it is consistent with national, state, and county-wide conditions. Thus, it is more than reasonably foreseeable, indeed, highly likely, that Tier III and Tier IV equipment would be used even if not proposed as part of the Project and required as a condition of approval.

Second, unlike the *Lotus* case, the EIR has not identified any specialized operating conditions for off-road construction equipment that could be construed as "avoidance, minimization and/or mitigation measures." The EIR's analysis is based on typical conditions under which off-road construction equipment would operate, and the use of heavy-duty off-road equipment is necessitated for almost every single construction project of similar scope and size as the Greystar Project.

Third, the Draft EIR contained a full, robust analysis for each environmental impact that was related to the operation of heavy-duty off-road construction equipment. The EIR made significance determinations based on substantial evidence regarding criteria air pollutant emissions, toxic air contaminants, and greenhouse gas emissions that could be released from the Project. The Draft EIR analyses did not "compress the analysis" of impacts into a single issue.

Finally, information regarding construction equipment operating assumptions; construction phasing; worker, vendor, and hauling trips; and other construction parameters (e.g., quantity of soils for off-haul) was requested at the onset of environmental review as part of a data request and prior to any analysis conducted to evaluate the significance of Project's air quality or greenhouse gas emissions, including potential health risks posed by receptor exposure to DPM emissions. The BAAQMD recommends "construction-related TAC and PM impacts should be addressed on a case-by-case basis, taking into consideration the specific construction-related characteristics of each project…" (BAAQMD CEQA Guidelines 2017; pg. 2-7, pg. 8-7, emphasis added). Thus, the Project's approach to assessing air quality and greenhouse gas emissions is consistent with guidance provided by the BAAQMD, and the City has made a good-faith effort to disclose potential impacts associated with the Project by utilizing known project-specific information in its analysis.

The EIR analyzed potential impacts associated with construction of the Greystar Project utilizing construction activity information that was available, including the engine tier of the heavy-duty off-road equipment that would be used for the Project, and analyzed potential impacts using established thresholds of significance. The Tier III and Tier IV heavy-duty off-road equipment analyzed in the EIR is readily available on the market, and the average emission rates are consistent with the overall off-road construction fleet utilized throughout the Santa Clara Sub-Area based on data obtained from CARB's OFFROAD2021 model. The Project does not require any unique equipment, construction practices, or operating characteristics. The EIR has not compressed the analysis of impacts and mitigation measures into a single issue. Therefore, the use of Tier III and IV equipment does not need to be included in the MMRP, and the EIR does not need to be recirculated.

Further, the commenter's claim that features of a project cannot be considered as such when "their purpose are [sic] to reduce adverse impacts" has no support in case law. Many projects as proposed include features that effect the project's potential environmental impacts. For example, the Greystar Project includes a public park and pedestrian pathways, which necessarily effect various potential impacts of the project including transportation and recreation impacts. There is no requirement that such features be characterized as mitigation. Further, such a principle would prohibit project proponents from incorporating environmentally beneficial features into their initial project planning efforts, which is contrary to CEQA's intent. (See, e.g., CEQA Guidelines, § 15124(c) [a project description shall identify a project's "environmental characteristics" and "principal engineering proposals"]; see also CEQA Guidelines, Appendix F(II)(A)(3) [stating the project description shall identify "[e]nergy conservation equipment and design features"].)

Finally, the quantitative construction HRA prepared by MIG supports and amplifies the conclusion in the EIR that the Greystar Project's pollutant concentrations of DPM do not result in significant health risks to sensitive receptors. As demonstrated in this analysis, the impact is less than significant regardless of whether the Applicant proposed to use Tier III and IV equipment, because, even absent the Applicant's commitment not to use of lower tier equipment, the average county-wide off-road emissions factor in the Santa Clara Sub-Area for Year 2022 is between U.S. EPA / CARB Tier III and Tier IV standards. As the Applicant's commitment to use Tier III and Tier IV equipment is not required to reduce potential health risk impacts to a less-than-significant level, that commitment does not constitute mitigation pursuant to CEQA. "[M]itigation measures are not required where the environmental effect is insignificant." (*Laurel Heights Improvement Assn. v. Regents of University of California* (1993) 6 Cal. 4th 1112, 1141.) In short, the City disagrees that CEQA requires an EIR to identify all project features included in a project description, which reduce a project's potentially significant environmental impacts, as mitigation measures. However, here, whether called mitigation or not, the developer's commitment to use Tier III and IV equipment (which is included in the Greystar Project's conditions of approval) is not required to comply with CEQA.

Biology Response: See the end of this memorandum for a detailed response on this matter.

Response 9: The commenter indicates they have reviewed the Project's Draft EIR and Final EIR and purports an updated EIR should be prepared to address the errors they allege are in the EIR. As described in Responses to Comments 10 through 41, the Final EIR has adequately and appropriately assessed the proposed Project's air quality and health risk impacts. The significance of the air quality impacts have been accurately identified and mitigated as required by CEQA. The significance determinations made in the EIR are further affirmed by the results of the construction HRA prepared for the Greystar Project (see Response 1).

Response 10: The commenter presents results contained in Draft EIR Section 5.3.3, including Table 5-16, and a summary of the Draft EIR's findings for the Project's operational criteria air pollutant emissions. The commenter specifically identifies the Draft EIR's conclusions that the Freedom Circle Focus Area Plan's operational NOx and ROG emissions would exceed applicable BAAQMD thresholds. This comment does not identify any deficiencies or inadequacies in the emissions modeling or analysis contained in the Draft EIR. No further response is required.

Response 11: The commenter presents language contained in Draft EIR Section 5.3.3 explaining the significant and unavoidable findings made for the Project's operational criteria air pollutant emissions even after the incorporation of feasible mitigation measures. This comment does not identify any deficiencies or inadequacies in the emissions modeling or analysis contained in the Draft EIR. No further response is required.

Response 12: The commenter states that the Draft EIR's conclusion that the Freedom Circle Focus Area Plan's operational criteria air pollutant emissions would be significant and unavoidable is incorrect and cites CEQA Guidelines § 15096(g)(2). The comment is introductory and lacks specificity.

Response 13: The commenter states that that although the Project has incorporated Mitigation Measures 5-3C and 5-3D, which address emissions from architectural coatings and mobile sources (via a Transportation Demand Management program), the Draft EIR and Final EIR have failed to implement all feasible mitigation measures. The commenter recommends additional feasible mitigation measures should be incorporated and provides a list of suggested measures at the end of the letter.

It should be noted that although this comment specifically addresses operational criteria air pollutant emissions from the Freedom Circle Focus Area Plan, that the overwhelming majority of mitigation measures recommended by the commenter do not address operational emissions; rather, they address construction emissions. As detailed in the Draft EIR and Final EIR, and further affirmed through the construction HRA prepared for the Greystar Project, the Greystar Project would not result in a significant impact related to its criteria air pollutant emissions or DPM emissions, and mitigation is not required. The Project has incorporated mitigation at the programmatic level (Mitigation Measures 5-3A, 5-3D, and 5-5) to address potential construction air quality impacts associated with future development proposed within the Focus Plan Area.

The commenter has provided no evidence that the Project's significant-and-unavoidable impact determination for the Freedom Circle Focus Area Plan's operational criteria air pollutants is unsubstantiated, nor has the commenter identified additional feasible mitigation measures that would further reduce the magnitude of the impact. Further, the duty to condition project approval on incorporation of feasible mitigation measures only exists when such measures would "substantially lessen" a significant environmental effect. (Public Resources Code, § 21002; State CEQA Guidelines, § 15021, subd. (a)(2).) Thus, a lead agency need not, under CEQA, adopt every nickel and dime mitigation scheme brought to its attention or proposed in the project EIR. (*San Franciscans for Reasonable Growth v. City and County of San Francisco* (1989) 209 Cal.App.3d 1502, 1519.) The EIR's significance conclusions are substantiated, and all feasible mitigation has been incorporated. The preparation of an updated EIR is not required as suggested by the commenter. See Responses 32 through 41 for a point-by-point response to each mitigation measure recommended by the commenter.

Response 14: The commenter presents an excerpt from the Draft EIR that discusses operational emissions of ROG, NOx, and PM from mobile sources in the Freedom Circle Focus Area Plan Area. This comment is introductory and lacks specificity. No further response is required.

Response 15: The commenter presents Mitigation Measure 5-3D from the Draft EIR. This comment is introductory and lacks specificity. No further response is required.

Response 16: The commenter suggests that EIR Mitigation Measure 5-3D, which requires residential and office land uses within the Freedom Circle Focus Area Plan to prepare and implement TDM Programs, is insufficient, because the measure, "fails to tangibly consider potential actions that could achieve the measure's performance standard" (SWAPE, pg. 3). The existence of TDM Programs as well as their implementation and the menu of options available for achieving the goals of a TDM Program are not new concepts. The Valley Transportation Agency's *Requirements for Deficiency Plans*, referenced in the City's 2010-2035 General Plan EIR, identifies TDM Programs for the region dating as far back as 1992, approximately three decades prior to the preparation of the EIR (Santa Clara 2011; pg. 84). TDM Programs (and the measures that comprise the programs) have also been identified in the City's 2010-2035 General Plan (Santa Clara 2010; pg. 140) and 2013 Climate Action Plan (Santa Clara 2013; pg. 89). Furthermore, the Draft EIR includes examples of potential TDM measures throughout the document, including:

- Draft EIR pg. 5-31, which states, "The land uses would be required to comply with the City of Santa Clara's Climate Action Plan and General Plan, which require the development and implementation of TDM measures. The TDM plans could include measures such as transit subsidies, carpool incentives, bicycling incentives, carshare memberships, additional last mile services, and/or vanpools."
- Draft EIR pg. 5-34, which states, "Telecommuting is an example of a measure that could be implemented through a TDM plan that would reduce single-occupancy vehicle trips and VMT."
- Draft EIR pg. 17-34: "The following are example TDM measures that could be considered: providing both short- and long-term bicycle parking in convenient, secure and prominent locations in each building; providing

information about transit options and passes; distributing transportation news and commuter alerts; and providing information to residents (through links to appropriate websites, apps and other resources like "511"); and assisting with rideshare matching, which would also reduce single-occupancy vehicle trips and VMT."

The implementation of the example TDM measures identified above would be more than adequate for achieving the performance standard specified in Mitigation Measure 5-3D. For example, according to the California Air Pollution Control Officers Association (CAPCOA) *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity*, a transit subsidy program can result in up to a 5.5% reduction in vehicle emissions from employees/residents accessing the site (Measure T-9), providing information in transit options and passes can result in up to a 4% reduction in vehicle emissions from employees/residents accessing the site (Measure T-7), and providing a ridesharing program can result in up to a 8% reduction in vehicle emissions from employees/residents accessing the site (Measure T-8) (CAPCOA 2021). As noted in the CAPCOA document, the emissions reductions associated with TDM measure implementation can be paired/packaged together for increased (i.e., stacking) reductions (CAPCOA 2021, pg. 92).

Furthermore, the term "TDM measures" does not need to be redefined within the mitigation measure itself – examples of TDM measures have been well documented historically, and definitions and examples of TDM measures have been provided numerous times throughout the City's planning documents, including the Draft EIR itself. The potential actions covered under the implementation of TDM measures would feasibly achieve the performance standard set forth by the mitigation measure. Mitigation Measure 5-3D is adequate per CEQA Guidelines Section 15126.4(a)(1)(B), and the Draft EIR and Final EIR both adequately address and mitigate the Project's significant mobile-source operational emissions.

Response 17: The commenter reiterates the assertion made in their December 17, 2021, comment letter that the Draft EIR failed to adequately evaluate the proposed Project's potential health risk impacts. The commenter indicates they have identified five reasons to support their assertion. This comment is introductory and lacks specificity. See Responses 18 through 28 for detailed responses on this matter.

Response 18: The commenter quotes a section of Response to Comment L4.119 from the Final EIR that concerns the construction emission rate for DPM that SWAPE had calculated. This comment is introductory. No further response is required.

Response 19: The commenter responds to a portion of Final EIR Response to Comment L4.119 indicating that the screening-level construction HRA they prepared only utilized on-road mobile source emissions and argues that the DPM emissions rate they used in the screening-level analysis was not overestimated.

Comment noted. As described in Response 1, the City prepared a quantitative construction HRA that evaluated potential health risks at residential receptors that could be exposed to construction DPM emissions associated with the Greystar Project. The results of the construction HRA affirm the Draft EIR's determination that construction DPM emissions associated with the Greystar Project would not result in a significant health risk impact.

Response 20: See Response 19.

Response 21: The commenter quotes a section of Response to Comment L4.119 from the Final EIR related to BAAQMD guidelines for health risk assessments. This comment is introductory. No further response is required.

Response 22: The commenter acknowledges that the screening-level construction HRA they prepared incorrectly utilized PM_{10} exhaust emissions when it should have utilized $PM_{2.5}$ exhaust emissions. See Response 19.

Response 23: See Response 19. The commenter has failed to acknowledge the deficiencies in their derivation of an operational emissions rate for a health risk assessment, as detailed in Final EIR Response to Comment L4.119. The commenter continues to improperly use the sum of all emissions sources included in CalEEMod (i.e., area, energy, and mobile) for their comparison purposes. As discussed in Final EIR Response to Comment L4.119, it is incorrect to assume that all $PM_{2.5}$ exhaust emissions from the Project would be 100 percent DPM. The commenter's April 13, 2022, comment letter does not respond to or address any of the issues raised in Final EIR Response to Comment L4.119, nor have they provided any additional information to support their derivation of the operational emissions rate utilized in their December 17, 2021, comment letter. The actual DPM emission associated with operational activities would only be a minor subset of the mobile source emissions, which would be distributed throughout the city, county, and region in proximity of the Project site as vehicles travel on the regional transportation network. Thus, the fact that the commenter notes that, "the difference between operational PM_{10} exhaust emissions and $PM_{2.5}$ exhaust emissions… is negligible" (SWAPE, pg. 6) is immaterial to the argument at hand. The $PM_{2.5}$ exhaust emissions total of approximately 0.1088 tons / year is not representative of operational DPM emissions and is an incorrect assumption by the commenter. The commenter has not provided any evidence that the Project would result in significant operational health risk impact and continues to incorrectly conflate sources contributing to DPM emissions.

Response 24: The commenter quotes a section of Response to Comment L4.119 from the Final EIR related to unmitigated vs. mitigated operational emissions rate from the Greystar Project. This comment is introductory. No further response is required.

Response 25: The commenter indicates they used the "mitigated" operational emissions estimates, not the "unmitigated" operational emissions estimates, for the Greystar Project during the preparation of their screening-level operational health risk assessment contained in their December 17, 2021, comment letter.

Comment noted. As shown in the unmitigated and mitigated Greystar Residential Development CalEEMod output files, Draft EIR pgs. 1238 and 1152, respectively, the $PM_{2.5}$ exhaust emission for operation mobile sources are both estimated to be approximately 0.0272 tons / year. This is because the operational mobile source emissions estimates shown in the "Greystar Residential Development (2030; Mitigated)" file (Draft EIR pg. 1152) does not reflect the application of Mitigation Measure 5-3D. Mitigation Measure 5-3D, while applicable to the Greystar Project because it falls within the programmatic EIR's analysis, was not quantified in the emissions modeling. This is because Mitigation Measure 5-3D was not needed to demonstrate that the Greystar Project's air quality and greenhouse gas emissions would be less-than-significant on the project-level. Thus, the mobile source emissions reductions associated with the Greystar Project's mobile source emissions would be lower than that shown in the Draft

EIR. Additional information is provided below on the additional reductions in mobile source emissions that would occur through the Greystar Project implementing Mitigation Measure 5-3D.

Implementation of Mitigation Measure 5-3D would decrease the mobile source emissions shown in the "Greystar Residential Development (2030; Mitigated)" CalEEMod file by approximately 14%. As shown in Hexagon's Transportation Analysis, Draft EIR pg. 1492, Table 7, the Greystar Project's trip generation would be decreased by approximately 5.6 percent based on reductions from fewer internal trips, fewer external public transit trips, and fewer retail passby trips. Thus, the implementation of Mitigation Measure 5-3D for the Greystar Project, which requires a minimum reduction in VMT of 20 percent, is anticipated to reduce Greystar Project mobile source emissions by approximately 14 percent more than that shown in the "Greystar Residential Development (2030; Mitigated)" CalEEMod file. Applying Mitigation Measure 5-3D to the "Greystar Residential Development (2030; Mitigated)" CalEEMod file would further reduce already less-than-significant impacts at the project-level.

Response 26: The commenter quotes portions of Final EIR Response to Comment L4.119 related to the operational emissions rate the commenter had used for the operational HRA that was included in their December 17, 2021, comment letter. This comment is introductory. No further response is required.

Response 27: The commenter acknowledges that the operational DPM emissions rate they utilized was overestimated and indicates that a more refined estimated of on-site DPM emissions was not utilized, because the Draft EIR did not provide on-site DPM emissions associated with the Project.

Comment noted. It should be reiterated that the operational HRA prepared by the commenter (contained in their December 17, 2021, comment letter) contained several incorrect assumptions regarding the methodology used to derive the DPM emissions rate, and the health risk estimates prepared by the commenter are not at all reflective of the Project. The actual DPM emission associated with operational activities would only be a minor subset of the mobile source emissions, which would be distributed throughout the city, county, and region in proximity of the Project site as vehicles travel on the regional transportation network. The operational DPM emissions would not come from the area sources, energy sources, or majority of mobile sources as had been assumed by the commenter.

The commenter's operational HRA health risks were overestimated and artificially inflated, as acknowledged by the commenter. The operational HRA prepared by the commenter does not constitute substantial evidence of a significant impact. See also Response 19 regarding construction health risks associated with the Project.

Response 28: The commenter re-presents the results of their screening-level construction HRA. As noted by the commenter in Response 29, the screening-level HRA is known to be conservative. The refined quantitative construction HRA prepared for the Greystar Project takes into account site specific details, including an emissions breakdown by construction year, emissions assignments to the specific areas in which the emissions would occur, topography, and meteorological conditions at the site. Thus, the quantitative construction HRA prepared for the Project reflects a more accurate portrayal of the Project's emissions and health risks than the screening-level HRA prepared by the commenter. See Response 19.

Response 29: The commenter accurately quotes a section of the U.S. EPA's "Exposure Assessment Tools by Tiers and Types - Screening-Level and Refined" that provides an overview of exposure assessment tools. This comment is introductory. No further response is required.

Response 30: The commenter suggests that an updated, refined quantitative HRA should be prepared, because their screening-level analysis indicates a potentially significant impact. See Response 19. The commenter has not provided any evidence of a potentially significant operational health risk impact. The analysis contained on page 5-55 of the Draft EIR provides the rationale for the less-than-significant operational health risk conclusion. Final EIR Response to Comments L4.30, L4.32, and L4.124 provide additional context regarding the appropriateness of the Project's operational health risk assessment. Thus, no quantitative operational HRA was prepared.

Response 31: The commenter purports their analysis demonstrates that the Project would result in a significant air quality impact, and that further mitigation should be identified to reduce the Project's emissions, citing the Southern California Association of Government's (SCAG) *2020 RTP/SCS* Programmatic EIR's Air Quality Project Level Mitigation Measures ("PMM-AQ-1"). This comment is introductory. No further response is required.

Response 32: The commenter identifies SCAG RTP/SCS 2020-2045 PMM-AQ-1(m), which includes recommendations for reducing fugitive dust by having an operational water truck on-site at all times and sweeping paved streets at least once per day.

The actions proposed by SCAG RTP/SCS 2020-2045 PMM-AQ-1(m) are already incorporated into the Project through Draft EIR Mitigation Measures 5-3A and 5-4A. Thus, the actions proposed by this measure would not be anything additional or new beyond that already addressed or covered in the EIR. Implementation of Draft EIR Mitigation Measures 5-3A and 5-4A would reduce the significance of fugitive dust emissions during construction to less than significant, consistent with the BAAQMD significance thresholds. No additional mitigation is required. This additional mitigation measure has not been incorporated into the EIR.

Response 33: The commenter identifies SCAG RTP/SCS 2020-2045 PMM-AQ-1(n), which includes recommendations for utilizing existing power sources or clean fuel generators rather than temporary power generators.

As discussed under Draft EIR Impact 5-4 (Draft EIR pg. 5-43) and Impact 5-7 (Draft EIR pg. 5-54) the Greystar Project would not result in a significant criteria air pollutant or health risk impact during construction after the implementation of Mitigation Measures 5-4A and 5-4B. The less-than-significant health risk assessment determination is further affirmed by the quantitative construction HRA prepared for the Project. The less-than-significant construction impacts associated with the Greystar Project do not require further mitigation.

Mitigation Measures 5-3B and 5-5 were identified to address programmatic impacts associated with future development that could occur within the Freedom Circle Focus Area Plan. Mitigation Measures 5-3B and 5-5 require the preparation of quantitative project-level construction criteria air pollutant and toxic air contaminant emissions analysis for future development proposed under implementation of the Freedom Circle Focus Area Plan. Mitigation Measures 5-3B and 5-5 specify that if emissions are shown to be above BAAQMD thresholds, the City shall require the implementation of mitigation to reduce emissions below

BAAQMD thresholds or to the maximum extent feasible. Mitigation Measures 5-3B and 5-5 identify equipment utilizing alternative fuel sources (e.g., electric-powered and liquefied or compressed natural gas) as a possible means by which to reduce construction emissions.

Incorporation of this mitigation measure is not required for the Greystar Project and would not further reduce the magnitude of Draft EIR Impact 5-3 and Impact 5-5 for the Freedom Circle Focus Area Plan. Further, the recommendations of SCAG RTP/SCS 2020-2045 PMM-AQ-1(n) are already addressed through the mitigation measures contained in the EIR. This additional mitigation measure, as written, has not been incorporated into the EIR as suggested by the commenter.

Response 34: The commenter identifies SCAG RTP/SCS 2020-2045 PMM-AQ-1(o), which includes recommendations that projects develop a traffic plan to minimize traffic flow interference from construction activities.

As discussed under Draft EIR Impact 5-4 and Impact 5-7, the Greystar Project would not result in a significant criteria air pollutant or health risk impact during construction after the implementation of Mitigation Measures 5-4A and 5-4B. The less-than-significant health risk assessment determination is further affirmed by the quantitative construction HRA prepared for the Project. The less-than-significant construction impacts associated with the Greystar Project do not require further mitigation.

Furthermore, Draft EIR Mitigation Measure 13-1 functions in many aspects as a traffic plan, as suggested by SCAG RTP/SCS 2020-2045 PMM-AQ-1(o). Draft EIR Mitigation Measure 13-1 restricts work hours, contains provisions that public notification be given, and requires construction traffic to follow City City-designated truck routes and avoid routes (including local roads in the Plan Area) that contain residential dwelling units to the maximum extent feasible given specific project location and access needs. Other considerations contained in PMM-AQ-1(o), such as use of public transportation or providing satellite parking areas with shuttle service, could be options considered under the implementation of Mitigation Measures 5-3B and 5-5, if needed.

This additional mitigation measure, as written, has not been incorporated into the EIR as suggested by the commenter, because many of the provisions are already required through Mitigation Measure 13-1 and other options identified in PMM-AQ-1(o) could be considered, if needed, for future projects through the implementation of Mitigation Measures 5-3B and 5-5. Further, incorporation of this mitigation measure is not required for the Greystar Project, nor would it reduce the magnitude of Draft EIR Impact 5-3 and Impact 5-5 for the Freedom Circle Focus Area Plan.

Response 35: The commenter identifies SCAG RTP/SCS 2020-2045 PMM-AQ-1(p), which includes recommendations that portable engines and portable engine-driven equipment units used at the project work site, with the exception of on-road and off-road motor vehicles, obtain CARB Portable Equipment Registration with the state or a local district permit.

As discussed under Draft EIR Impact 5-4 (Draft EIR pg. 5-43) and Impact 5-7 (Draft EIR pg. 5-54) the Greystar Project would not result in a significant criteria air pollutant or health risk impact during construction after the implementation of Mitigation Measures 5-4A and 5-4B. The less-than-significant health risk assessment determination is further affirmed by the quantitative construction

HRA prepared for the Project. The less-than-significant construction impacts associated with the Greystar Project do not require further mitigation.

The commenter has provided no evidence that the incorporation of PMM-AQ-1(p) would reduce the magnitude of Draft EIR Impacts 5-3 and 5-5, nor as the commenter identified what constitutes “appropriate consultations” as provided for in the commenter’s recommended mitigation language. Furthermore, the mitigation language, as proposed by the commenter, could raise enforceability issues, as the City does not have the authority to register equipment under CARB’s Portable Equipment Registration Program (PERP); rather, CARB is the regulatory entity that oversees, implements, and enforces the PERP. Future projects occurring under the implementation of the Freedom Circle Focus Area Plan would be required to comply with Mitigation Measures 5-3B and 5-5, which require the preparation of quantitative project-level construction criteria air pollutant and toxic air contaminant emissions analyses. Mitigation Measures 5-3B and 5-5 specify that if emissions are shown to be above BAAQMD thresholds, the City shall require the implementation of mitigation to reduce emissions below BAAQMD thresholds or to the maximum extent feasible. Discussions with CARB or the BAAQMD may be undertaken if a future project is unable to reduce its emissions below BAAQMD thresholds, but requiring consultations in and of themselves does not guarantee emissions reductions or a reduction in magnitude of Draft EIR Impact 5-3 and 5-5.

Incorporation of this mitigation measure is not required for the Greystar Project and would not further reduce the magnitude of Draft EIR Impact 5-3 and Impact 5-5 for the Freedom Circle Focus Area Plan. This additional mitigation measure, as written, has not been incorporated into the EIR as suggested by the commenter.

Response 36: The commenter identifies SCAG RTP/SCS 2020-2045 PMM-AQ-1(q), which includes recommendations that projects within 500 feet of residences, hospitals, or schools use Tier IV equipment for all engines greater than 50 horsepower unless the individual project can demonstrate that Tier IV engines would not be required to mitigate emissions below significance thresholds.

As discussed under Draft EIR Impact 5-4 (Draft EIR pg. 5-43) and Impact 5-7 (Draft EIR pg. 5-54) the Greystar Project would not result in a significant criteria air pollutant or health risk impact during construction after the implementation of Mitigation Measures 5-4A and 5-4B. The less-than-significant health risk assessment determination is further affirmed by the quantitative construction HRA prepared for the Project. The less-than-significant construction impacts associated with the Greystar Project do not require further mitigation.

Mitigation Measures 5-3B and 5-5 were identified to address programmatic impacts associated with future development that could occur within the Freedom Circle Focus Area Plan. Mitigation Measures 5-3B and 5-5 require the preparation of quantitative project-level construction criteria air pollutant and toxic air contaminant emissions analysis for future development proposed under implementation of the Freedom Circle Focus Area Plan. Mitigation Measures 5-3B and 5-5 specify that if emissions are shown to be above BAAQMD thresholds, the City shall require the implementation of mitigation to reduce emissions below BAAQMD thresholds or to the maximum extent feasible. The implementation of recommended PMM-AQ-1(q) would have no different effect in practice as Draft EIR Mitigation Measures 5-3B and 5-5.

Incorporation of this mitigation measure is not required for the Greystar Project and would not further reduce the magnitude of Draft EIR Impact 5-3 and Impact 5-5 for the Freedom Circle Focus Area Plan. This additional mitigation measure, as written, has not been incorporated into the EIR as suggested by the commenter.

Response 37: The commenter identifies SCAG RTP/SCS 2020-2045 PMM-AQ-1(t), which includes recommendations that projects should provide information about air quality related programs to schools, including the EJCP, CARE, and Why Air Quality Matters programs.

As described under Section 5.1.4.1 of the Draft EIR, "the Plan Area is not located in a disadvantaged community (as designated by SB 535 or the BAAQMD Community Air Risk Evaluation (CARE) program), nor is it exposed to high amounts of pollution" (Draft EIR pg. 5-11). Furthermore, there are no schools in proximity of the Plan Area that serve a younger student population, and the mitigation language proposed would not reduce any emissions from the Project. The nearest school is Mission College, which provides educational opportunities for older teenagers and adults. The OEHHA health risk assessment methodology contains age sensitivity factors that take into account the increased sensitivity to carcinogens during early-life exposure. These age sensitivity factors provide a higher weighting of risks for younger members of the population (e.g., infants, children, pre-teens, and younger teens) than those of younger and older adults. Sensitive receptors – as they relate to schools – to are for facilities that provide educational services for children and young adults (e.g., elementary, middle, and high schools). Facilities that provide educational opportunities for adults (e.g., colleges) are typically not considered sensitive receptors, particularly for construction health risk assessments. Thus, increased consideration of potential risks for students at Mission College would not be given, since it provides educational opportunities to older members of the public. It should be further noted that student receptors at colleges are transient, meaning that they move throughout the campus throughout the day while attending classes and would not be exposed to the same pollutant concentrations throughout the day and year. The Project would not result in any potentially significant health risk impacts to students, including the college students at Mission College. Thus, the lack of a significant health risk impact at a school eliminates the need for any mitigation, such as the proposed information to the schools.

This additional mitigation measure, as written, has not been incorporated into the EIR as suggested by the commenter. It is not applicable to the Project's setting, nor would it reduce the magnitude of any air quality impacts associated with the Project.

Response 38: The commenter identifies SCAG RTP/SCS 2020-2045 PMM-AQ-1(u), which includes recommendations that projects work with local cities and communities to install signage that prohibits truck idling in certain locations (e.g., near schools and sensitive receptors). The Freedom Circle Focus Area Plan and Greystar Project propose primarily residential and office land uses, which do not generate substantial number of trucks trips like other land uses, such as industrial and warehousing operations. The majority of truck trips associated with future activities within the Freedom Circle Focus Area Plan would be related to construction, which is temporary (and, as noted below, impacts would be less than significant). Therefore, it is not logical that project applicants would work with the City to install temporary signage.

As discussed under Draft EIR Impact 5-4 (Draft EIR pg. 5-43) and Impact 5-7 (Draft EIR pg. 5-54) the Greystar Project would not result in a significant criteria air pollutant or health risk impact during construction after the implementation of Mitigation Measures 5-4A and 5-4B. The less-than-significant health risk assessment determination is further affirmed by the quantitative construction HRA prepared for the Project. The less-than-significant construction impacts associated with the Greystar Project do not require further mitigation.

Mitigation Measures 5-3B and 5-5 were identified to address programmatic impacts associated with future development that could occur within the Freedom Circle Focus Area Plan. Mitigation Measures 5-3B and 5-5 require the preparation of quantitative project-level construction criteria air pollutant and toxic air contaminant emissions analysis for future development proposed under implementation of the Freedom Circle Focus Area Plan. Mitigation Measures 5-3B and 5-5 specify that if emissions are shown to be above BAAQMD thresholds, the City shall require the implementation of mitigation to reduce emissions below BAAQMD thresholds or to the maximum extent feasible. Requirements on idling and idling times could be incorporated as requirements for projects through the implementation of Mitigation Measures 5-3B and 5-5, if necessary. These requirements could include installing signage.

This additional mitigation measure, as written, has not been incorporated into the EIR as suggested by the commenter. The Project does not propose land uses that would generate trip trick in the quantities that would result in significant health risks, is not located in proximity of any Elementary / Middle Schools, and potential impacts associated with truck operation would be addressed through the implementation of Mitigation Measures 5-3B and 5-5. Incorporating SCAG RTP/SCS 2020-2045 PMM-AQ-1(u) as a standalone mitigation measure for the Project's EIR would not further reduce the magnitude of Draft EIR Impacts 5-3 and 5-5.

Response 39: The commenter identifies SCAG RTP/SCS 2020-2045 PMM-AQ-1(y), which includes recommendations that projects locating sensitive receptors within 500 feet of freeways and other sources install high efficiency enhanced filtration units. This comment relates to the environment's impact on a project, rather than the project's impact on the environment.

The California Supreme Court decision (December 2015) in *California Building Industry Association v. Bay Area Air Quality Management District* ("*CBIA v. BAAQMD*") concluded, "[W]e hold that CEQA does not generally require an agency to consider the effects of existing environmental conditions on a proposed project's future users or residents. What CEQA does mandate…is an analysis of how a project might exacerbate existing environmental hazards." Thus, per the Court's ruling in *CBIA v. BAAQMD*, the City is not required to incorporate PMM-AQ-1(y) as recommended by the commenter.

Future projects developed within the Freedom Circle Focus Area Plan would be required to demonstrate consistency with the City's General Plan, which currently includes Policy 5.10.5-P34. General Plan Policy 5.10.5-P34 requires, "projects to implement minimum setbacks of 500 feet from roadways with average daily trips of 100,000 or more and 100 feet from railroad tracks for new residential or other uses with sensitive receptors, unless a project-specific study identifies measures, such as site design, tiered landscaping, air filtration systems, and window design, to reduce exposure, demonstrating that the potential risks can be reduced to acceptable levels" (Draft EIR pg. 5-55).

SCAG RTP/SCS 2020-2045 PMM-AQ-1(y) is not required for projects to comply with CEQA or General Plan Policy 5.10.5-P34 and therefore has not been incorporated as mitigation into the EIR.

Response 40: The commenter identifies SCAG RTP/SCS 2020-2045 PMM-AQ-1(z), which recommends a monitoring and maintenance program for MERV filters (presumably those discussed in SCAG RTP/SCS 2020-2045 PMM-AQ-1(y)). See Response 39.

Response 41: The commenter identifies SCAG RTP/SCS 2020-2045 PMM-AQ-1(bb), which sets forth recommendations for equipment using diesel equipment. See Response 36.

Response 42: The commenter identifies SCAG RTP/SCS 2020-2045 PMM-AQ-1(cc), which recommends various measures to increase energy efficiency, including: improving pedestrian networks, implementing street design features to reduce traffic (e.g., traffic calming measures), creating urban non-motorized zones (including parks and public spaces), dedicating land for bike trails, limiting parking / require parking permits, and providing ride-sharing programs.

As described on Draft EIR pg. 1-2, "Pursuant to section 15150 (Incorporation By Reference) of the CEQA Guidelines, the Freedom Circle Focus Area Plan is incorporated into this Draft EIR by reference." The Freedom Circle Focus Area Plan contains numerous goals and policies related to pedestrian and bicycle improvements, roadway design criteria to help reduce vehicle trips, and increasing transit ridership. See FC-G4, FC-G6, FC-P4 through FC-P6, FC-P7, FC-P10 through FC-P12, FC-P14, FC-P16, FC-P18 through FC-P24. The Draft EIR also includes Mitigation Measures 5-3D and 9-1A, which set forth requirements that new projects develop TDM Programs that achieve minimum reduction in vehicle miles traveled (VMT) of 20 percent compared to baseline conditions. Such TDM measures could include limiting parking supply, requiring residential area parking permits, and/or providing ride-sharing programs.

This additional mitigation measure, as written, has not been incorporated into the EIR as suggested by the commenter. The commenter has not provided any evidence that SCAG RTP/SCS 2020-2045 PMM-AQ-1(cc) would substantially lessen the magnitude of any significant impacts identified in the EIR. (See *San Franciscans for Reasonable Growth v. City and County of San Francisco* (1989) 209 Cal.App.3d 1502, 1519; Public Resource Code, § 21002; State CEQA Guidelines, § 15021, subd. (a)(2).) The street design criteria and improvements to pedestrian and bicycle infrastructure are included in the Focus Area Plan's framework, and other measures related to parking supply, parking permits, and ride-sharing programs are addressed through Draft EIR Mitigation Measures 5-3D and 9-1A.

Response 43: See Responses 32 through 42. The SCAG RTP/SCS 2020-2045 mitigation measures recommended by the commenter are either included or incorporated through existing mitigation identified in the EIR, are covered under the framework of the Freedom Circle Focus Area Plan, would not substantially lessen the magnitude of any significant impacts, or are not applicable to the Project at all. The EIR has not incorporated any of the mitigation measures recommended by the commenter. The mitigation measures identified in the EIR fully, accurately, and appropriately address potential impacts, and mitigate them consistent with CEQA requirements.

Response 44: Comment noted.

General Plan Consistency Response

The 2035 General Plan includes three Future Focus Areas. All the requirements set forth in the General Plan relating to Future Focus Areas concerns these three existing Future Focus Areas. For these three existing Future Focus Areas, the General Plan includes discussion and policies concerning the development of comprehensive planning for these areas. In adopting policies relating to these three Future Focus Areas as part of the existing General Plan, the City exercised its discretion to prohibit any specific project from moving forward within these three Future Focus Areas until after comprehensive planning was completed.

Freedom Circle is not one of the three existing Future Focus Areas included in the General Plan. The General Plan does not state that, should the City exercise its discretion to create Additional Future Focus Areas, those Additional Future Focus Areas must be made subject to all the same requirements as the three Future Focus Areas included in current General Plan. Therefore, in proposing to identify Freedom Circle as an Additional Future Focus Area, the City has the discretion to create new policies relating to it and other Additional Future Focus Areas that may be proposed by the City in the future.

As explained in the EIR, the City has proposed adding Policy 5.4.7-P11 to the General Plan, which allows for the creation of Additional Future Focus Areas and also allows the City to exercise its discretion to allow for General Plan and Zoning amendments to proceed at that the same time as an Additional Focus Area is created. For example, the City may choose to exercise its discretion to allow for General Plan and Zoning amendments to proceed concurrently for an Additional Focus Area, where a Future Focus Area is made up of numerous property owners and only a subset of those property owners is prepared to move forward to specific project applications as was the case with Freedom Circle and Greystar. In such circumstances, the City may determine that delaying an application for a specific development project is not appropriate for one or more reasons such as, for example, where due to the location or use proposed by an applicant the City believes the use can move forward concurrently with the comprehensive planning without negatively impacting the ability to comprehensively plan the Additional Future Focus Area or where the City determines the use, if developed, should be developed in the near term. For Greystar, as demonstrated in the EIR, the Project can be implemented without negatively impacting comprehensive planning of the entire Additional Future Focus Area. Moreover, the Greystar Project proposes over 1,000 new homes. Given the local need and state objective to produce more housing, City staff believes the uses proposed in Greystar further supports the City Council exercising its discretion to allow the project to move forward concurrently with comprehensive planning of this Additional Future Focus Area.

City Staff, however, acknowledges that minor clarifications to the proposed General Plan Amendments may help to avoid confusion concerning the differences between existing Future Focus Areas and Additional Future Focus Areas such as Freedom Circle. Therefore, City Staff proposes the following clarifications to the proposed General Plan Amendments:

Text under section 5.4.7, Future Focus Areas Goals and Policies:

"In addition to the three Future Focus Areas ***identified in the General Plan as adopted on November 16, 2010***, ***A***additional Future Focus Areas may be added to the General Plan Land Use diagram through the General Plan Amendment process. ***Subject to the discretion provided pursuant to Policy 5.4.7-P11, t***The creation of a***n Additional***

Future Focus Area is a precursor to the comprehensive planning process required for all Focus Areas."

Policy 5.4.7-P11:

Allow for General Plan Amendments and rezonings outside of existing Future Focus Areas in combination with the designation of new ***Additional*** Future Focus Areas.

Biology Response

MIG prepared a memorandum in addition to this one that provides an updated biological setting for the Greystar Project parcels, based on a site visit conducted in April 2022 (MIG 2022). See that memorandum for additional details regarding comments related to biological resources. The Smallwood letter repeats numerous arguments addressed in the Final EIR, and many of the arguments are based on Smallwood's claim that the biological site visit is too old or otherwise inaccurate. While CEQA's baseline is generally when the NOP was issued, an additional site visit was nevertheless completed in order to confirm whether conditions have substantially changed in a way that could impact the environmental conclusions in the EIR. As explained in the updated biological setting memorandum, the site visit confirms the conclusions reached in the EIR.

References

The following references were used to prepare this memorandum:

California Air Pollution Control Officers Association (CAPCOA). 2021. *Handbook for Analyzing Greenhouse Gas Emission Reductions, Assessing Climate Vulnerabilities, and Advancing Health and Equity.* December 2021. Available online: https://www.airquality.org/ClimateChange/Documents/Final%20Handbook_AB434.pdf

City of Santa Clara. 2010. 2010-2035 General Plan. Adopted November 16, 2010. Available online: https://www.santaclaraca.gov/home/showpublisheddocument/56139/636619791319700000

______. 2011. Integrated Final Environmental Impact Report for the City of Santa Clara 2010-2035 General Plan. January 2011. Available online: https://www.santaclaraca.gov/home/showpublisheddocument/12900/635713044859030000

______. 2013. City of Santa Clara Climate Action Plan. Adopted December 3, 2013. Available online: https://www.santaclaraca.gov/home/showpublisheddocument/10170/635713044859030000

______. 2021. Environmental Impact Report for Freedom Circle Focus Area and Greystar General Plan Amendment. SCH# 2020060425. November 2021.

MIG, Inc. (MIG). 2022. Memorandum. Re: Updated Biological Setting for the Greystar Parcels in the Freedom Circle Focus Area Plan. From Tay Peterson, MIG, to John Davidson, City of Santa Clara. May 11, 2022.

PG / CD

Attachment A

Adams Broadwell Joseph & Cardozo April 13, 2022, Planning Commission Letter

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April 13, 2022

Via Email Submission
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Re: Agenda Item 4 (22-259): Comments on the Freedom Circle Focus Area and Greystar General Plan Amendment Project

Honorable Members of the Planning Commission:

We write on behalf of Silicon Valley Residents for Responsible Development ("Silicon Valley Residents") to provide comments on Freedom Circle Focus Area and Greystar General Plan Amendment Project ("Project"), which appears as Item 4 (22-259) on the Agenda for the April 13, 2022 Santa Clara Planning Commission meeting. The Planning Commission will consider whether to adopt resolutions recommending (1) approval of an Environmental Impact Report ("EIR") and an associated Mitigation Monitoring and Reporting Program ("MMRP"); (2) adoption of General Plan amendments; and (3) rezoning for the Greystar site (collectively, "approvals").

The Freedom Circle Focus Area would allow, subject to a future planning study, 2,500 dwelling units beyond those anticipated in the Greystar General Plan Amendment, and an additional 2 million square feet of additional office space. The Focus Area is 108 gross acres bounded by San Tomas Aquino Creek to the east, Great America Parkway to the west, Great America Theme Park to the north and Highway 101 to the south.

The Greystar Project, evaluated in the EIR at the project level, proposes development of three buildings with 1,075 residential units and 2,000 square feet of retail space, plus a 2.0-acre park. The 13.3-acre Greystar site lies within the Freedom Circle Focus Area and is bounded by San Tomas Aquino Creek to the East, Freedom Circle to the West, and Highway 101 in Santa Clara.

The Project requires the following approvals: (1) determination of the adequacy of the EIR prepared to analyze the potential environmental impacts for the project and an associated MMRP; (2) adoption of a General Plan text amendment to add language regarding the creation of additional Future Focus Areas, the re-designation of land outside of Focus Areas, creation of the new Very High-Intensity Office/Research & Development ("R&D") designation, and adoption of a General Plan Amendment to create the Freedom Circle Future Focus Area; (3) adoption of the Greystar General Plan Amendment from High Intensity Office/R&D (maximum Floor Area Ratio of 2.0) to Very High Density Residential (51- 100 Dwelling Unit/Acre; and (4) adoption of the Planned Development Rezoning for the Greystar site, which would allow up to 1,100 units on a 13.3 gross acre site bounded by Freedom Circle to the west, Mission College Boulevard to the north, San Tomas Aquino Creek to the east and Highway 101 to the south. As will be explained below, the above approvals will result in inconsistencies with the Santa Clara General Plan.

On December 20, 2021, Silicon Valley Residents submitted comments on the Draft EIR ("DEIR") prepared for the Project. On March 30, 2022, the City released the Final EIR ("FEIR"), which revises the DEIR and includes responses to our comments. As will be explained below, the FEIR fails to remedy the issues identified in our initial comments. We prepared our responses to the FEIR with the assistance of air quality and health risk experts from Soil / Water / Air Protection Enterprise ("SWAPE"),[1] and biological resources expert Shawn Smallwood, PhD.[2]

For these reasons, Silicon Valley Residents urges the Planning Commission to recommend against adopting the Project's Approvals at the Planning Commission meeting set for April 13, 2022. Silicon Valley Residents urges the Planning Commission to remand the FEIR back to Staff to allow for preparation of a legally adequate EIR pursuant to CEQA.

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[1] SWAPE's technical comments and curricula vitae are attached hereto as **Exhibit A**.
[2] Dr. Smallwood's reply comments and curricula vitae are attached hereto as **Exhibit B**.

I. The Project's General Plan Amendment Related to Future Focus Areas Is Internally Inconsistent

The Project includes designation of the Freedom Circle Focus Area, which would allow, subject to a future planning study, 2,500 dwelling units beyond those anticipated in the Greystar General Plan Amendment, and an additional 2 million square feet of additional office space. The Freedom Circle Focus Area Plan is defined as a "focus area plan," which is one of several policy and regulatory tools used by the City of Santa Clara to implement the City's 2010-2035 General Plan. A focus area plan provides a foundation for the future comprehensive, detailed planning study (or "comprehensive plan," such as a specific plan) necessary to be adopted prior to allowing development in the Plan Area. A focus area plan provides a preliminary analysis of land use, utilities, streets, services, parks, and other public facilities as part of a coordinated planning process established to determine new infrastructure and service needs adequate to support future development and to plan for timing of development appropriate to sustain environmental quality.

General Plan Comment

The Project proposes to establish the Freedom Circle Focus Area via a General Plan Amendment. In order to establish the Focus Area through an Amendment, the Project includes a General Plan Amendment that would add the following text to the General Plan (under section "5.4.7 Future Focus Areas Goals and Policies"):

> In addition to the three Future Focus Areas, additional Future Focus Areas may be added to the General Plan Land Use diagram through the General Plan Amendment process. The creation of a Future Focus Area is a precursor to the comprehensive planning process required for all Focus Areas.

This General Plan Amendment is inconsistent with General Plan Goals. Goal 5.4.7-G1 provides: "All applicable prerequisites are met, and a comprehensive plan is adopted, prior to implementation of any Future Focus Area." It is contradictory to require a comprehensive plan prior to implementation of a Future Focus Area, while also stating the creation of a Future Focus Area precedes a comprehensive plan.[3] The Planning Commission should recommend against approval of this General Plan amendment.

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[3] General Plan Section 8.2-18: Implementation – "Actions, procedures, programs or techniques that carry out policies."

II. The Project's Rezoning and Related General Plan Amendment Potentially Conflict With the General Plan

The Greystar Project would require rezoning the Project site from high-intensity office/R&D to high-density residential. But rezoning at this time conflicts with the General Plan, as the General Plan prohibits rezoning in future focus areas before a comprehensive plan (i.e. specific plan) is adopted for the future focus area:

> Policy 5.4.7-P1: "Require the adoption of the comprehensive plan prior to any rezoning within that designated Future Focus Area."
>
> Policy 5.4.7-P4 states: "Until such time as a comprehensive plan is adopted for a Future Focus Area, allow development in accordance with the land use designations on the Phase II General Plan Land Use Diagram."

Here, a comprehensive plan has not yet been prepared, yet the proposed rezoning would occur in what would be a Future Focus Area. Thus, the rezoning conflicts with the General Plan.

The Project includes the following General Plan Amendment, which purports to ensure the rezoning is consistent with the General Plan: General Plan Comment

> Policy 5.4.7-P11 Allow for General Plan Amendments and rezonings outside of existing Future Focus Areas in combination with the designation of new Future Focus Areas.

It is unclear how this General Plan Amendment would resolve the issue of rezoning prior to comprehensive planning, as the new Policy does not waive the prerequisite comprehensive planning. Allowing for General Plan Amendments and rezonings in combination with Future Focus Areas while also prohibiting rezoning without prerequisite comprehensive planning would be an internal inconsistency within the General Plan. It is also inconsistent with the City's intent in adopting the current General Plan, which is to ensure proper planning for Future Focus Areas.

The Project's proposed Policy 5.4.7-P11 is also structurally inconsistent with General Plan policies listed above because this Policy undermines the General Plan's goals for cohesive development in Focus Areas:

> Goal 5.1.1-G1 states: "Cohesive, integrated planning that restrains premature development prior to the necessary supportive infrastructure has been programmed for each phase of the Progressive General Plan."
>
> Goal 5.4.7-G1 states: "All applicable prerequisites are met, and a comprehensive plan is adopted, prior to implementation of any Future Focus Area."

And as stated in the DEIR:

> Comprehensive planning is a prerequisite for new development in Santa Clara, and Focus Areas have been identified throughout the city to support and foster a diverse economic and cultural base by encouraging improvements and new development tailored to each area's character and the quality of these areas. Future Focus Areas are intended to continue to support community vitality, and all Future Focus Areas require a detailed, comprehensive plan prior to any development approval.[4]

By allowing rezoning before comprehensive planning has occurred, the General Plan Amendment weakens the effectiveness of the Focus Area. As a result, the rezoning and the General Plan Amendment is inconsistent with the General Plan.

General Plan Comment

III. Prerequisite Planning and Studies Are Required Before the Greystar Project is Approved

General Plan Policy 5.1.1-P8 provides: "Prior to approval of residential development for Phase III in any Future Focus Area, complete a comprehensive plan for each area that specifies: [land uses, street system, community design, infrastructure and utilities, etc.]." The DEIR acknowledges that the Freedom Circle Focus Area would be subject to requirements for Phase III development:

> The Freedom Circle Focus Area (upon approval of the proposed General Plan amendment) would be added as a Phase III Focus Area to the General Plan (Section 5.4.7, and any change in land use designation or rezoning of land within the Freedom Circle area would be subject to the requirements of the

[4] DEIR, pg. 3-12.

Future Focus Area Goals and Policies of the General Plan, as amended (see above).[5]

However, the City argues that the Greystar Project is not subject to the Phase III requirements: General Plan Comment

> Although projects identified for Phase III of the General Plan require the City to perform the necessary Phase III prerequisite studies as part of the planning process, there is no near-term timeframe limit during which a Future Focus Area can be considered, which would allow for the Greystar project to be developed concurrently with the Focus Area planning process.

This reasoning is unclear and does not resolve the General Plan inconsistency. The Planning Commission should recommend against approval of the Greystar Project until a comprehensive plan has been prepared.

IV. The City Fails to Conduct a Quantitative Health Risk Analysis

In our initial comments, we explained that the City's failure to conduct a quantitative health risk analysis violates CEQA. By failing to analyze and disclose key information such as the magnitude of diesel particulate matter ("DPM") generated by the Project, and the concentration of DPM by sensitive receptors, the City fails to meet CEQA's informational and analytical standards for EIRs. As the Court explained in *Sierra Club v. County of Fresno*, "a sufficient discussion of significant impacts requires not merely a determination of whether an impact is significant, but some effort to explain the nature and magnitude of the impact."[6] 1

In the FEIR, the City responds that analysis and disclosure of this information is not necessary. The City reasons that "[g]iven that the Greystar project would not result in a significant health risk impact, nor has the commenter provided any evidence that such an impact would occur, it is not necessary for the Draft EIR to explain in substantial detail the specific magnitude to which receptors could be adversely affected by exposure to diesel particulate matter (DPM) concentrations."[7] 2

[5] DEIR, pg. 3-12.
[6] *Sierra Club,* 6 Cal.5th at 519, citing *Cleveland National Forest Foundation v. San Diego Assn. of Governments* (2017) 3 Cal.5th 497, 514–515.
[7] FEIR, response L4.31.

The City's reasoning is flawed, as SWAPE's screening-level HRA shows the Project has potentially significant health risk impacts. This is substantial evidence 3
that triggers the need for disclosure and analysis of the magnitude and concentrations of DPM.

The City argues that the HRA is not supported by substantial evidence, identifying elements of the screening-level HRA that are not representative of project-specific conditions. However, the City misconstrues the purpose of a screening-level HRA: the screening-level assessment conservatively evaluates the Project's impacts to determine whether more rigorous analysis is necessary. As stated in SWAPE's initial comments: "[a] Level 2 HRSA utilizes a limited amount of site-specific information to generate maximum reasonable downwind concentrations 4
of air contaminants to which nearby sensitive receptors may be exposed. If an unacceptable air quality hazard is determined to be possible using AERSCREEN, a more refined modeling approach is required prior to approval of the Project."[8] Thus, the City's critique of SWAPE's HRA does not affect its conclusion that a more rigorous quantitative analysis is justified.

V. The EIR Relies on Nonbinding Air Quality Mitigation

The EIR states that the proposed Greystar Project would not result in significant air quality impacts during construction activities.[9] The DEIR assumes that all heavy-duty off-road equipment would meet either U.S. EPA / CARB Tier III or IV emissions standards: the Applicant provided a list of the heavy-duty off-road equipment that would be used during construction of the Greystar Project, and all listed equipment meets meet either U.S. EPA / CARB Tier III or IV emissions standards.[10] But use of Tier III and IV equipment is not included in the Project's 5
MMRP. As a result, this mitigation is not binding. CEQA requires that mitigation measures that are adopted by an agency must be enforceable through conditions of approval, contracts, or other means that are *legally* binding.[11] The MMRP must be revised to explicitly require the Greystar project to use Tier III or IV equipment as described in the Applicant's list. Therefore, potentially significant air quality impacts during construction activities remain unmitigated and the FEIR's conclusions must be revised and recirculated for public review.

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[8] SWAPE initial comments, pg. 11.
[9] DEIR, pg. 5-48.
[10] DEIR, pg. 5-44.
[11] Pub. Resources Code § 21081.6(b).

VI. The DEIR Conceals Potentially Significant Environmental Impacts by Disguising Mitigation Measures as Project Design Features

When the EIR describes the Greystar Project's construction emissions impacts, its disclosure of "unmitigated" emissions assumes use of Tier III or IV 6
construction equipment. The EIR reasons that the Applicant provided a list of the heavy-duty off-road equipment that would be used during construction of the Greystar Project, and that the listed equipment meets meet either U.S. EPA / CARB Tier III or IV emissions standards.[12]

But under CEQA, it is improper to attempt to disguise mitigation measures as part of the project's design if this obfuscates the potential significance of environmental impacts.[13] In *Lotus v. Department of Transportation*, an EIR prepared by the California Department of Transportation ("CalTrans") contained measures to help minimize potential stress on redwood trees during highway construction, such as restorative planting, invasive plant removal, watering, and 7
use of an arborist and specialized excavation equipment.[14] The Court of Appeal held that because the EIR relied on these measures to reduce adverse impacts, they were actually mitigation measures.[15] The Court of Appeal held that the EIR improperly compressed the analysis of impacts and mitigation measures into a single issue because the EIR did not designate the measures as mitigation and concluded that because of the measures, no significant impacts were anticipated.[16]

As in *Lotus*, the EIR improperly compresses the analysis of impacts and mitigation measures into a single issue. Just as measures like restorative planting and invasive plant removal are not project design features of a highway construction project because their purpose are to reduce adverse impacts, use of Tier III and IV equipment is not a design feature because it reduces adverse 8
emission impacts. By assuming use of Tier III and IV equipment when disclosing the Project's impacts, the EIR avoids disclosing significant impacts. The City must reconduct the air quality analysis, GHG analysis, and health risk analysis so that

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[12] DEIR, pg. 5-44.
[13] *Lotus v. Department of Transportation* (2014) 223 Cal.App.4th 645, 658 (compression of mitigation measures into project design without acknowledging potentially significant impact if effects were not mitigated violates CEQA)
[14] *Id.* at 650.
[15] *Id. Lotus v. Dep't of Transp.* (2014) 223 Cal. App. 4th 645, 651-52.
[16] *Id.* at 656.

the Project's unmitigated impacts are accurately disclosed. Also, as explained above, the City must include use of Tier III and IV equipment in the MMRP. Once these errors are corrected, the EIR must be recirculated. 8 (con't)

VII. The EIR Fails To Adequately Analyze and Mitigate All Potentially Significant Impacts to Biological Resources

In our initial comments, we explained that the EIR's description of the Greystar site's biological baseline is not supported by substantial evidence. First, the EIR fails to substantiate any details of its site visit, so it is unknown who performed the survey, methods used, the time of day when the survey began, how long the survey lasted, which portion of the Project site was covered, and weather conditions during the survey. As a result, the EIR lacks substantial evidence that the baseline is as described. Second, the EIR assumes, without scientific evidentiary support (i.e., substantial evidence), that because the Greystar site is disturbed, it has low habitat value. Conversely, Dr. Smallwood's report provides photographic evidence that wildlife forages, nests, and moves through the site. Biology Comment
Third, whereas the EIR claimed the site lacked burrows, Dr. Smallwood's site visit detected several burrow systems of California ground squirrels on the project site, which demonstrates that the site contains potential habitat for burrowing owls, and foraging grounds for carnivores. Fourth, the City failed to consult all available biological resources databases to establish which species are potentially present, even overlooking species actually seen at the Greystar site.

The City does not resolve these issues in any way in the FEIR. Dr. Smallwood's reply comments explain that the City's claims regarding the sufficiency of its analysis are flawed, and the City's environmental baseline is still not supported by substantial evidence. These errors require the City to revise its environmental setting, conduct new biological surveys, and analyze and mitigate impacts on the full spectrum of potentially present species.

VIII. Conclusion

The Planning Commission cannot recommend approval of the Project until the City complies with CEQA by preparing a legally adequate EIR for the Project. The Project still has potentially significant impacts to public health, air quality, climate change, and biological resources, all of which remain unmitigated. The Project relies on several General Plan amendments that result in internal inconsistencies within the General Plan. Silicon Valley Residents urges the

Planning Commission to remand the FEIR back to Staff to allow for preparation of a legally adequate EIR and recirculation to the public, as required by CEQA.

Sincerely,

Aidan P. Marshall

Attachments

APM:acp

3826-007acp

EXHIBIT A

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

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April 13, 2022

Aidan P. Marshall
Adams Broadwell Joseph & Cardozo
601 Gateway Blvd #1000
South San Francisco, CA 94080

Subject: **Comments on the Freedom Circle Focus Area Plan/Greystar Project General Plan Amendment (SCH No. 2020060425)**

Dear Mr. Marshall,

We have reviewed the March 2022 Final Environmental Impact Report ("FEIR") and the November 2021 Public Release Draft Environmental Impact Report ("DEIR") for the Freedom Circle Focus Area Plan/Greystar Project General Plan Amendment ("Project") located in the City of Santa Clara ("City"). After our review of the FEIR, we find that the FEIR is insufficient in addressing our concerns regarding the Project's air quality and health risk impacts. Furthermore, we find additional errors within the DEIR's air quality analysis. As asserted in our December 17th comment letter, an updated EIR should be prepared to adequately evaluate the Project's potential impacts. 9

Air Quality

Failure to Implement All Feasible Mitigation to Reduce Emissions

The DEIR concludes that the Project's operational criteria air pollutant emissions would be significant-and-unavoidable (p. 5-41). Specifically, the DEIR concludes that the Project's operational NO_X and ROG emissions would exceed the applicable BAAQMD thresholds (see excerpt below) (p. 5-40, Table 5-16). 10

Table 5-16

FREEDOM CIRCLE FOCUS AREA PLAN: NET CHANGE IN OPERATIONAL CRITERIA AIR POLLUTANT EMISSIONS (2040)

Emissions Scenario / Source	Maximum Daily Pollutant Emissions (Pounds per Day)						
	ROG	NOx	CO	PM_{10}		$PM_{2.5}$	
				Dust	Exhaust	Dust	Exhaust
Proposed Focus Area Plan Operational Emissions in Year 2040							
Area Sources	249.5	2.4	147.1	0.0	0.9	0.0	0.9
Energy Sources	4.9	44.1	33.9	0.0	3.4	0.0	3.4
Mobile Sources	85.0	85.3	686.8	259.9	1.1	64.8	1.0
Total[(A)]	339.4	131.8	867.8	259.9	5.3	64.8	5.3
Existing Land Use Operational Emissions in Year 2040[(B)]							
Area Sources	83.7	<0.1	0.2	0.0	<0.1	0.0	<0.1
Energy Sources	2.8	25.0	21.0	0.0	1.9	0.0	1.9
Mobile Sources	20.7	22.1	166.8	63.0	0.3	15.7	0.3
Total[(A)]	107.2	47.1	187.9	63.0	2.2	15.7	2.2
Net Change in Emissions Levels							
Area Sources	165.8	2.4	147.0	0.0	0.9	0.0	0.9
Energy Sources	2.2	19.1	12.9	0.0	1.5	0.0	1.5
Mobile Sources	64.3	63.2	250.0	197.0	0.8	49.1	0.7
Total[(A)]	232.2	84.7	679.9	197.0	3.2	49.1	3.1
BAAQMD CEQA Threshold	54	54	--	None	82	None	54

Source: MIG 2021, see Appendix 25.2.
(A) Totals may not equal due to rounding.
(B) See Table 5-6.

10 (con't)

As a result, the DEIR determines that the Project's operational criteria air pollutant emissions would be significant-and-unavoidable (p. 5-41). The DEIR states:

> "Despite the implementation of these mitigation measures, growth allowed for under the Focus Area Plan would still be substantially more than that accounted for in the City's General Plan and could result in a cumulatively considerable net increase in pollutants for which the region is in nonattainment. This impact would be significant and unavoidable" (p. 5-41). 11

However, while we agree that the Project's operational emissions would result in a significant air quality impact, the DEIR's conclusion that these impacts are "significant and unavoidable" is incorrect. According to CEQA Guidelines § 15096(g)(2):

> "When an EIR has been prepared for a project, the Responsible Agency shall not approve the project as proposed if the agency finds any feasible alternative or feasible mitigation measures within its powers that would substantially lessen or avoid any significant effect the project would have on the environment." 12

As demonstrated above, an impact can only be labeled as significant and unavoidable after all available, feasible mitigation is considered. Here, while the DEIR includes Mitigation Measure ("MM") 5-3C and 5-3D, which require the use of low- and super-compliant VOC architectural coatings as well as the development of a Transportation Demand Management ("TDM") program, the DEIR and FEIR both fail to implement *all* feasible mitigation (p. 2.4-21). Thus, the DEIR's conclusion that the Project's operational criteria air pollutant impacts are significant-and-unavoidable is unsubstantiated. To reduce 13 air quality impacts to the maximum extent possible, additional feasible mitigation measures should be incorporated, such as those suggested in the section of this letter titled "Feasible Mitigation Measures Available to Reduce Emissions." Thus, the Project should not be approved until an updated EIR is prepared, incorporating all feasible mitigation to reduce emissions to less-than-significant levels. 13 (con't)

Insufficient Mitigation Measure to Reduce Operational Air Quality Emissions

Regarding the Project's mobile-source operational emissions, the DEIR states:

> "Despite the Focus Area Plan being served by frequent bus service via VTA Routes 20, 57, and 59 and featuring many amenities to help reduce trips within the Plan Area (i.e., people could walk or bike to their destination), emissions from mobile sources would still remain a substantial source of emissions associated with buildout of the Focus Area Plan. As described in Section 5.1.3.1, the SFBAAB is designated as non-attainment for ozone, and NOx and ROG/VOCs are precursors to ozone (see Section 5.1.1.1). The SFBAAB is also designated as nonattainment for state PM10 and state and federal PM2.5 air quality standards. Accordingly, the City would implement Mitigation Measure 5-3D, which requires future development within the Plan Area to develop and implement a TDM program, consistent with the City of Santa Clara's 2013 Climate Action Plan (see Chapter 9) and 2010-2035 General Plan (City of Santa Clara 2010, 2013)" (p. 5-40). 14

As demonstrated above, the DEIR incorporates MM 5-3D, which states:

> "Proposed residential and office land uses within the Freedom Circle Focus Area Plan shall prepare and implement Transportation Demand Management (TDM) programs that achieve a minimum reduction in vehicle miles traveled (VMT) of 20 percent compared to baseline conditions (i.e., without internal or external reductions accounted for, such as geographic location, land use interconnectivity, etc.), with at least 10 percent of the reduction coming through project-specific TDM measures (e.g., transit subsidies, telecommuting options, etc.)" (p. 5-43). 15

However, MM 5-3D is insufficient. According to CEQA Guidelines § 15126.4(a)(1)(B), a lead agency must identify "the type(s) of potential action(s) that can feasibly achieve that performance standard and that will [be] considered, analyzed, and potentially incorporated in the mitigation measure."[1] While MM 5-3D offers examples of TDM reduction measures (i.e. transit subsidies, telecommuting options), MM 5-3D fails to tangibly consider potential actions that could achieve the measure's performance standard. Thus, despite including a performance standard of reducing the Project's anticipated vehicle miles traveled ("VMT") by 20% compared to baseline conditions, with at least 10% coming through project-specific TDM measures, MM 5-3D fails to formally include actions that could be used to achieve this standard. As such, MM 5-3D is inadequate per CEQA Guidelines § 15126.4(a)(1)(B), and the DEIR and 16

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[1] "2019 CEQA California Environmental Quality Act Statute & Guidelines." Association of Environmental Professionals, *available at:* https://resources.ca.gov/CNRALegacyFiles/ceqa/docs/2019_CEQA_Statutes_and_Guidelines.pdf, p. 194.

FEIR both inadequately address and mitigate the Project's significant mobile-source operational emissions. 16 (con't)

Screening-Level Analysis Indicates a Potentially Significant Health Risk Impact

As discussed in our December 17th comment letter, the DEIR failed to adequately evaluate the proposed Project's potential health risk impacts. Review of the FEIR demonstrates that the Project again fails to adequately evaluate the Project's potential health risk impacts. As such, we find the FEIR to be inadequate and maintain that the DEIR's less-than-significant impact conclusion regarding the Project's health risk impact should not be relied upon for five reasons. 17

First, regarding the construction-related DPM emission rate, the FEIR states:

> "The construction emissions rate for DPM derived by the commenter appears to be a combination of both on- and off-site emissions (e.g., trucks hauling materials to and from the site)" (p. 2-301). 18

As demonstrated above, the FEIR claims that SWAPE's HRA accounted for both on-site and off-site emissions during Project construction. This is incorrect. In order to calculate the construction-related DPM emission rate, we utilized the mitigated annual criteria air pollutant emissions summary, provided in the Supplemental Air Quality/GHG Information as Appendix 25.2 to the DEIR. Review of this summary demonstrates that almost no on-road mobile emissions were accounted for (see excerpt below) (pp. 1274, Table 2-2).

Table 2-2: Criteria Air Pollutant Emissions (Mitigated)

Year / Phase	Emissions (tons/yr)					
	NOx	CO	ROG	PM10 (Exh)	PM2.5 (Exh)	SOx
Year 2022						
Off-road Equipment	0.6	4.0	0.3	0.0	0.0	0.0
On-road Mobile	1.2	0.8	0.1	0.1	0.0	0.0
Year 2022 Total	1.8	4.8	0.3	0.1	0.1	0.0
Year 2023						
Off-road Equipment	1.4	1.8	0.1	0.1	0.1	0.0
On-road Mobile	0.2	1.6	0.1	0.0	0.0	0.0
Year 2023 Total	1.6	3.4	0.2	0.1	0.1	0.0
Year 2024						
Off-road Equipment	2.4	2.7	0.2	0.2	0.2	0.0
On-road Mobile	0.1	1.6	0.1	0.0	0.0	0.0
Year 2024 Total	2.6	4.3	0.2	0.2	0.2	0.0
Year 2025						
Off-road Equipment	3.5	4.0	0.2	0.3	0.2	0.0
On-road Mobile	0.2	2.0	0.1	0.0	0.0	0.0
Year 2025 Total	3.6	6.0	0.3	0.3	0.3	0.0
Year 2026						
Off-road Equipment	2.0	2.5	5.0	0.1	0.1	0.0
On-road Mobile	0.1	1.1	0.1	0.0	0.0	0.0
Year 2026 Total	2.1	3.6	5.0	0.2	0.1	0.0

19

As such, the DPM emission rate utilized by SWAPE almost entirely accounts for off-road construction equipment located on-site. Thus, the DPM emissions rate is not overestimated. 20

Second, the FEIR states: 21

> "The screening level HRA indicates that it uses PM_{10} exhaust estimates, while BAAQMD recommends using $PM_{2.5}$ exhaust estimates (BAAQMD Guidelines, pg. 8-8)" (p. 2-301).

After further review of BAAQMD guidelines, we agree that $PM_{2.5}$ exhaust estimates should have been utilized. However, review of the above-mentioned emissions summary demonstrates that the construction-related PM_{10} exhaust estimates and $PM_{2.5}$ exhaust estimates are the almost identical (see excerpt below) (pp. 1274, Table 2-2).

22

Table 2-2: Criteria Air Pollutant Emissions (Mitigated)

Year / Phase	Emissions (tons/yr)					
	NOx	CO	ROG	PM10 (Exh)	PM2.5 (Exh)	SOx
Year 2022						
Off-road Equipment	0.6	4.0	0.3	0.0	0.0	0.0
On-road Mobile	1.2	0.8	0.1	0.1	0.0	0.0
Year 2022 Total	1.8	4.8	0.3	0.1	0.1	0.0
Year 2023						
Off-road Equipment	1.4	1.8	0.1	0.1	0.1	0.0
On-road Mobile	0.2	1.6	0.1	0.0	0.0	0.0
Year 2023 Total	1.6	3.4	0.2	0.1	0.1	0.0
Year 2024						
Off-road Equipment	2.4	2.7	0.2	0.2	0.2	0.0
On-road Mobile	0.1	1.6	0.1	0.0	0.0	0.0
Year 2024 Total	2.6	4.3	0.2	0.2	0.2	0.0
Year 2025						
Off-road Equipment	3.5	4.0	0.2	0.3	0.2	0.0
On-road Mobile	0.2	2.0	0.1	0.0	0.0	0.0
Year 2025 Total	3.6	6.0	0.3	0.3	0.3	0.0
Year 2026						
Off-road Equipment	2.0	2.5	5.0	0.1	0.1	0.0
On-road Mobile	0.1	1.1	0.1	0.0	0.0	0.0
Year 2026 Total	2.1	3.6	5.0	0.2	0.1	0.0

As such, the construction-related emissions estimates utilized in SWAPE's screening-level HRA are an accurate representation of Project-generated $PM_{2.5}$ emissions, as recommended by BAAQMD guidance. Regarding the operational emissions estimates, we acknowledge that PM_{10} exhaust emissions were incorrectly used in our screening-level HRA. However, review of the CalEEMod output files demonstrates that the "Greystar Residential Development (2030; Mitigated)" model calculated 0.1107 tons/year of PM_{10} exhaust and 0.1088 tons/year of $PM_{2.5}$ exhaust (see excerpt below) (Appendix 25.2, pp. 1152). 23

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total
Category	tons/yr									
Area	4.7120	0.1289	7.9852	6.6000e-004		0.0473	0.0473		0.0473	0.0473
Energy	0.0497	0.4248	0.1848	2.7100e-003		0.0343	0.0343		0.0343	0.0343
Mobile	2.0054	2.1395	15.1472	0.0460	4.5993	0.0291	4.6284	1.1472	0.0272	1.1745
Waste						0.0000	0.0000		0.0000	0.0000
Water						0.0000	0.0000		0.0000	0.0000
Total	**6.7670**	**2.6933**	**23.3172**	**0.0494**	**4.5993**	**0.1107**	**4.7100**	**1.1472**	**0.1088**	**1.2560**

23 (con't)

As such, the difference between operational PM_{10} exhaust emissions and $PM_{2.5}$ exhaust emissions is only 0.0019 tons/year. Thus, the difference is negligible.

Third, the FEIR states:

> "The operational emissions estimate used by the commenter came from the Greystar Project (2030) Unmitigated CalEEMod run. The Greystar Project would be subject to mitigation that would reduce emissions" (p. 2-301). 24

However, the FEIR's claim that we utilized *unmitigated* operational emissions estimates is incorrect. As indicated above, we utilized the *mitigated* operational emissions estimates calculated in the "Greystar Residential Development (2030; Mitigated)" model (Appendix 25.2, pp. 1152). 25

Fourth, regarding the operational DPM emission rate, the FEIR states:

> "The operational emissions rate derived by the commenter incorrectly assumes that all $PM_{2.5}$ exhaust emissions from the Project (i.e., from area, energy, and mobile sources) would be 100 percent DPM, and that all the Project's emissions would occur within the 13.3-acre area" (p. 2-302).

Furthermore, the FEIR states: 26

> "[I]t is not appropriate to assume all mobile source emissions would be generated within the 13.3-acre Project site, as reflected in the emissions rate and, ultimately, the area modeled by the commenter. Mobile sources would operate primarily outside of the Plan Area, distributing the same quantity of pollutants over a greater area and resulting in lower concentrations than that assumed by the commenter" (p. 2-302).

We acknowledge that the operational DPM emission rate utilized by SWAPE is overestimated. As the DEIR and associated documents did not provide the on-site DPM emissions associated with Project 27 operation, we were unable to calculate a more precise emission rate. Regardless, we have included our screening-level HRA below, now only accounting for construction emissions, in order to not artificially inflate the Project's cancer risk (see table below).[2]

27 (con't)

The Maximally Exposed Individual at an Existing Residential Receptor

Age Group	Emissions Source	Duration (years)	Concentration (ug/m3)	Breathing Rate (L/kg-day)	Cancer Risk (without ASFs*)	ASF	Cancer Risk (with ASFs*)
3rd Trimester	Construction	0.25	0.2212	361	2.56E-07	10	**2.56E-06**
Infant (Age 0 - 2)	Construction	2	0.2212	1090	6.18E-06	10	**6.18E-05**
	Construction	*1.75*	*0.2212*	*572*	*2.40E-06*		
	Operation	*12.25*	*	*572*	*		
Child (Age 2 - 16)	Total	14			*	3	*
Adult (Age 16 - 30)	Operation	14	*	261	*	1	*
Lifetime		**30**			**6.43E-06**		**6.43E-05**

* Operational cancer risk not accounted for.

As you can see in the excerpt above, the excess cancer risk over the course of Project construction is 64.3 in one million, which still exceeds the BAAQMD threshold of 10 in one million and results in a potentially significant impact not previously addressed or identified by the DEIR or FEIR. 28

To conclude, we reiterate our December 17th comment that our analysis represents a screening-level HRA, which is known to be conservative and tends to err on the side of health protection.[3] The purpose of the screening-level construction and operational HRA shown above is to demonstrate the link between the proposed Project's emissions and the potential health risk. According to the U.S. EPA:

> "EPA's Exposure Assessment Guidelines recommend completing exposure assessments iteratively using a *tiered approach* to *'strike a balance between the costs of adding detail and refinement to an assessment and the benefits associated with that additional refinement' (U.S. EPA, 1992).* 29
>
> In other words, an assessment using basic tools (e.g., simple exposure calculations, default values, rules of thumb, conservative assumptions) can be conducted as the first phase (or tier) of the overall assessment (i.e., a screening-level assessment).

[2] Methodology discussed in SWAPE's December 17th comment letter.
[3] "Risk Assessment Guidelines Guidance Manual for Preparation of Health Risk Assessments." OEHHA, February 2015, *available at:* https://oehha.ca.gov/media/downloads/crnr/2015guidancemanual.pdf, p. 1-5

> The exposure assessor or risk manager can then determine whether the results of the screening-level assessment warrant further evaluation through refinements of the input data and exposure assumptions or by using more advanced models."[4] 29 (con't)

As demonstrated above, screening-level analyses warrant further evaluation in a refined modeling approach. Because our screening-level HRA demonstrates that the Project could result in a potentially significant health risk impact, the City should prepare an updated, refined quantitative health risk analysis which more accurately evaluates health risk impacts associated with both Project construction and operation. 30

Feasible Mitigation Measures Available to Reduce Emissions

Our analysis demonstrates that the Project would result in a significant air quality impact that should be mitigated further. As such, in an effort to reduce the Project's emissions, we identified several mitigation measures that are applicable to the proposed Project. Therefore, to reduce the Project's emissions, we recommend consideration of SCAG's 2020 *RTP/SCS* PEIR's Air Quality Project Level Mitigation Measures ("PMM-AQ-1"), as described below: [5]

SCAG RTP/SCS 2020-2045	31
Air Quality Project Level Mitigation Measures – PMM-AQ-1: In accordance with provisions of sections 15091(a)(2) and 15126.4(a)(1)(B) of the *State CEQA Guidelines*, a Lead Agency for a project can and should consider mitigation measures to reduce substantial adverse effects related to violating air quality standards. Such measures may include the following or other comparable measures identified by the Lead Agency:	
m) Provide an operational water truck on-site at all times. Use watering trucks to minimize dust; watering should be sufficient to confine dust plumes to the project work areas. Sweep paved streets at least once per day where there is evidence of dirt that has been carried on to the roadway.	32
n) Utilize existing power sources (e.g., power poles) or clean fuel generators rather than temporary power generators.	33
o) Develop a traffic plan to minimize traffic flow interference from construction activities. The plan may include advance public notice of routing, use of public transportation, and satellite parking areas with a shuttle service. Schedule operations affecting traffic for off-peak hours. Minimize obstruction of through-traffic lanes. Provide a flag person to guide traffic properly and ensure safety at construction sites.	34
p) As appropriate require that portable engines and portable engine-driven equipment units used at the project work site, with the exception of on-road and off-road motor vehicles, obtain CARB Portable Equipment Registration with the state or a local district permit. Arrange appropriate consultations with the CARB or the District to determine registration and permitting requirements prior to equipment operation at the site.	35

[4] "Exposure Assessment Tools by Tiers and Types - Screening-Level and Refined." U.S. EPA, *available at:* https://www.epa.gov/expobox/exposure-assessment-tools-tiers-and-types-screening-level-and-refined.

[5] "4.0 Mitigation Measures." Connect SoCal Program Environmental Impact Report Addendum #1, September 2020, available at: https://scag.ca.gov/sites/main/files/file-attachments/fpeir_connectsocal_addendum_4_mitigationmeasures.pdf?1606004420, p. 4.0-2 – 4.0-10; 4.0-19 – 4.0-23; See also: "Certified Final Connect SoCal Program Environmental Impact Report." Southern California Association of Governments (SCAG), May 2020, *available at:* https://scag.ca.gov/peir.

q) Require projects within 500 feet of residences, hospitals, or schools to use Tier 4 equipment for all engines above 50 horsepower (hp) unless the individual project can demonstrate that Tier 4 engines would not be required to mitigate emissions below significance thresholds. 36

t) Where applicable, projects should provide information about air quality related programs to schools, including the Environmental Justice Community Partnerships (EJCP), Clean Air Ranger Education (CARE), and Why Air Quality Matters programs. 37

u) Projects should work with local cities and counties to install adequate signage that prohibits truck idling in certain locations (e.g., near schools and sensitive receptors). 38

y) Projects that will introduce sensitive receptors within 500 feet of freeways and other sources should consider installing high efficiency of enhanced filtration units, such as Minimum Efficiency Reporting Value (MERV) 13 or better. Installation of enhanced filtration units can be verified during occupancy inspection prior to the issuance of an occupancy permit. 39

z) Develop an ongoing monitoring, inspection, and maintenance program for the MERV filters. 40

bb) The following criteria related to diesel emissions shall be implemented on by individual project sponsors as appropriate and feasible:

- Diesel nonroad vehicles on site for more than 10 total days shall have either (1) engines that meet EPA on road emissions standards or (2) emission control technology verified by EPA or CARB to reduce PM emissions by a minimum of 85%
- Diesel generators on site for more than 10 total days shall be equipped with emission control technology verified by EPA or CARB to reduce PM emissions by a minimum of 85%.
- Nonroad diesel engines on site shall be Tier 2 or higher.
- Diesel nonroad construction equipment on site for more than 10 total days shall have either (1) engines meeting EPA Tier 4 nonroad emissions standards or (2) emission control technology verified by EPA or CARB for use with nonroad engines to reduce PM emissions by a minimum of 85% for engines for 50 hp and greater and by a minimum of 20% for engines less than 50 hp.
- Emission control technology shall be operated, maintained, and serviced as recommended by the emission control technology manufacturer.
- Diesel vehicles, construction equipment, and generators on site shall be fueled with ultra-low sulfur diesel fuel (ULSD) or a biodiesel blend approved by the original engine manufacturer with sulfur content of 15 ppm or less. 41
- The construction contractor shall maintain a list of all diesel vehicles, construction equipment, and generators to be used on site. The list shall include the following:
    i. Contractor and subcontractor name and address, plus contact person responsible for the vehicles or equipment.
    ii. Equipment type, equipment manufacturer, equipment serial number, engine manufacturer, engine model year, engine certification (Tier rating), horsepower, engine serial number, and expected fuel usage and hours of operation.
    iii. For the emission control technology installed: technology type, serial number, make, model, manufacturer, EPA/CARB verification number/level, and installation date and hour-meter reading on installation date.
- The contractor shall establish generator sites and truck-staging zones for vehicles waiting to load or unload material on site. Such zones shall be located where diesel emissions have the least impact on abutters, the general public, and especially sensitive receptors such as hospitals, schools, daycare facilities, elderly housing, and convalescent facilities.
- The contractor shall maintain a monthly report that, for each on road diesel vehicle, nonroad construction equipment, or generator onsite, includes:
    i. Hour-meter readings on arrival on-site, the first and last day of every month, and on off-site date.
    ii. Any problems with the equipment or emission controls.
    iii. Certified copies of fuel deliveries for the time period that identify:
        1. Source of supply
        2. Quantity of fuel

3. Quantity of fuel, including sulfur content (percent by weight) 41 (con't)

cc) Project should exceed Title-24 Building Envelope Energy Efficiency Standards (California Building Standards Code). The following measures can be used to increase energy efficiency:

- Provide pedestrian network improvements, such as interconnected street network, narrower roadways and shorter block lengths, sidewalks, accessibility to transit and transit shelters, traffic calming measures, parks and public spaces, minimize pedestrian barriers.
- Provide traffic calming measures, such as:
  - i. Marked crosswalks
  - ii. Count-down signal timers
  - iii. Curb extensions iv. Speed tables
  - iv. Raised crosswalks
  - v. Raised intersections
  - vi. Median islands 42
  - vii. Tight corner radii
  - viii. Roundabouts or mini-circles
  - ix. On-street parking
  - x. Chicanes/chokers
- Create urban non-motorized zones
- Provide bike parking in non-residential and multi-unit residential projects
- Dedicate land for bike trails
- Limit parking supply through:
  - i. Elimination (or reduction) of minimum parking requirements
  - ii. Creation of maximum parking requirements
  - iii. Provision of shared parking
- Require residential area parking permit.
- Provide ride-sharing programs
  - i. Designate a certain percentage of parking spacing for ride sharing vehicles
  - ii. Designating adequate passenger loading and unloading and waiting areas for ride-sharing vehicles
  - iii. Providing a web site or messaging board for coordinating rides
  - iv. Permanent transportation management association membership and finding requirement.

These measures offer a cost-effective, feasible way to incorporate lower-emitting design features into the proposed Project, which subsequently, reduce emissions released during Project operation. An updated EIR should be prepared to include all feasible mitigation measures, as well as include an updated air quality analysis to ensure that the necessary mitigation measures are implemented to 43
reduce emissions to below thresholds. The updated EIR should also demonstrate a commitment to the implementation of these measures prior to Project approval, to ensure that the Project's significant emissions are reduced to the maximum extent possible.

Disclaimer

SWAPE has received limited discovery regarding this project. Additional information may become available in the future; thus, we retain the right to revise or amend this report when additional information becomes available. Our professional services have been performed using that degree of 44
care and skill ordinarily exercised, under similar circumstances, by reputable environmental consultants practicing in this or similar localities at the time of service. No other warranty, expressed or implied, is made as to the scope of work, work methodologies and protocols, site conditions, analytical testing results, and findings presented. This report reflects efforts which were limited to information that was

reasonably accessible at the time of the work, and may contain informational gaps, inconsistencies, or otherwise be incomplete due to the unavailability or uncertainty of information obtained or provided by third parties. 44 (con't)

Sincerely,

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

Paul E. Rosenfeld, Ph.D.

Attachment A: Matt Hagemann CV
Attachment B: Paul E. Rosenfeld CV

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

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Matthew F. Hagemann, P.G., C.Hg., QSD, QSP

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

Education:

M.S. Degree, Geology, California State University Los Angeles, Los Angeles, CA, 1984.
B.A. Degree, Geology, Humboldt State University, Arcata, CA, 1982.

Professional Certifications:

California Professional Geologist
California Certified Hydrogeologist
Qualified SWPPP Developer and Practitioner

Professional Experience:

Matt has 30 years of experience in environmental policy, contaminant assessment and remediation, stormwater compliance, and CEQA review. He spent nine years with the U.S. EPA in the RCRA and Superfund programs and served as EPA's Senior Science Policy Advisor in the Western Regional Office where he identified emerging threats to groundwater from perchlorate and MTBE. While with EPA, Matt also served as a Senior Hydrogeologist in the oversight of the assessment of seven major military facilities undergoing base closure. He led numerous enforcement actions under provisions of the Resource Conservation and Recovery Act (RCRA) and directed efforts to improve hydrogeologic characterization and water quality monitoring. For the past 15 years, as a founding partner with SWAPE, Matt has developed extensive client relationships and has managed complex projects that include consultation as an expert witness and a regulatory specialist, and a manager of projects ranging from industrial stormwater compliance to CEQA review of impacts from hazardous waste, air quality and greenhouse gas emissions.

Positions Matt has held include:

- Founding Partner, Soil/Water/Air Protection Enterprise (SWAPE) (2003 – present);
- Geology Instructor, Golden West College, 2010 – 2104, 2017;
- Senior Environmental Analyst, Komex H2O Science, Inc. (2000 -- 2003);

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

Senior Regulatory and Litigation Support Analyst:

With SWAPE, Matt's responsibilities have included:

- Lead analyst and testifying expert in the review of over 300 environmental impact reports and negative declarations since 2003 under CEQA that identify significant issues with regard to hazardous waste, water resources, water quality, air quality, greenhouse gas emissions, and geologic hazards. Make recommendations for additional mitigation measures to lead agencies at the local and county level to include additional characterization of health risks and implementation of protective measures to reduce worker exposure to hazards from toxins and Valley Fever.
- Stormwater analysis, sampling and best management practice evaluation at more than 100 industrial facilities.
- Expert witness on numerous cases including, for example, perfluorooctanoic acid (PFOA) contamination of groundwater, MTBE litigation, air toxins at hazards at a school, CERCLA compliance in assessment and remediation, and industrial stormwater contamination.
- Technical assistance and litigation support for vapor intrusion concerns.
- Lead analyst and testifying expert in the review of environmental issues in license applications for large solar power plants before the California Energy Commission.
- Manager of a project to evaluate numerous formerly used military sites in the western U.S.
- Manager of a comprehensive evaluation of potential sources of perchlorate contamination in Southern California drinking water wells.
- Manager and designated expert for litigation support under provisions of Proposition 65 in the review of releases of gasoline to sources drinking water at major refineries and hundreds of gas stations throughout California.

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

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

- Expert witness testimony in a case of oil production-related contamination in Mississippi.
- Lead author for a multi-volume remedial investigation report for an operating school in Los Angeles that met strict regulatory requirements and rigorous deadlines.
- Development of strategic approaches for cleanup of contaminated sites in consultation with clients and regulators.

Executive Director:

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

Hydrogeology:

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

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

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

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

- Received an EPA Bronze Medal for his contribution to the development of national guidance for the protection of drinking water.
- Managed the Sole Source Aquifer Program and protected the drinking water of two communities through designation under the Safe Drinking Water Act. He prepared geologic reports, conducted

public hearings, and responded to public comments from residents who were very concerned about the impact of designation.
- Reviewed a number of Environmental Impact Statements for planned major developments, including large hazardous and solid waste disposal facilities, mine reclamation, and water transfer.

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

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

Policy:

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

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

principles into the policy-making process.
- Established national protocol for the peer review of scientific documents.

<u>Geology:</u>

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

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

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

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

<u>Teaching:</u>

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

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

Matt is currently a part time geology instructor at Golden West College in Huntington Beach, California where he taught from 2010 to 2014 and in 2017.

<u>Invited Testimony, Reports, Papers and Presentations:</u>

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Other Experience:

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

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Paul Rosenfeld, Ph.D.

Chemical Fate and Transport & Air Dispersion Modeling

Principal Environmental Chemist

Risk Assessment & Remediation Specialist

Education

Ph.D. Soil Chemistry, University of Washington, 1999. Dissertation on volatile organic compound filtration.

M.S. Environmental Science, U.C. Berkeley, 1995. Thesis on organic waste economics.

B.A. Environmental Studies, U.C. Santa Barbara, 1991. Thesis on wastewater treatment.

Professional Experience

Dr. Rosenfeld has over 25 years' experience conducting environmental investigations and risk assessments for evaluating impacts to human health, property, and ecological receptors. His expertise focuses on the fate and transport of environmental contaminants, human health risk, exposure assessment, and ecological restoration. Dr. Rosenfeld has evaluated and modeled emissions from oil spills, landfills, boilers and incinerators, process stacks, storage tanks, confined animal feeding operations, industrial, military and agricultural sources, unconventional oil drilling operations, and locomotive and construction engines. His project experience ranges from monitoring and modeling of pollution sources to evaluating impacts of pollution on workers at industrial facilities and residents in surrounding communities. Dr. Rosenfeld has also successfully modeled exposure to contaminants distributed by water systems and via vapor intrusion.

Dr. Rosenfeld has investigated and designed remediation programs and risk assessments for contaminated sites containing lead, heavy metals, mold, bacteria, particulate matter, petroleum hydrocarbons, chlorinated solvents, pesticides, radioactive waste, dioxins and furans, semi- and volatile organic compounds, PCBs, PAHs, creosote, perchlorate, asbestos, per- and poly-fluoroalkyl substances (PFOA/PFOS), unusual polymers, fuel oxygenates (MTBE), among other pollutants. Dr. Rosenfeld also has experience evaluating greenhouse gas emissions from various projects and is an expert on the assessment of odors from industrial and agricultural sites, as well as the evaluation of odor nuisance impacts and technologies for abatement of odorous emissions. As a principal scientist at SWAPE, Dr. Rosenfeld directs air dispersion modeling and exposure assessments. He has served as an expert witness and testified about pollution sources causing nuisance and/or personal injury at sites and has testified as an expert witness on numerous cases involving exposure to soil, water and air contaminants from industrial, railroad, agricultural, and military sources.

Professional History:

Soil Water Air Protection Enterprise (SWAPE); 2003 to present; Principal and Founding Partner
UCLA School of Public Health; 2007 to 2011; Lecturer (Assistant Researcher)
UCLA School of Public Health; 2003 to 2006; Adjunct Professor
UCLA Environmental Science and Engineering Program; 2002-2004; Doctoral Intern Coordinator
UCLA Institute of the Environment, 2001-2002; Research Associate
Komex H_2O Science, 2001 to 2003; Senior Remediation Scientist
National Groundwater Association, 2002-2004; Lecturer
San Diego State University, 1999-2001; Adjunct Professor
Anteon Corp., San Diego, 2000-2001; Remediation Project Manager
Ogden (now Amec), San Diego, 2000-2000; Remediation Project Manager
Bechtel, San Diego, California, 1999 – 2000; Risk Assessor
King County, Seattle, 1996 – 1999; Scientist
James River Corp., Washington, 1995-96; Scientist
Big Creek Lumber, Davenport, California, 1995; Scientist
Plumas Corp., California and USFS, Tahoe 1993-1995; Scientist
Peace Corps and World Wildlife Fund, St. Kitts, West Indies, 1991-1993; Scientist

Publications:

Remy, L.L., Clay T., Byers, V., **Rosenfeld P. E.** (2019) Hospital, Health, and Community Burden After Oil Refinery Fires, Richmond, California 2007 and 2012. *Environmental Health.* 18:48

Simons, R.A., Seo, Y. **Rosenfeld, P**., (2015) Modeling the Effect of Refinery Emission On Residential Property Value. Journal of Real Estate Research. 27(3):321-342

Chen, J. A, Zapata A. R., Sutherland A. J., Molmen, D.R., Chow, B. S., Wu, L. E., **Rosenfeld, P. E.,** Hesse, R. C., (2012) Sulfur Dioxide and Volatile Organic Compound Exposure To A Community In Texas City Texas Evaluated Using Aermod and Empirical Data. *American Journal of Environmental Science*, 8(6), 622-632.

Rosenfeld, P.E. & Feng, L. (2011). *The Risks of Hazardous Waste.* Amsterdam: Elsevier Publishing.

Cheremisinoff, N.P., & **Rosenfeld, P.E.** (2011). *Handbook of Pollution Prevention and Cleaner Production: Best Practices in the Agrochemical Industry*, Amsterdam: Elsevier Publishing.

Gonzalez, J., Feng, L., Sutherland, A., Waller, C., Sok, H., Hesse, R., **Rosenfeld, P.** (2010). PCBs and Dioxins/Furans in Attic Dust Collected Near Former PCB Production and Secondary Copper Facilities in Sauget, IL. *Procedia Environmental Sciences*. 113–125.

Feng, L., Wu, C., Tam, L., Sutherland, A.J., Clark, J.J., **Rosenfeld, P.E.** (2010). Dioxin and Furan Blood Lipid and Attic Dust Concentrations in Populations Living Near Four Wood Treatment Facilities in the United States. *Journal of Environmental Health*. 73(6), 34-46.

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Tam L. K.., Wu C. D., Clark J. J. and **Rosenfeld, P.E.** (2008). A Statistical Analysis Of Attic Dust And Blood Lipid Concentrations Of Tetrachloro-p-Dibenzodioxin (TCDD) Toxicity Equivalency Quotients (TEQ) In Two Populations Near Wood Treatment Facilities. *Organohalogen Compounds*, 70, 002252-002255.

Tam L. K.., Wu C. D., Clark J. J. and **Rosenfeld, P.E.** (2008). Methods For Collect Samples For Assessing Dioxins And Other Environmental Contaminants In Attic Dust: A Review. *Organohalogen Compounds*, 70, 000527-000530.

Hensley, A.R. A. Scott, J. J. J. Clark, **Rosenfeld, P.E.** (2007). Attic Dust and Human Blood Samples Collected near a Former Wood Treatment Facility. *Environmental Research*. 105, 194-197.

Rosenfeld, P.E., J. J. J. Clark, A. R. Hensley, M. Suffet. (2007). The Use of an Odor Wheel Classification for Evaluation of Human Health Risk Criteria for Compost Facilities. *Water Science & Technology* 55(5), 345-357.

Rosenfeld, P. E., M. Suffet. (2007). The Anatomy Of Odour Wheels For Odours Of Drinking Water, Wastewater, Compost And The Urban Environment. *Water Science & Technology* 55(5), 335-344.

Sullivan, P. J. Clark, J.J.J., Agardy, F. J., **Rosenfeld, P.E.** (2007). *Toxic Legacy, Synthetic Toxins in the Food, Water, and Air in American Cities.* Boston Massachusetts: Elsevier Publishing

Rosenfeld, P.E., and Suffet I.H. (2004). Control of Compost Odor Using High Carbon Wood Ash. *Water Science and Technology*. 49(9),171-178.

Rosenfeld P. E., J.J. Clark, I.H. (Mel) Suffet (2004). The Value of An Odor-Quality-Wheel Classification Scheme For The Urban Environment. *Water Environment Federation's Technical Exhibition and Conference (WEFTEC) 2004.* New Orleans, October 2-6, 2004.

Rosenfeld, P.E., and Suffet, I.H. (2004). Understanding Odorants Associated With Compost, Biomass Facilities, and the Land Application of Biosolids. *Water Science and Technology*. 49(9), 193-199.

Rosenfeld, P.E., and Suffet I.H. (2004). Control of Compost Odor Using High Carbon Wood Ash, *Water Science and Technology*, 49(9), 171-178.

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Rosenfeld, P.E., Grey, M and Suffet, M. (2002). Compost Demonstration Project, Sacramento California Using High-Carbon Wood Ash to Control Odor at a Green Materials Composting Facility. *Integrated Waste Management Board Public Affairs Office*, Publications Clearinghouse (MS–6), Sacramento, CA Publication #442-02-008.

Rosenfeld, P.E., and C.L. Henry. (2001). Characterization of odor emissions from three different biosolids. *Water Soil and Air Pollution*. 127(1-4), 173-191.

Rosenfeld, P.E., and Henry C. L., (2000). Wood ash control of odor emissions from biosolids application. *Journal of Environmental Quality.* 29, 1662-1668.

Rosenfeld, P.E., C.L. Henry and D. Bennett. (2001). Wastewater dewatering polymer affect on biosolids odor emissions and microbial activity. *Water Environment Research*. 73(4), 363-367.

Rosenfeld, P.E., and C.L. Henry. (2001). Activated Carbon and Wood Ash Sorption of Wastewater, Compost, and Biosolids Odorants. *Water Environment Research*, 73, 388-393.

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Rosenfeld, P. E. (1991). How to Build a Small Rural Anaerobic Digester & Uses Of Biogas In The First And Third World. Bachelors Thesis. University of California.

Presentations:

Rosenfeld, P.E., "The science for Perfluorinated Chemicals (PFAS): What makes remediation so hard?" Law Seminars International, (May 9-10, 2018) 800 Fifth Avenue, Suite 101 Seattle, WA.

Rosenfeld, P.E., Sutherland, A; Hesse, R.; Zapata, A. (October 3-6, 2013). Air dispersion modeling of volatile organic emissions from multiple natural gas wells in Decatur, TX. *44th Western Regional Meeting, American Chemical Society.* Lecture conducted from Santa Clara, CA.

Sok, H.L.; Waller, C.C.; Feng, L.; Gonzalez, J.; Sutherland, A.J.; Wisdom-Stack, T.; Sahai, R.K.; Hesse, R.C.; **Rosenfeld, P.E.** (June 20-23, 2010). Atrazine: A Persistent Pesticide in Urban Drinking Water. *Urban Environmental Pollution*. Lecture conducted from Boston, MA.

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Rosenfeld, P.E. (April 19-23, 2009). Perfluoroctanoic Acid (PFOA) and Perfluoroactane Sulfonate (PFOS) Contamination in Drinking Water From the Use of Aqueous Film Forming Foams (AFFF) at Airports in the United States. *2009 Ground Water Summit and 2009 Ground Water Protection Council Spring Meeting*, Lecture conducted from Tuscon, AZ.

Rosenfeld, P.E. (April 19-23, 2009). Cost to Filter Atrazine Contamination from Drinking Water in the United States" Contamination in Drinking Water From the Use of Aqueous Film Forming Foams (AFFF) at Airports in the United States. *2009 Ground Water Summit and 2009 Ground Water Protection Council Spring Meeting*. Lecture conducted from Tuscon, AZ.

Wu, C., Tam, L., Clark, J., **Rosenfeld, P**. (20-22 July, 2009). Dioxin and furan blood lipid concentrations in populations living near four wood treatment facilities in the United States. Brebbia, C.A. and Popov, V., eds., *Air Pollution XVII: Proceedings of the Seventeenth International Conference on Modeling, Monitoring and Management of Air Pollution*. Lecture conducted from Tallinn, Estonia.

Rosenfeld, P. E. (October 15-18, 2007). Moss Point Community Exposure To Contaminants From A Releasing Facility. *The 23rd Annual International Conferences on Soils Sediment and Water.* Platform lecture conducted from University of Massachusetts, Amherst MA.

Rosenfeld, P. E. (October 15-18, 2007). The Repeated Trespass of Tritium-Contaminated Water Into A Surrounding Community Form Repeated Waste Spills From A Nuclear Power Plant. *The 23rd Annual International*

Conferences on Soils Sediment and Water. Platform lecture conducted from University of Massachusetts, Amherst MA.

Rosenfeld, P. E. (October 15-18, 2007). Somerville Community Exposure To Contaminants From Wood Treatment Facility Emissions. The *23rd Annual International Conferences on Soils Sediment and Water*. Lecture conducted from University of Massachusetts, Amherst MA.

Rosenfeld P. E. (March 2007). Production, Chemical Properties, Toxicology, & Treatment Case Studies of 1,2,3-Trichloropropane (TCP). *The Association for Environmental Health and Sciences (AEHS) Annual Meeting*. Lecture conducted from San Diego, CA.

Rosenfeld P. E. (March 2007). Blood and Attic Sampling for Dioxin/Furan, PAH, and Metal Exposure in Florala, Alabama. *The AEHS Annual Meeting.* Lecture conducted from San Diego, CA.

Hensley A.R., Scott, A., **Rosenfeld P.E.,** Clark, J.J.J. (August 21 – 25, 2006). Dioxin Containing Attic Dust And Human Blood Samples Collected Near A Former Wood Treatment Facility. *The 26th International Symposium on Halogenated Persistent Organic Pollutants – DIOXIN2006*. Lecture conducted from Radisson SAS Scandinavia Hotel in Oslo Norway.

Hensley A.R., Scott, A., **Rosenfeld P.E.,** Clark, J.J.J. (November 4-8, 2006). Dioxin Containing Attic Dust And Human Blood Samples Collected Near A Former Wood Treatment Facility. *APHA 134 Annual Meeting & Exposition.* Lecture conducted from Boston Massachusetts.

Paul Rosenfeld Ph.D. (October 24-25, 2005). Fate, Transport and Persistence of PFOA and Related Chemicals. Mealey's C8/PFOA. *Science, Risk & Litigation Conference.* Lecture conducted from The Rittenhouse Hotel, Philadelphia, PA.

Paul Rosenfeld Ph.D. (September 19, 2005). Brominated Flame Retardants in Groundwater: Pathways to Human Ingestion, *Toxicology and Remediation PEMA Emerging Contaminant Conference*. Lecture conducted from Hilton Hotel, Irvine California.

Paul Rosenfeld Ph.D. (September 19, 2005). Fate, Transport, Toxicity, And Persistence of 1,2,3-TCP. *PEMA Emerging Contaminant Conference.* Lecture conducted from Hilton Hotel in Irvine, California.

Paul Rosenfeld Ph.D. (September 26-27, 2005). Fate, Transport and Persistence of PDBEs. *Mealey's Groundwater Conference.* Lecture conducted from Ritz Carlton Hotel, Marina Del Ray, California.

Paul Rosenfeld Ph.D. (June 7-8, 2005). Fate, Transport and Persistence of PFOA and Related Chemicals. *International Society of Environmental Forensics: Focus On Emerging Contaminants*. Lecture conducted from Sheraton Oceanfront Hotel, Virginia Beach, Virginia.

Paul Rosenfeld Ph.D. (July 21-22, 2005). Fate Transport, Persistence and Toxicology of PFOA and Related Perfluorochemicals. *2005 National Groundwater Association Ground Water And Environmental Law Conference*. Lecture conducted from Wyndham Baltimore Inner Harbor, Baltimore Maryland.

Paul Rosenfeld Ph.D. (July 21-22, 2005). Brominated Flame Retardants in Groundwater: Pathways to Human Ingestion, Toxicology and Remediation. *2005 National Groundwater Association Ground Water and Environmental Law Conference.* Lecture conducted from Wyndham Baltimore Inner Harbor, Baltimore Maryland.

Paul Rosenfeld, Ph.D. and James Clark Ph.D. and Rob Hesse R.G. (May 5-6, 2004). Tert-butyl Alcohol Liability and Toxicology, A National Problem and Unquantified Liability. *National Groundwater Association. Environmental Law Conference*. Lecture conducted from Congress Plaza Hotel, Chicago Illinois.

Paul Rosenfeld, Ph.D. (March 2004). Perchlorate Toxicology. *Meeting of the American Groundwater Trust*. Lecture conducted from Phoenix Arizona.

Hagemann, M.F., **Paul Rosenfeld, Ph.D.** and Rob Hesse (2004). Perchlorate Contamination of the Colorado River. *Meeting of tribal representatives*. Lecture conducted from Parker, AZ.

Paul Rosenfeld, Ph.D. (April 7, 2004). A National Damage Assessment Model For PCE and Dry Cleaners. *Drycleaner Symposium. California Ground Water Association*. Lecture conducted from Radison Hotel, Sacramento, California.

Rosenfeld, P. E., Grey, M., (June 2003) Two stage biofilter for biosolids composting odor control. *Seventh International In Situ And On Site Bioremediation Symposium Battelle Conference* Orlando, FL.

Paul Rosenfeld, Ph.D. and James Clark Ph.D. (February 20-21, 2003) Understanding Historical Use, Chemical Properties, Toxicity and Regulatory Guidance of 1,4 Dioxane. *National Groundwater Association. Southwest Focus Conference. Water Supply and Emerging Contaminants*.. Lecture conducted from Hyatt Regency Phoenix Arizona.

Paul Rosenfeld, Ph.D. (February 6-7, 2003). Underground Storage Tank Litigation and Remediation. *California CUPA Forum*. Lecture conducted from Marriott Hotel, Anaheim California.

Paul Rosenfeld, Ph.D. (October 23, 2002) Underground Storage Tank Litigation and Remediation. *EPA Underground Storage Tank Roundtable*. Lecture conducted from Sacramento California.

Rosenfeld, P.E. and Suffet, M. (October 7- 10, 2002). Understanding Odor from Compost, *Wastewater and Industrial Processes. Sixth Annual Symposium On Off Flavors in the Aquatic Environment. International Water Association*. Lecture conducted from Barcelona Spain.

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Rosenfeld, P.E. and Grey, M. A. (September 22-24, 2002). Biocycle Composting For Coastal Sage Restoration. *Northwest Biosolids Management Association*. Lecture conducted from Vancouver Washington..

Rosenfeld, P.E. and Grey, M. A. (November 11-14, 2002). Using High-Carbon Wood Ash to Control Odor at a Green Materials Composting Facility. *Soil Science Society Annual Conferenc*e. Lecture conducted from Indianapolis, Maryland.

Rosenfeld. P.E. (September 16, 2000). Two stage biofilter for biosolids composting odor control. *Water Environment Federation.* Lecture conducted from Anaheim California.

Rosenfeld. P.E. (October 16, 2000). Wood ash and biofilter control of compost odor. *Biofest.* Lecture conducted from Ocean Shores, California.

Rosenfeld, P.E. (2000). Bioremediation Using Organic Soil Amendments. *California Resource Recovery Association*. Lecture conducted from Sacramento California.

Rosenfeld, P.E., C.L. Henry, R. Harrison. (1998). Oat and Grass Seed Germination and Nitrogen and Sulfur Emissions Following Biosolids Incorporation With High-Carbon Wood-Ash. *Water Environment Federation 12th Annual Residuals and Biosolids Management Conference Proceedings*. Lecture conducted from Bellevue Washington.

Rosenfeld, P.E., and C.L. Henry. (1999). An evaluation of ash incorporation with biosolids for odor reduction. *Soil Science Society of America*. Lecture conducted from Salt Lake City Utah.

Rosenfeld, P.E., C.L. Henry, R. Harrison. (1998). Comparison of Microbial Activity and Odor Emissions from Three Different Biosolids Applied to Forest Soil. *Brown and Caldwell.* Lecture conducted from Seattle Washington.

Rosenfeld, P.E., C.L. Henry. (1998). Characterization, Quantification, and Control of Odor Emissions from Biosolids Application To Forest Soil. *Biofest.* Lecture conducted from Lake Chelan, Washington.

Rosenfeld, P.E, C.L. Henry, R. Harrison. (1998). Oat and Grass Seed Germination and Nitrogen and Sulfur Emissions Following Biosolids Incorporation With High-Carbon Wood-Ash. Water Environment Federation 12th Annual Residuals and Biosolids Management Conference Proceedings. Lecture conducted from Bellevue Washington.

Rosenfeld, P.E., C.L. Henry, R. B. Harrison, and R. Dills. (1997). Comparison of Odor Emissions From Three Different Biosolids Applied to Forest Soil. *Soil Science Society of America*. Lecture conducted from Anaheim California.

Teaching Experience:

UCLA Department of Environmental Health (Summer 2003 through 20010) Taught Environmental Health Science 100 to students, including undergrad, medical doctors, public health professionals and nurses. Course focused on the health effects of environmental contaminants.

National Ground Water Association, Successful Remediation Technologies. Custom Course in Sante Fe, New Mexico. May 21, 2002. Focused on fate and transport of fuel contaminants associated with underground storage tanks.

National Ground Water Association; Successful Remediation Technologies Course in Chicago Illinois. April 1, 2002. Focused on fate and transport of contaminants associated with Superfund and RCRA sites.

California Integrated Waste Management Board, April and May, 2001. Alternative Landfill Caps Seminar in San Diego, Ventura, and San Francisco. Focused on both prescriptive and innovative landfill cover design.

UCLA Department of Environmental Engineering, February 5, 2002. Seminar on Successful Remediation Technologies focusing on Groundwater Remediation.

University Of Washington, Soil Science Program, Teaching Assistant for several courses including: Soil Chemistry, Organic Soil Amendments, and Soil Stability.

U.C. Berkeley, Environmental Science Program Teaching Assistant for Environmental Science 10.

Academic Grants Awarded:

California Integrated Waste Management Board. $41,000 grant awarded to UCLA Institute of the Environment. Goal: To investigate effect of high carbon wood ash on volatile organic emissions from compost. 2001.

Synagro Technologies, Corona California: $10,000 grant awarded to San Diego State University.
Goal: investigate effect of biosolids for restoration and remediation of degraded coastal sage soils. 2000.

King County, Department of Research and Technology, Washington State. $100,000 grant awarded to University of Washington: Goal: To investigate odor emissions from biosolids application and the effect of polymers and ash on VOC emissions. 1998.

Northwest Biosolids Management Association, Washington State. $20,000 grant awarded to investigate effect of polymers and ash on VOC emissions from biosolids. 1997.

James River Corporation, Oregon: $10,000 grant was awarded to investigate the success of genetically engineered Poplar trees with resistance to round-up. 1996.

United State Forest Service, Tahoe National Forest: $15,000 grant was awarded to investigating fire ecology of the Tahoe National Forest. 1995.

Kellogg Foundation, Washington D.C. $500 grant was awarded to construct a large anaerobic digester on St. Kitts in West Indies. 1993

Deposition and/or Trial Testimony:

In the Circuit Court Of The Twentieth Judicial Circuit, St Clair County, Illinois
Martha Custer et al., Plaintiff vs. Cerro Flow Products, Inc., Defendants
Case No.: No. 0i9-L-2295
Rosenfeld Deposition, 5-14-2021
Trial, October 8-4-2021

In the Circuit Court of Cook County Illinois
Joseph Rafferty, Plaintiff vs. Consolidated Rail Corporation and National Railroad Passenger Corporation d/b/a AMTRAK,
Case No.: No. 18-L-6845
Rosenfeld Deposition, 6-28-2021

In the United States District Court For the Northern District of Illinois
Theresa Romcoe, Plaintiff vs. Northeast Illinois Regional Commuter Railroad Corporation d/b/a METRA Rail, Defendants
Case No.: No. 17-cv-8517
Rosenfeld Deposition, 5-25-2021

In the Superior Court of the State of Arizona In and For the Cunty of Maricopa
Mary Tryon et al., Plaintiff vs. The City of Pheonix v. Cox Cactus Farm, L.L.C., Utah Shelter Systems, Inc.
Case Number CV20127-094749
Rosenfeld Deposition: 5-7-2021

In the United States District Court for the Eastern District of Texas Beaumont Division
Robinson, Jeremy et al *Plaintiffs*, vs. CNA Insurance Company et al.
Case Number 1:17-cv-000508
Rosenfeld Deposition: 3-25-2021

In the Superior Court of the State of California, County of San Bernardino
Gary Garner, Personal Representative for the Estate of Melvin Garner vs. BNSF Railway Company.
Case No. 1720288
Rosenfeld Deposition 2-23-2021

In the Superior Court of the State of California, County of Los Angeles, Spring Street Courthouse
Benny M Rodriguez vs. Union Pacific Railroad, A Corporation, et al.
Case No. 18STCV01162
Rosenfeld Deposition 12-23-2020

In the Circuit Court of Jackson County, Missouri
Karen Cornwell, *Plaintiff,* vs. Marathon Petroleum, LP, *Defendant.*
Case No.: 1716-CV10006
Rosenfeld Deposition. 8-30-2019

In the United States District Court For The District of New Jersey
Duarte et al, *Plaintiffs,* vs. United States Metals Refining Company et. al. *Defendant.*
Case No.: 2:17-cv-01624-ES-SCM
Rosenfeld Deposition. 6-7-2019

In the United States District Court of Southern District of Texas Galveston Division
M/T Carla Maersk, *Plaintiffs,* vs. Conti 168., Schiffahrts-GMBH & Co. Bulker KG MS "Conti Perdido" *Defendant.*
Case No.: 3:15-CV-00106 consolidated with 3:15-CV-00237
Rosenfeld Deposition. 5-9-2019

In The Superior Court of the State of California In And For The County Of Los Angeles – Santa Monica
Carole-Taddeo-Bates et al., vs. Ifran Khan et al., Defendants
Case No.: No. BC615636
Rosenfeld Deposition, 1-26-2019

In The Superior Court of the State of California In And For The County Of Los Angeles – Santa Monica
The San Gabriel Valley Council of Governments et al. vs El Adobe Apts. Inc. et al., Defendants
Case No.: No. BC646857
Rosenfeld Deposition, 10-6-2018; Trial 3-7-19

In United States District Court For The District of Colorado
Bells et al. Plaintiff vs. The 3M Company et al., Defendants
Case No.: 1:16-cv-02531-RBJ
Rosenfeld Deposition, 3-15-2018 and 4-3-2018

In The District Court Of Regan County, Texas, 112th Judicial District
Phillip Bales et al., Plaintiff vs. Dow Agrosciences, LLC, et al., Defendants
Cause No.: 1923
Rosenfeld Deposition, 11-17-2017

In The Superior Court of the State of California In And For The County Of Contra Costa
Simons et al., Plaintiffs vs. Chevron Corporation, et al., Defendants
Cause No C12-01481
Rosenfeld Deposition, 11-20-2017

In The Circuit Court Of The Twentieth Judicial Circuit, St Clair County, Illinois
Martha Custer et al., Plaintiff vs. Cerro Flow Products, Inc., Defendants
Case No.: No. 0i9-L-2295
Rosenfeld Deposition, 8-23-2017

In United States District Court For The Southern District of Mississippi
Guy Manuel vs. The BP Exploration et al., Defendants
Case: No 1:19-cv-00315-RHW
Rosenfeld Deposition, 4-22-2020

In The Superior Court of the State of California, For The County of Los Angeles
Warrn Gilbert and Penny Gilber, Plaintiff vs. BMW of North America LLC
Case No.: LC102019 (c/w BC582154)
Rosenfeld Deposition, 8-16-2017, Trail 8-28-2018

In the Northern District Court of Mississippi, Greenville Division
Brenda J. Cooper, et al., *Plaintiffs,* vs. Meritor Inc., et al., *Defendants*
Case Number: 4:16-cv-52-DMB-JVM
Rosenfeld Deposition: July 2017

In The Superior Court of the State of Washington, County of Snohomish
Michael Davis and Julie Davis et al., Plaintiff vs. Cedar Grove Composting Inc., Defendants
Case No.: No. 13-2-03987-5
Rosenfeld Deposition, February 2017
Trial, March 2017

In The Superior Court of the State of California, County of Alameda
Charles Spain., Plaintiff vs. Thermo Fisher Scientific, et al., Defendants
Case No.: RG14711115
Rosenfeld Deposition, September 2015

In The Iowa District Court In And For Poweshiek County
Russell D. Winburn, et al., Plaintiffs vs. Doug Hoksbergen, et al., Defendants
Case No.: LALA002187
Rosenfeld Deposition, August 2015

In The Circuit Court of Ohio County, West Virginia
Robert Andrews, et al. v. Antero, et al.
Civil Action N0. 14-C-30000
Rosenfeld Deposition, June 2015

In The Iowa District Court For Muscatine County
Laurie Freeman et. al. Plaintiffs vs. Grain Processing Corporation, Defendant
Case No 4980
Rosenfeld Deposition: May 2015

In the Circuit Court of the 17th Judicial Circuit, in and For Broward County, Florida
Walter Hinton, et. al. Plaintiff, vs. City of Fort Lauderdale, Florida, a Municipality, Defendant.
Case Number CACE07030358 (26)
Rosenfeld Deposition: December 2014

In the County Court of Dallas County Texas
Lisa Parr et al, *Plaintiff*, vs. Aruba et al, *Defendant.*
Case Number cc-11-01650-E
Rosenfeld Deposition: March and September 2013
Rosenfeld Trial: April 2014

In the Court of Common Pleas of Tuscarawas County Ohio
John Michael Abicht, et al., *Plaintiffs,* vs. Republic Services, Inc., et al., *Defendants*
Case Number: 2008 CT 10 0741 (Cons. w/ 2009 CV 10 0987)
Rosenfeld Deposition: October 2012

In the United States District Court for the Middle District of Alabama, Northern Division
James K. Benefield, et al., *Plaintiffs*, vs. International Paper Company, *Defendant*.
Civil Action Number 2:09-cv-232-WHA-TFM
Rosenfeld Deposition: July 2010, June 2011

In the Circuit Court of Jefferson County Alabama
Jaeanette Moss Anthony, et al., *Plaintiffs*, vs. Drummond Company Inc., et al., *Defendants*
Civil Action No. CV 2008-2076
Rosenfeld Deposition: September 2010

In the United States District Court, Western District Lafayette Division
Ackle et al., *Plaintiffs*, vs. Citgo Petroleum Corporation, et al., *Defendants*.
Case Number 2:07CV1052
Rosenfeld Deposition: July 2009

Attachment B

Greystar General Plan Amendment Project Quantitative Construction Health Risk Assessment

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Memo

To: John Davidson and Alexander Abbe, City of Santa Clara

CC: Ray Pendro, MIG, and Chris Butcher, Thomas Law Group

From: Phil Gleason and Chris Dugan

Date: May 11, 2022

SUBJECT: Greystar General Plan Amendment Construction Health Risk Assessment

This memorandum describes the methodology and results of a quantitative health risk assessment (HRA) prepared for the proposed Greystar General Plan Amendment Project. This memorandum has been prepared to further affirm the significance conclusions drawn in the Freedom Circle Focus Area Plan/Greystar General Plan Amendment Environmental Impact Report (EIR) (State Clearinghouse Number 2020060425; City of Santa Clara 2021). As explained in this memorandum, construction emission associated with the proposed project would not result in cancerogenic health risks that exceed the BAAQMD-recommended significance threshold of 10 excess cancers per million population.

Project Description

The Greystar Project proposes the development of three buildings with 1,075 residential units and 2,000 square feet of retail space, plus a 2.0-acre park. The 13.3-acre Greystar site lies within the Freedom Circle Focus Area and is bounded by San Tomas Aquino Creek to the east, Freedom Circle to the west, and Highway 101 in Santa Clara.

Construction activities associated with development of the proposed Greystar Project would generally include: clearing and grubbing; mass excavation; structural concrete work, including structural framing and rough in; and exterior / interior work, including structural framing / rough in and site work / landscaping. In total, construction of the Greystar Project is anticipated to last approximately 48 months, beginning in the middle of 2023 and concluding in the middle of 2027, and require the net off-haul of approximately 71,500 cubic yards of soil. [1] The specific types of heavy-duty, off-road equipment would vary between the construction phases, depending on the types of activities being undertaken, but would require the use of backhoes, graders, excavators, mini excavators, scrapers, bulldozers, cranes, telehandlers (e.g., Gradalls), and tractors / loaders. The Applicant, Greystar, provided a list of the heavy-duty off-road equipment that would be used during construction of the Greystar Project, as well as the number of hauling and vendor trips that are anticipated per construction phase. Attachment 1 provides a full breakdown of the construction schedule, heavy-duty equipment operating characteristics by phase, and worker, vendor, and hauling trip details, as provided by Greystar.

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[1] The Applicant, Greystar, has indicated that the project's timeline has been delayed by approximately one year. The date ranges presented in this memorandum are approximately one year later than that presented in the EIR. Other construction parameters (e.g., hauling, vendor, worker trips; off-road equipment operating characteristics; etc.) were also confirmed with the Applicant prior to initiating the health risk analysis contained in this memorandum.

Construction Exhaust $PM_{2.5}$ Modeling Methodology

Construction activities associated with the proposed project would generate on- and off-site exhaust emissions, including diesel particulate matter (DPM), in the form of $PM_{2.5}$. The specific quantity of emissions emitted at any given time would be dependent on the type and number of pieces of equipment operating, the equipment's engine classification, the equipment's horsepower, and the load the engine is under. Off-site emissions would be generated from haul trucks used to export waste and soil to and from the site and from vendor trips used to deliver construction materials (e.g., rebar, concrete, lumber, etc.) to the site. This analysis also includes potential DPM emissions that could be generated by workers commuting to and from the site.

The U.S. EPA's AERMOD dispersion model (version 21112) was used to predict pollutant concentrations at existing sensitive residential receptors (Santa Clara Square Apartments) located approximately 770 feet southwest of the Greystar Project site.[2] The AERMOD dispersion model is an EPA-approved and BAAQMD-recommended model for simulating the dispersion of pollutant emissions and estimating concentrations of pollutants at specified receptor locations. AERMOD requires the user to input information on the source(s) of pollutants being modeled, the receptors where pollutant concentrations are modeled, and the meteorology, terrain, and other factors that affect the potential dispersion of pollutants. These variables are described below.

Modeled Construction Sources / Emission Rates

On- and off-site construction emissions were modeled as a series of area and line area sources, as shown in Table 1 and Figure 1.

Table 1: AERMOD Source Parameters

Source ID	Source Description	UTM Coordinates(A)		Size (m^2)
		X	Y	
PAREA01	Year 1: On-site Building C (North)	591229.6	4138492.0	5,506.5
PAREA02	Year 1: On-site Building C (Central)	591192.3	4138390.8	5,500.0
PAREA03	Year 1: On-site Building C (South)	591171.6	4138327.1	3,253.6
PAREA04	Year 1: On-site Park (North)	591172.3	4138312.9	4,976.9
PAREA05	Year 1: On-site Park (South)	591173.2	4138258.9	4,230.8
PAREA06	Year 1: On-site Building B (North)	591168.6	4138230.3	6,551.7
PAREA07	Year 1: On-site Building B (Central)	591125.4	4138173.2	5,717.4
PAREA08	Year 1: On-site Building B (South)	591147.1	4138130.4	5,150.2
PAREA09	Year 1: On-site Building A (North)	591161.4	4138088.3	4,818.2
PAREA10	Year 1: On-site Building A (Central)	591151.9	4138051.6	4,811.5
PAREA11	Year 1: On-site Building A (South)	591143.4	4138020.1	5,891.6
PAREA12	Year 2: On-site Building C (North)	591229.6	4138492.0	5,506.5
PAREA13	Year 2: On-site Building C (Central)	591192.3	4138390.8	5,500.0
PAREA14	Year 2: On-site Building C (South)	591171.6	4138327.1	3,253.6
PAREA15	Year 2: On-site Park (North)	591172.3	4138312.9	4,976.9
PAREA16	Year 2: On-site Park (South)	591173.2	4138258.9	4,230.8

2 This is the distance from the Greystar Project's southern property line to the receptor location. The majority of construction activities at the Greystar Project site would take place 1,200 feet or more from these receptors

Table 1: AERMOD Source Parameters				
Source ID	Source Description	UTM Coordinates(A)		Size (m^2)
		X	Y	
PAREA17	Year 2: On-site Building B (North)	591168.6	4138230.3	6,551.7
PAREA18	Year 2: On-site Building B (Central)	591125.4	4138173.2	5,717.4
PAREA19	Year 2: On-site Building B (South)	591147.1	4138130.4	5,150.2
PAREA20	Year 2: On-site Building A (North)	591161.4	4138088.3	4,818.2
PAREA21	Year 2: On-site Building A (Central)	591151.9	4138051.6	4,811.5
PAREA22	Year 2: On-site Building A (South)	591143.4	4138020.1	5,891.6
PAREA23	Year 3: On-site Building C (North)	591229.6	4138492.0	5,506.5
PAREA24	Year 3: On-site Building C (Central)	591192.3	4138390.8	5,500.0
PAREA25	Year 3: On-site Building C (South)	591171.6	4138327.1	3,253.6
PAREA26	Year 3: On-site Park (North)	591172.3	4138312.9	4,976.9
PAREA27	Year 3: On-site Park (South)	591173.2	4138258.9	4,230.8
PAREA28	Year 3: On-site Building B (North)	591168.6	4138230.3	6,551.7
PAREA29	Year 3: On-site Building B (Central)	591125.4	4138173.2	5,717.4
PAREA30	Year 3: On-site Building B (South)	591147.1	4138130.4	5,150.2
PAREA31	Year 3: On-site Building A (North)	591161.4	4138088.3	4,818.2
PAREA32	Year 3: On-site Building A (Central)	591151.9	4138051.6	4,811.5
PAREA33	Year 3: On-site Building A (South)	591143.4	4138020.1	5,891.6
PAREA34	Year 4: On-site Building C (North)	591229.6	4138492.0	5,506.5
PAREA35	Year 4: On-site Building C (Central)	591192.3	4138390.8	5,500.0
PAREA36	Year 4: On-site Building C (South)	591171.6	4138327.1	3,253.6
PAREA37	Year 4: On-site Park (North)	591172.3	4138312.9	4,976.9
PAREA38	Year 4: On-site Park (South)	591173.2	4138258.9	4,230.8
PAREA39	Year 4: On-site Building B (North)	591168.6	4138230.3	6,551.7
PAREA40	Year 4: On-site Building B (Central)	591125.4	4138173.2	5,717.4
PAREA41	Year 4: On-site Building B (South)	591147.1	4138130.4	5,150.2
PAREA42	Year 4: On-site Building A (North)	591161.4	4138088.3	4,818.2
PAREA43	Year 4: On-site Building A (Central)	591151.9	4138051.6	4,811.5
PAREA44	Year 4: On-site Building A (South)	591143.4	4138020.1	5,891.6
ARLN01	Year 1: Off-site East of Site	591150.7	4138204.3	2,054.2(B)
ARLN02	Year 1: Off-site West of Site	590233.5	4138214.6	2,461.0(B)
ARLN03	Year 2: Off-site East of Site	591150.7	4138204.3	2,054.2(B)
ARLN04	Year 2: Off-site West of Site	590233.5	4138214.6	2,461.0(B)
ARLN05	Year 3: Off-site East of Site	591150.7	4138204.3	2,054.2(B)
ARLN06	Year 3: Off-site West of Site	590233.5	4138214.6	2,461.0(B)
ARLN07	Year 4: Off-site East of Site	591150.7	4138204.3	2,054.2(B)
ARLN08	Year 4: Off-site West of Site	590233.5	4138214.6	2,461.0(B)

(A) UTM coordinates represent the northwest corner of the source.
(B) Reflects length of line area source in meters.

Figure 1: Modeled Construction Emissions Sources

Consistent with BAAQMD-recommendations, $PM_{2.5}$ construction exhaust emissions were presumed to be 100 percent DPM.

The HRA conducted for the Project evaluates health risks for two emissions scenarios.

- **EIR Scenario 1 (Emissions from Tier III and Tier IV Equipment):** Potential $PM_{2.5}$ exhaust emissions from the operation of heavy-duty off-road construction equipment (e.g., scrapers, excavators, etc.) were estimated using U.S. EPA Tier III and IV emission factors. The specific emissions factor applied to each piece of off-road equipment was based on information provided by Greystar. This scenario is consistent with the methodology utilized to estimate emissions in the EIR.
- **OFFROAD2021Scenario 2 (Average County-wide Fleet Emissions):** To develop the emission factors associated with each piece of off-road construction equipment that would be needed for the project under this scenario, OFFROAD2021[3] was first used to generate an emissions inventory for the Santa Clara County "Construction and Mining" industrial category for the year 2022.[4] Equipment was aggregated to include all model years. This approach allows for the identification of typical characteristics for off-road vehicle equipment in the county. The emissions inventory provided the total pollutant emissions (in tons per day) and equipment activity in the county (in annual horsepower-hours (hp-hrs)). Total daily pollutant emissions were then multiplied by 365 (to convert to tons per year), converted to grams, and then divided by total hp-hrs to derive an emissions rate in terms of grams per horsepower hour (g/hp-hr) for each vehicle classification (e.g., excavators, graders, etc.) and horsepower bin (e.g., 100 hp to 175 hp). To estimate the total mass of $PM_{2.5}$ emissions from a piece of off-road construction equipment, the equipment's horsepower was multiplied by the emissions factor (g/hp-hr), its total daily runtime hours, its engine load factor, and the anticipated duration of use (in days).[5]

Mobile source emissions (i.e., from on-road sources – hauling, vendor, and worker trips) were estimated using EMFAC2021 emissions factors for Santa Clara County in year 2022. Attachment 1 contains additional details regarding the number of trips and trip distances. The on-road mobile source emissions were the same for both Scenarios 1 and 2.

The emissions inventories for Scenarios 1 and 2 were utilized to develop an emissions factor for each source identified in Table 1. Total mass emissions were assigned to each project element (i.e., on-site emissions for Building A, Building, B, Building C, and Park; and off-site emissions) based on detailed phasing information provided by Greystar. For example, as shown in Attachment 1, the project would generally be constructed such that Building A would be finished first, followed by Building B, then Building C, and finally the Park. Emissions estimates were assigned to each project element on a monthly basis, based on where construction activities were taking place that month and where vendor materials would be used onsite. A portion of the

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3 OFFROAD2021 is CARB's database of off-road diesel vehicles and equipment information (e.g., population, age, activity levels, emission rates) and associated emissions levels for different geographic regions (e.g., at the air basin, air district, county, or statewide level). OFFROAD2021 is composed of 18 primary industrial categories, one of which is "Construction and Mining." The equipment associated with each industrial category is broken down into sub-classifications based on equipment type and horsepower bin. For example, under the "Construction and Mining" category, there are several types of construction equipment listed (e.g., bore/drill rigs, excavators, graders) broken down by engine horsepower ranges (e.g., 75 hp to 100 hp, 100 hp to 175 hp).

4 Although construction is not anticipated to begin until 2023, the emissions estimates for this scenario conservatively use equipment characteristics from year 2022. This is conservative, because in later years off-road equipment would, on average, be cleaner burning (i.e., emit less pollutants) than equipment in 2022.

5 This is the same methodology employed in the EIR for developing off-road equipment emissions rates and mass emissions for criteria air pollutants not affected by Tier III and Tier IV emissions standards; namely reactive organic gases (ROG) and sulfur oxides (SOx).

hauling and vendor emissions were also added to on-site sources to reflect on-road vehicles operating within the project site itself (e.g., a haul truck driving on-site to receive a new load).[6] Emissions, by project element, were then summed on an annual basis, based on linear years of construction,[7] and converted to an average emissions rate in terms of grams / second per hour of construction activity.[8] Mass emissions from the various project elements were split across two-to-three sources due to the relatively large area in which construction activities would take place for each project element (i.e., several acres per project element).

On-site DPM emissions were modeled as area sources with a release height of five (5) meters (m); this elevated source height reflects the height of the equipment exhaust pipes, plus an additional distance for the height of the exhaust plume above the exhaust pipes to account for the plume rise of the exhaust gases. The Sacramento Metro Air Quality Management District (SMAQMD) recommends a release height of 5 meters. Since the BAAQMD does not have a recommended release height for $PM_{2.5}$ exhaust emissions generated by construction equipment, the SMAQMD's release height has been used instead (SMAQMD 2013).

Off-site DPM emissions from vehicles were modeled as line area source with a release height of 4.15 meters, the approximate height of a truck exhaust.[9] Mobile source emissions were generally split evenly between roadway segments west of the site (i.e., Freedom Circle, Mission College Boulevard, and Bowers Avenue west of the site) and east of the site (i.e., Freedom Circle, Mission College Boulevard and Montague Expressway east of the site).[10]

Meteorological Data Inputs

AERMOD requires meteorological data as an input into the model. The meteorological data is processed using AERMET, a pre-processor to AERMOD. AERMET requires surface meteorological data, upper air meteorological data, and surface parameter data such as albedo (reflectivity) and surface roughness.

For the proposed project, pre-processed surface data was obtained from the BAAQMD for two meteorological stations in proximity of the Project site; San Jose International Airport (KSJC) and Moffett Federal Airfield (KNUQ) (see Figure 2). Upper air data was obtained from Oakland International Airport, since this is the closest upper air meteorological station with data available. These data sets contained five complete years of meteorological data from January 2013 to December 2017. The meteorological data was processed using AERMET version 18081 with the adjusted U*. Emissions were modeled to be generated during potential construction hours only.

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6 For hauling, the emissions from 1 mile out of the 46.7 miles (per trip) were assigned to on-site sources. For vendor trips, the emissions from 0.5 miles out of the 7.3 miles (per trip) were assigned to on-site sources. For context, the site is approximately 0.35 miles from its northern extent to its southern extent.

7 For example, emissions generated from July 2023 through June 2024 comprise Year 1 emissions, July 2024 through June 2025 comprise Year 2 emissions, and so on.

8 Consistent with EIR Mitigation Measure 13-2, emissions from construction activities were assumed to only occur during the hours of 7:00 AM to 6:00 PM, Monday through Friday, and 9:00 AM to 6:00 PM on Saturday.

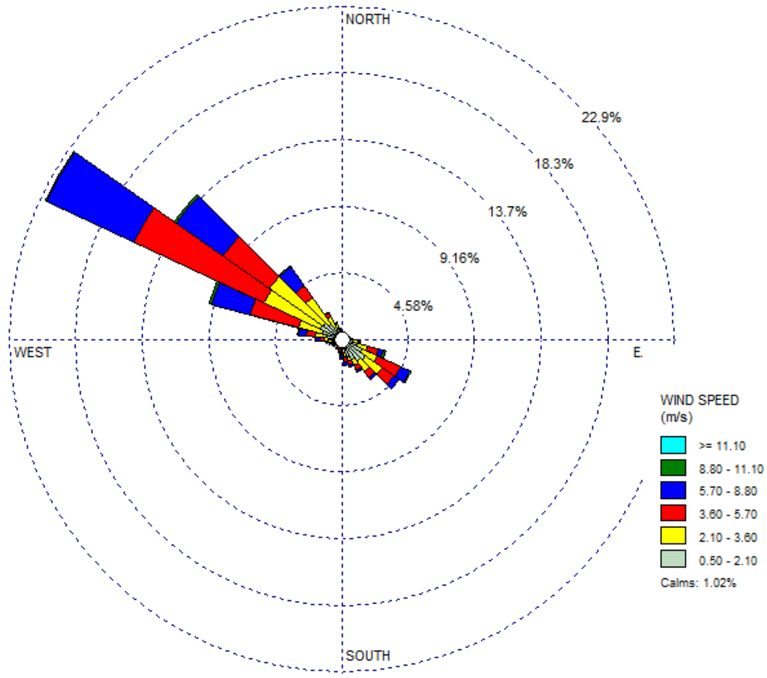
9 The release height of 4.15 meters is based on the modeling inputs from CARB's *2000 Diesel Risk Reduction Plan, Appendix VII, Table 2*. Although the inputs in the *Diesel Risk Reduction Plan* are for a "truck stop," the release height has been used in other studies, including CARB's HRA for the Union Pacific Railyard in Oakland (CARB 2000, CARB 2008).

10 Emissions from hauling are the one exception to this; they were assumed to only travel on the roadways east and south of the site. The roadways east and south of the site would provide the most direct routes to locations where on-site soils would be disposed of.

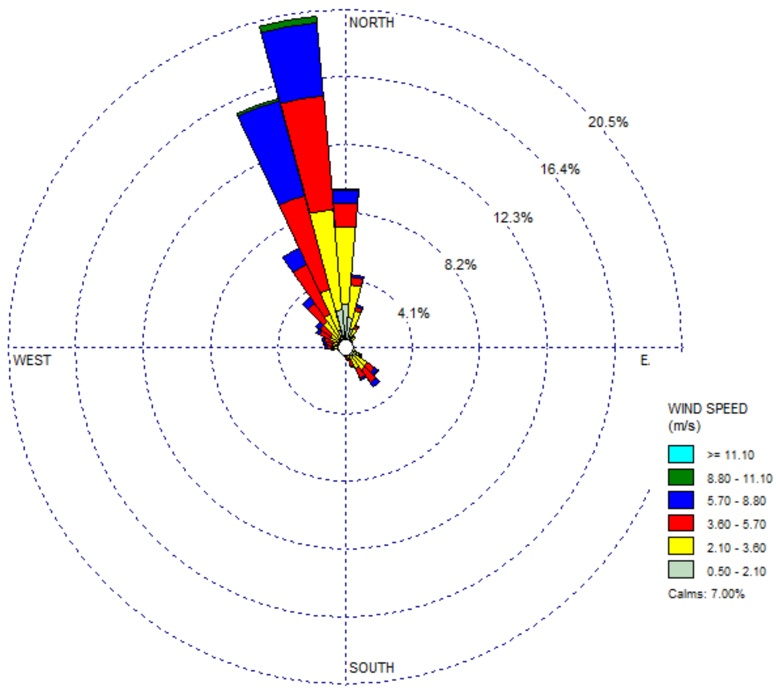
The BAAQMD recommended the San Jose International Airport data be used for the HRA (BAAQMD 2022); however, AERMOD model runs were conducted using both sets of meteorological data as a conservative practice.

Figure 2: Wind Rose for San Jose International Airport and Moffett Federal Airfield

San Jose International Airport



Moffett Federal Airfield



Source: BAAQMD 2019 and 2022

Note: Wind roses are for the 7:00 AM to 6:00 PM timeframe.

Terrain Inputs

Terrain was incorporated by using AERMAP (an AERMOD pre-processor) to import the elevation of the project site and surrounding area using data from the National Elevation Dataset (NED) with a resolution of 1/3 arcsecond.

Modeled Receptors

A 1,500-meter by 1,500-meter grid was generated with a receptor spacing of 75 meters. The grid's center coordinates were 591216.00m E and 4138242.00m N. The grid was converted to discrete Cartesian receptors. Receptors that were located within the project site (and associated, modeled area sources) were removed. An additional 400-meter by 280-meter grid was generated over the Santa Clara Square Apartment Homes with a spacing of 20 meters. This grid was also converted to discrete Cartesian receptors. In total, there were 731 modeled receptors. Consistent with BAAQMD modeling protocol, receptor height was set to 1.5 meters; the approximate an average human breathing zone (BAAQMD 2020).

Health Risk Analysis Methodology

Cancer risk and non-cancer health risks to sensitive receptors within one-quarter mile of on-site sources were estimated using the U.S. EPA's AERMOD dispersion model and recommendations contained in the BAAQMD's *Health Risks Assessment Modeling Protocol,* as well as the OEHHA *Air Toxics Hot Spots Program Guidance Manual* (BAAQMD 2020; OEHHA 2015).

Cancer Risk

Cancer risk is the calculated, pollutant-specific estimated probability of developing cancer based upon the dose and exposure to the toxic air contaminants (TAC). Cancer risk is determined by calculating the combinatory effects of the cancer potency factor (CPF) when inhaling the toxic, the daily inhalation dose, the age group the receptor is cohort to, the duration of exposure over a lifetime (70 years), and other factors such as age sensitivity and the amount of time spent at the location of exposure. Risks were assessed for the inhalation pathway (i.e., breathing) for both residential receptors. Additionally, residential receptors were assessed under a 70-year exposure duration to further detail potential risk to those under lifetime exposure. Cancer risk equations for residential receptors are summarized in Table 2 and Table 3.

Receptor exposure was assessed for the four years in which construction activities would take place and the receptors would be exposed to construction $PM_{2.5}$ emissions. The exposure time is consistent with the construction schedule described in the project's EIR.

Table 2: Cancer Risk Equations	
Equation 1 – Residential Risk:	$RISK_{INH.RES} = DOSE_{AIR.RES} \times CPF \times ASF \times \frac{ED}{AT} \times FAH$
Where:	
$DOSE_{AIR}$ =	Daily Inhalation Dose (mg/kg-day). See Table 3.
CPF =	Cancer Potency Factor for Inhalants (mg/kg-day). CPF is expressed as the 95th percent upper confidence limit of the slope of the dose response curve under continuous lifetime exposure conditions. The CPF for diesel exhaust is 1.1 mg/kg-day.
ASF =	Age Sensitivity Factor. ASF is a protective coefficient intended to take into account increased susceptibility to long-term health effects from early-life exposure to TACs. The recommended ASFs are 10 for the third-trimester to birth and two-year age bins, 3 for the two-year to nine-year and 16-year age bins, and 1 for receptors over 16 years of age.
ED =	Exposure Duration (years). Exposure duration characterizes the length of residency (30 Years) or employment (25 Years) of the receptor.
AT =	Averaging Time (years). A 70-year (lifetime) averaging time is used to characterize to total risk as a factor of average risk over a typical lifespan.
FAH =	Fraction at Home. FAH is the percentage of time the receptor is physically at the receptor location. The recommended percentages are 85 percent for the third-trimester to birth and two-year age bins, 72 percent for the two-year to nine-year and 16-year age bins, and 73 for receptors over 16 years of age.

Table 3: Inhalation Dose Equations	
Residential Dose	$DOSE_{AIR.RES} = C_{AIr} \times \frac{BR}{BW} \times A \times EF \times 10^{-6}$
Where:	
C_{AIR} =	Concentration of TAC in air (µg/m³). Concentration of toxic in micrograms per one cubic meter of air. The AERMOD program is used in the study to determine concentrations of diesel particulate matter at surrounding discrete and grid receptor points.
BR/BW =	Breathing Rate ÷ Body Weight (L/kg/day). Daily breathing rate normalized to body weight. The 95th percentile breathing rate to body weight ratios are used in this study with a recommended 361 L/kg/day for the third-trimester to birth age bin and 1,090 L/kg/day for the birth to two-years age bin. The 80th percentile breathing rate to body weight ratios are used in this study with a recommended 572 for the two-years to 16-years age bin, 261 L/kg/day for the 16-years to 30-years age bin, and 233 L/kg/day for the 16-years to 70-years age bin.
A =	Inhalation Absorption Factor. Is a coefficient that reflects the fraction of chemical absorbed in studies used in the development of CPF and Reference Exposure Levels (RELs). An absorption factor of one is recommended for all chemicals.
EF =	Exposure Frequency. EF is the ratio of days in a year that a receptor is receiving the dose. The recommended EF is 0.96 characterizing an assumed 350 days a year that a residential receptor is home for some portion of the day.

Non-Cancer Risk

The chronic non-cancer hazard quotient is the calculated pollutant-specific indicator for risk of developing an adverse health effect on specific organ system(s) targeted by the identified TAC, in this DPM. The potential for exposure to result in chronic non-cancer effects is evaluated by comparing the estimated annual average air concentration to the chemical-specific, non-cancer chronic reference exposure levels (RELs). The REL is a concentration below which there is assumed to be no observable adverse health impact to a target organ system. When calculated for a single chemical, the comparison yields a ratio termed a hazard quotient. To evaluate the potential for adverse chronic non-cancer health effects from simultaneous exposure to multiple chemicals, the hazard quotients for all chemicals are summed, yielding a hazard index. The chronic REL for DPM was established by OEHHA as 5 μg/m^3. For an acute hazard quotient, the one-hour maximum concentration is divided by the acute REL for the substance; however, there is no acute REL for DPM.

Chronic non-cancer risks are considered significant if a project's TAC emissions result in a hazard index greater than or equal to one. Non-cancer risk equations are summarized in Table 4.

Table 4: Non-Cancer Risk Equation	
Chronic Hazard Quotient:	$HI_{DPM} = \frac{C_{DPM}}{REL_{AAC}}$
Where:	
HI_{DPM} =	Hazard Index; an expression of the potential for non-cancer health effects.
C_{DPM} =	Annual average DPM concentration (μg/m^3).
REL_{DPM} =	Reference exposure level (REL) for DPM; the DPM concentration at which no adverse health effects are anticipated.

Discussion of Scaling Health Risk Values

The AERMOD model was run once for each meteorological file (i.e., once for San Jose International Airport and once for Moffett Federal Airfield), utilizing the emissions rates calculated for the project based on the use of Tier III and Tier IV equipment/emissions factors (i.e., Scenario 1 (Tier III and IV)). The health risk values presented for OFFROAD2021 Scenario 2 (Average County-wide Fleet) in the following section, "Health Risk Assessment Results", are based on the difference (ratio-wise) between mass emissions of $PM_{2.5}$ for off-road sources in EIR Scenario 1 and OFFROAD2021 Scenario 2.[11] Table 5 below shows the estimated mass emissions of $PM_{2.5}$ by linear construction year for Scenarios 1 and 2 and presents the ratios of these differences.

[11] This approach to scaling is slightly conservative, as it also increases risks associated with receptor exposure to DPM from on-road vehicles (hauling, vendor, and worker trips). In actuality, there would be no difference in risks between the two scenarios associated with DPM emissions (and corresponding concentrations) from on-road vehicles. Thus, including those concentrations (and risk contributions from those concentrations) in the parameter being scaled would result in a slightly higher outcome than if only the off-road emissions were being scaled.

Table 5: Off-road Project Construction DPM Emissions for Scenarios 1 and 2, and Scaling Values			
Linear Year of Construction	**Off-road Equipment DPM Exhaust Emissions ($PM_{2.5}$ Tons per Year)**		**Scaling Factor (Ratio of Scenario 2 to 1)**
	EIR Scenario 1 (Tier III and IV Equipment)	**OFFROAD2021 Scenario 2 (Average County-wide Fleet)**	
Year 1	0.04	0.11	2.83
Year 2	0.08	0.08	1.01
Year 3	0.12	0.09	0.74
Year 4	0.14	0.08	0.57
Source: MIG, 2022 (see Attachment 1)			

As shown in Table 5, Scenario 2 emissions are approximately 283% greater in Year 1 than Scenario 1 emissions. Therefore, health risks calculated for Scenario 1 would be scaled up by approximately 2.83 for Year 1. Similarly, Scenario 1 risks are scaled by approximately 1.01 in Year 2, 0.74 in Year 3, and 0.57 in Year 4.

It is observed that, based on OFFROAD2021, the average blend of construction equipment operating in Santa Clara County during Year 2022 has an emissions profile somewhere between Tier III and Tier IV emissions standards. As shown in Table 5, the off-road DPM emissions calculated for Scenario 1 generally reflect a greater blend of Tier IV equipment earlier on in the construction schedule (Year 1), while a greater blend of Tier III equipment is utilized toward the end of construction (Years 3 and 4). Scenario 2 (Average County-wide Fleet) has more emissions than Scenario 1 (mainly comprised of Tier IV equipment, as noted previously) in Year 1, which demonstrates that the county-wide fleet, on average, emits more $PM_{2.5}$ exhaust than Tier IV equipment alone. In contrast, emissions in Years 3 and 4 for Scenario 2 are lower than Scenario 1 (i.e., where more equipment meets Tier III emissions standards), which indicates that the county-wide fleet in later years emits less $PM_{2.5}$ exhaust than Tier III equipment. This indicates that the equipment's emissions profile by Greystar is in line with typical construction emissions rates characteristics throughout the county.

Construction Health Risk Assessment Results

The results of the construction HRA are presented below. The AERMOD output files for the project are contained in Attachment 2.

Individual Cancer Risk from Exposure to DPM (San Jose International Airport Met Data)

The predicted locations of the annual, point of maximum impact (PMI) and the maximally exposed individual resident (MEIR) for DPM exposure during construction along with contours of pollutant concentrations in proximity of the Project site are shown in Attachment 3. Figure 1 through Figure 4 of Attachment 3 depict DPM concentrations for construction Year 1 through Year 4, respectively. See Attachment 4 for the HRA calculations. The predicted PMI is located to the east of the Building A construction area for Year 1 and Year 3, to the southeast of Building B for Year 2, and southeast of Building C for Year 4.[12] Since the PMIs for DPM exposure are located on land that is not occupied by a receptor on a permanent basis, lifetime

[12] The PMI for Year 1 and Year 3 is located at 591291.00 m E, 4138017.00 m N; at 591291.00 m E, 4138092.00 m N for Year 2; and at 591291.00 m E, 4138317.00 m N for Year 4.

excess cancer risks and chronic non-cancer health hazards, which are based on exposure to annual average pollutant concentrations, were not estimated for the modeled PMI locations.

Accordingly, health risks were assessed at the modeled residential MEIR location, which is located southwest of the project site at a multi-family residential building (the northeastern-most building of the Santa Clara Square Apartments) located at the corner of Augustine Drive and Octavius Drive, in the City of Santa Clara (565524.25 m E, 4151934 m N). The HRA for residential receptors evaluated worst-case carcinogenic and non-carcinogenic risks to child (3rd trimester, 0-2 years, and 2-16 years) and adult (16-30 years and 30-70 years) receptors.

The potential incremental increase in cancerogenic health risk for receptors exposed to construction exhaust emissions associated with Scenario 1 (Tier III and IV) and Scenario 2 (Average County-wide Fleet) are shown below in Table 6.

Table 6: Incremental Increase in Cancer Risk from Exposure to Total Project Construction DPM Emissions (San Jose International Airport Met Data)

Starting Receptor Age Range at Year 1 of Project Construction	Health Risk Increase at MEIR(A)(B) (Total Excess Cancer Risk per Million Population)	
	Scenario 1	Scenario 2(C)
Residential Infant Receptor (3rd Trimester)	0.3	0.5
Residential Child Receptor (1-2 Years of Age)	0.2	0.3
Residential Child Receptor (2-16 Years of Age)	0.1	0.1
Residential Adult Receptor (16 to 30 Years of Age)	<0.1	<0.1
Residential Adult Receptor (30 to 70 Years of Age)	<0.1	<0.1
BAAQMD Significance Threshold	10	10
Threshold Exceeded?	**No**	**No**

Source: MIG, 2022 (see Attachment 4)
(A) MEIR is located at 591165.00 m E and 4137730.00 m N.
(B) Risks presented are representative of receptor's age at time of construction. For example, "Residential Infant Receptor (3rd Trimester)" accounts for risks associated with exposure from 3rd Trimester (Year 1) through age 4 (Year 4); "Residential Child Receptor (1-2)" accounts for risks associated with exposure from age 1 (Year 1) through age 5 (Year 4); and so on.
(C) Scenario 2 risks based on Scenario 1 yearly risks scaled based on the factors provided in Table 5.

As shown in Table 6, construction exhaust emissions associated with Scenario 1 (Tier III and IV) and Scenario 2 (Average County-wide Fleet) would have the potential to result in maximum incremental cancerogenic health risk increases of 0.3 and 0.5, respectively, for receptors that are at 3rd Trimester age at the beginning of construction. Both of these risk values are well below the BAAQMD's threshold of 10 excess cancers in a million.

In addition to assessing potential cancerogenic health risk increases based on receptor exposure throughout the entire duration of construction activities, an additional analysis was conducted to evaluate potential cancerogenic health risk increases if receptors were born at the beginning of Year 2 construction and Year 3 construction, due to varying pollutant concentrations across the different years. Table 7 below shows the potential increase in cancerogenic health risk for receptors of 3rd Trimester of age for construction activities beginning in Year 1, Year 2, and Year 3.[13]

[13] Note that potential health risks associated with a receptor that is of 3rd Trimester age at the beginning of Year 4 of construction has not been estimated, because the DPM concentrations at the MEIR are lower for that construction in that year than years prior. This is true for both Scenarios 1 and 2.

Table 7: Maximum Increased Cancer Risk from Project Construction DPM Emissions for Infant Receptors Based on Year of Birth (San Jose International Airport Met Data)		
Starting Year of Exposure	**Health Risk Increase at MEIR[(A)] (Total Excess Cancer Risk per Million Population)**	
	Scenario 1	**Scenario 2[(B)]**
Year 1	0.3[(C)]	0.5[(C)]
Year 2	0.5	0.4
Year 3	0.4	0.3
BAAQMD Significance Threshold	10	10
Threshold Exceeded?	**No**	**No**

Source: MIG, 2022 (see Attachment 4)

(A) MEIR is located at 591165.00 m E and 4137730.00 m N. The MEIR is located at the same location for all years of construction.

(B) Scenario 2 risks based on Scenario 1 yearly risks scaled based on the factors provided in Table 5).

(C) This value is the same as that presented in Table 6.

As shown in in Table 7, the maximum incremental increase in cancer risk for a 3rd Trimester residential receptor would be 0.5 for Scenario 1, if the receptor was born in Year 2 of construction, and 0.5 for Scenario 2, if the receptor was born in Year 1 of construction. The potential incremental increase in cancer risk would be well below the BAAQMD's significance threshold of 10.0 for both scenarios.

Individual Cancer Risk from Exposure to DPM (Moffett Federal Airfield Met Data)

The predicted locations of the annual, point of maximum impact (PMI) and the maximally exposed individual resident (MEIR) for DPM exposure during construction along with contours of pollutant concentrations in proximity of the Project site are shown in Attachment 3. Figure 5 through Figure 8 of Attachment 3 depict DPM concentrations for construction Year 1 through Year 4, respectively. The predicted PMI is located to the southeast of Building A construction area for Year 1 and Year 3, to the south of Building A for Year 2, and east of the Park for Year 4.[14] Since the PMI for DPM exposure is located on land that is not occupied by a receptor on a permanent basis, lifetime excess cancer risks and chronic non-cancer health hazards, which are based on exposure to annual average pollutant concentrations, were not estimated for the modeled PMI location.

Accordingly, health risks were assessed at the modeled residential MEIR location, which is located southwest of the project site at a multi-family residential building (the northeastern-most building of the Santa Clara Square Apartments) located at the corner of Augustine Drive and Octavius Drive, in the City of Santa Clara (565524.25 m E, 4151934 m N). The HRA for residential receptors evaluated worst-case carcinogenic and non-carcinogenic risks to child (3rd trimester, 0-2 years, and 2-16 years) and adult (16-30 years and 30-70 years) receptors.

The potential incremental increase in cancerogenic health risk for receptors exposed to construction exhaust emissions associated with EIR Scenario 1 (Tier III and IV) and OFFROAD2021 Scenario 2 (Average County-wide Fleet) are shown below in Table 8.

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14 The PMI for Year 1 and Year 3 is located at 591291.00 m E, 4137942.00 m N; at 591216.00 m E, 4137492.00 m N for Year 2; and at 591291.00 m E, 4138424.00 m N for Year 4.

Table 8: Incremental Increase in Cancer Risk from Exposure to Total Project Construction DPM Emissions (Moffett Federal Airfield Met Data)		
Starting Receptor Age Range at Year 1 of Project Construction	**Health Risk Increase at MEIR(A)(B) (Excess Cancer Risk per Million Population)**	
	Scenario 1	**Scenario 2(C)**
Residential Infant Receptor (3rd Trimester)	4.1	6.0
Residential Child Receptor (1-2 Years of Age)	2.2	3.9
Residential Child Receptor (2-16 Years of Age)	1.3	1.4
Residential Adult Receptor (16 to 30 Years of Age)	0.1	0.2
Residential Adult Receptor (30 to 70 Years of Age)	0.1	0.1
BAAQMD Significance Threshold	10	10
Threshold Exceeded?	**No**	**No**

Source: MIG, 2022 (see Attachment 4)
(A) MEIR is located at 591165.00m E and 4137730.00m N
(B) Risks presented are representative of receptor's age at time of construction. For example, "Residential Infant Receptor (3rd Trimester)" accounts for risks associated with exposure from 3rd Trimester (Year 1) through age 4 (Year 4); "Residential Child Receptor (1-2)" accounts for risks associated with exposure from age 1 (Year 1) through age 5 (Year 4); and so on.
(C) Scenario 2 risks based on Scenario 1 yearly risks scaled based on the factors provided in Table 5).

As shown in Table 8, construction exhaust emissions associated with Scenario 1 (Tier III and IV) and Scenario 2 (Average County-wide Fleet) would have the potential to result in maximum incremental cancerogenic health risk increases of 4.1 and 6.0, respectively, for receptors that are at 3rd Trimester age at the beginning of construction. Both of these risk values are below the BAAQMD's threshold of 10 excess cancers in a million.

Table 9 below shows the potential increase in cancerogenic health risk for receptors of 3rd Trimester of age for construction activities beginning in Year 1, Year 2, and Year 3.

Table 9: Maximum Increased Cancer Risk from Project Construction DPM Emissions for Infant Receptors Based on Year of Birth (Moffett Federal Airfield Met Data)		
Starting Year of Exposure	**Health Risk Increase at MEIR(A) (Total Excess Cancer Risk per Million Population)**	
	Scenario 1	**Scenario 2(B)**
Year 1	4.1(C)	6.0(C)
Year 2	6.0	5.0
Year 3	5.6	3.8
BAAQMD Significance Threshold	10	10
Threshold Exceeded?	**No**	**No**

Source: MIG, 2022 (see Attachment 4)
(A) MEIR is located at 591165.00m E and 4137730.00m N. The MEIR is located at the same location for all years of construction.
(B) Scenario 2 risks based on Scenario 1 yearly risks scaled based on the factors provided in Table 5).
(C) This value is the same as that presented in Table 8.

As shown in in Table 9, the maximum incremental increase in cancer risk for a 3rd Trimester residential receptor would be 6.0 for Scenario 1, if the receptor was born in Year 2 of construction, and 6.0 for Scenario 2, if the receptor was born in Year 1 of construction. The potential incremental increase in cancer risk would be the BAAQMD's significance threshold of 10.0 for both scenarios.

Non-Cancer Risk (San Jose International Airport Met Data)

The maximum annual average DPM concentration at any long-term receptor location would be approximately 0.0017 μg/m^3 for Scenario 1 (Year 3) and is estimated to be approximately 0.0015 μg/m^3 for Scenario 2 (Year 1). Both of these concentrations would be located at the MEIR (565524.25 m E, 4151934 m N). Based on the chronic inhalation REL for DPM (5 μg/m^3), the calculated chronic hazard quotient during the maximum exposure to DPM concentrations for Scenario 1 and Scenario 2 would be 0.003 and 0.003, respectively, both of which are well below the BAAQMD's non-cancer hazard index threshold value of 1.0. The annual average DPM concentrations at the MEIR location would be lower for all other years under both scenarios, therefore, DPM concentrations in those years would also result in chronic hazard quotients that are below the BAAQMD's non-cancer hazard index threshold.

Non-Cancer Risk (Moffett Federal Airfield Met Data)

The maximum annual average DPM concentration at any long-term receptor location would be approximately 0.0208 μg/m^3 for Scenario 1 (Year 3) and is estimated to be approximately 0.0184 μg/m^3 for Scenario 2 (Year 1). Both of these concentrations would be located at the MEIR (565524.25 m E, 4151934 m N). Based on the chronic inhalation REL for DPM (5 μg/m^3), the calculated chronic hazard quotient during the maximum exposure to DPM concentrations for Scenario 1 and Scenario 2 would be 0.004 and 0.004, respectively, both of which are well below the BAAQMD's non-cancer hazard index threshold value of 1.0. The annual average DPM concentrations at the MEIR location would be lower for all other years under both scenarios, therefore, DPM concentrations in those years would also result in chronic hazard quotients that are below the BAAQMD's non-cancer hazard index threshold.

Conclusion

As described in this memo, receptor exposure to construction exhaust emissions associated with the proposed Greystar General Plan Amendment Project would not exceed applicable BAAQMD-recommended CEQA thresholds of significance for cancer risk or non-cancer risk. As documented herein this memorandum, potential cancerogenic and non-cancerogenic health risks associated with the Greystar General Plan Amendment Project were evaluated for four separate conditions:

1) EIR Scenario 1 (Tier III and IV Equipment) under San Jose International Airport Meteorological Conditions
2) OFFROAD2021 Scenario 2 (Average County-wide Fleet) under San Jose International Airport Meteorological Conditions
3) EIR Scenario 1 (Tier III and IV Equipment) under Moffett Federal Airfield Meteorological Conditions
4) OFFROAD2021 Scenario 2 (Average County-wide Fleet) under Moffett Federal Airfield Meteorological Conditions

All of the analyses for the conditions presented above demonstrate that the project would result in less-than-significant health impacts under the scenario analyzed in the EIR, as well as if the project were to use a construction fleet meeting the county-wide average emissions profile. These results confirm the significance findings contained in the project's EIR.

It should be further noted that, when using the meteorological dataset recommended for use by the BAAQMD (i.e., the San Jose International Airport data), the estimated incremental increase in cancer risk per million population associated with receptor exposure to construction DPM emissions was less than 1.0, and less than a tenth of the BAAQMD's cancer risk threshold of 10.0 excess cancer risks per million population.

References

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PG / CD

Attachment 1

Construction $PM_{2.5}$ Exhaust (DPM) Calculations and AERMOD Rate Derivations

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Greystar General Plan Amendment (City of Santa Clara, CA)

Health Risk Assessment Memorandum
Attachment 1: Construction PM2.5 Exhaust (DPM) Calculations and AERMOD Rate Derivations
Prepared by: MIG, Inc.

Contents:

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Sheet 1: Scenario 2 Scaling Factors for HRA

Table 1-1: Scenario 2 Scaling Factors for HRA

Linear Year of Construction	Off-road Equipment PDM (Exhaust) PM2.5 Emissions (Tons)		Scaling Factor (Ratio of Scenario 2 to 1)
	Scenario 1 (EIR; Tier III and IV)	Scenario 2 (OFFROAD2021; Average County-wide Fleet)	
Year 1	0.04	0.11	2.83
Year 2	0.08	0.08	1.01
Year 3	0.12	0.09	0.74
Year 4	0.14	0.08	0.57

Sheet 2: Scenario 1 - AERMOD Source Inputs

Table 2-1: Senario 1 AERMOD Source Input Information

Source	Description	Size (ft^2) / Length (m)	Size (m^2) / Length (m)	Emissions Rate (grams / sec)	Emissions Rate (grams / (sec * m^2))	Notes
PAREA01	Y1_ON_C-N	59,271.9	5,506.5	0.000227241	4.13E-08	PAREA01 through PAREA44: Emissions from each project element (e.g., Building C, Park, etc.) spread equally across sub-sources (e.g., Building C North, Building C Central, etc.) by size of each source.
PAREA02	Y1_ON_C-C	59,201.9	5,500.0	0.000226973	4.13E-08	
PAREA03	Y1_ON_C-S	35,021.6	3,253.6	0.000134268	4.13E-08	
PAREA04	Y1_ON_P-N	53,571.2	4,976.9	0.000201733	4.05E-08	
PAREA05	Y1_ON_P-S	45,539.8	4,230.8	0.000171489	4.05E-08	
PAREA06	Y1_ON_B-N	70,522.1	6,551.7	0.000396605	6.05E-08	
PAREA07	Y1_ON_B-C	61,542.1	5,717.4	0.000346103	6.05E-08	
PAREA08	Y1_ON_B-S	55,437.1	5,150.2	0.000311769	6.05E-08	
PAREA09	Y1_ON_A-N	51,862.9	4,818.2	0.000315277	6.54E-08	
PAREA10	Y1_ON_A-C	51,790.7	4,811.5	0.000314838	6.54E-08	
PAREA11	Y1_ON_A-S	63,417.6	5,891.6	0.000385518	6.54E-08	
PAREA12	Y2_ON_C-N	59,271.9	5,506.5	0.000592099	1.08E-07	
PAREA13	Y2_ON_C-C	59,201.9	5,500.0	0.0005914	1.08E-07	
PAREA14	Y2_ON_C-S	35,021.6	3,253.6	0.00034985	1.08E-07	
PAREA15	Y2_ON_P-N	53,571.2	4,976.9	0	0.00E+00	
PAREA16	Y2_ON_P-S	45,539.8	4,230.8	0	0.00E+00	
PAREA17	Y2_ON_B-N	70,522.1	6,551.7	0.000878567	1.34E-07	
PAREA18	Y2_ON_B-C	61,542.1	5,717.4	0.000766694	1.34E-07	
PAREA19	Y2_ON_B-S	55,437.1	5,150.2	0.000690637	1.34E-07	
PAREA20	Y2_ON_A-N	51,862.9	4,818.2	0.000648663	1.35E-07	
PAREA21	Y2_ON_A-C	51,790.7	4,811.5	0.00064776	1.35E-07	
PAREA22	Y2_ON_A-S	63,417.6	5,891.6	0.000793181	1.35E-07	
PAREA23	Y3_ON_C-N	59,271.9	5,506.5	0.00080796	1.47E-07	
PAREA24	Y3_ON_C-C	59,201.9	5,500.0	0.000807005	1.47E-07	
PAREA25	Y3_ON_C-S	35,021.6	3,253.6	0.000477394	1.47E-07	
PAREA26	Y3_ON_P-N	53,571.2	4,976.9	0	0.00E+00	
PAREA27	Y3_ON_P-S	45,539.8	4,230.8	0	0.00E+00	
PAREA28	Y3_ON_B-N	70,522.1	6,551.7	0.001379358	2.11E-07	
PAREA29	Y3_ON_B-C	61,542.1	5,717.4	0.001203716	2.11E-07	
PAREA30	Y3_ON_B-S	55,437.1	5,150.2	0.001084307	2.11E-07	
PAREA31	Y3_ON_A-N	51,862.9	4,818.2	0.001081404	2.24E-07	
PAREA32	Y3_ON_A-C	51,790.7	4,811.5	0.001079898	2.24E-07	
PAREA33	Y3_ON_A-S	63,417.6	5,891.6	0.001322333	2.24E-07	
PAREA34	Y4_ON_C-N	59,271.9	5,506.5	0.002412391	4.38E-07	
PAREA35	Y4_ON_C-C	59,201.9	5,500.0	0.002409542	4.38E-07	
PAREA36	Y4_ON_C-S	35,021.6	3,253.6	0.001425393	4.38E-07	
PAREA37	Y4_ON_P-N	53,571.2	4,976.9	0.00165837	3.33E-07	
PAREA38	Y4_ON_P-S	45,539.8	4,230.8	0.001409747	3.33E-07	
PAREA39	Y4_ON_B-N	70,522.1	6,551.7	0.000276437	4.22E-08	
PAREA40	Y4_ON_B-C	61,542.1	5,717.4	0.000241237	4.22E-08	
PAREA41	Y4_ON_B-S	55,437.1	5,150.2	0.000217306	4.22E-08	
PAREA42	Y4_ON_A-N	51,862.9	4,818.2	0.000114078	2.37E-08	

PAREA43	Y4_ON_A-C	51,790.7	4,811.5	0.000113919	2.37E-08	
PAREA44	Y4_ON_A-S	63,417.6	5,891.6	0.000139493	2.37E-08	
ARLN01	Y1_OFF_E	2,054.2		4.79719E-05	3.83E-09	ARLN01: Emissions for this segment porportioned to a weighted distance derived from haul, vendor, and worker trips.
ARLN02	Y1_OFF_W	2,461.0		6.97541E-06	4.65E-10	
ARLN03	Y2_OFF_E	2,054.2		5.85375E-06	4.68E-10	
ARLN04	Y2_OFF_W	2,461.0		7.01299E-06	4.68E-10	
ARLN05	Y3_OFF_E	2,054.2		3.96015E-06	3.16E-10	ARLN02 through ARLN08: Emissions for this segment porportioned to a weighted distance derived from vendor and worker trips.
ARLN06	Y3_OFF_W	2,461.0		4.74439E-06	3.16E-10	
ARLN07	Y4_OFF_E	2,054.2		3.85097E-06	3.08E-10	
ARLN08	Y4_OFF_W	2,461.0		4.61359E-06	3.08E-10	

Sheet 3: Scenario 1 - PM2.5 Emissions Source Assigment (Area of Emissions)

Table 3-1: Scenario 1 PM2.5 Emissions Source Assigment

Description	**PM2.5 Emissions (grams)**							**Emissions Rate (grams / second)**
	Heavy-Duty Off-road	**Hauling (46.7 mi)**		**Vendor (7.3 mi)**		**Worker (14.7 mi)**	**Total Emissions (grams)**	
		Running	**Idle**	**Running**	**Idle**			
Year 1								
Y1 On Building A	12036.89465	108.3294548	9.362421023	6.610006795	6.893935947	0	12168.09047	0.001015633
Y1 On Building B	12506.53625	108.3294548	9.362421023	4.531053045	4.725681899	0	12633.48486	0.001054478
Y1 On Building C	6930.074537	108.3294548	9.362421023	1.33266266	1.389906441	0	7050.488982	0.000588482
Y1 On Park	4353.81168	108.3294548	9.362421023	0	0	0	4471.503556	0.000373222
Y1 Off (West of Site)	0	0	0	372.9643028	0	46.70614281	419.6704456	3.50286E-05
Y1 Off (East of Site)	0	19802.62433	0	372.9643028	0	46.70614281	20222.29478	0.001687892
Y1 Off Building A	*0*	*19802.62433*	*0*	*395.2784063*	*0*	*93.41228561*	*20291.31502*	
Y1 Off Building B	*0*		*0*	*270.9569721*	*0*		*270.9569721*	
Y1 Off Building C	*0*		*0*	*79.69322708*	*0*		*79.69322708*	
Y1 Off Park	*0*		*0*	*0*	*0*		*0*	
Year 2								
Y2 On Building A	25027.28571	0	0	3.838068462	4.00293055	0	25035.12671	0.002089604
Y2 On Building B	27974.16137	0	0	5.757102692	6.004395825	0	27985.92287	0.002335898
Y2 On Building C	18364.86651	0	0	2.878551346	3.002197913	0	18370.74726	0.001533349
Y2 On Park	0	0	0	0	0	0	0	0
Y2 Off (West of Site)	0	0	0	372.9643028	0	65.50991459	438.4742173	3.65981E-05
Y2 Off (East of Site)	0	0	0	372.9643028	0	65.50991459	438.4742173	3.65981E-05
Y2 Off Building A	*0*	*0*	*0*	*229.516494*	*0*	*131.0198292*	*360.5363232*	
Y2 Off Building B	*0*	*0*	*0*	*344.274741*	*0*		*344.274741*	
Y2 Off Building C	*0*	*0*	*0*	*172.1373705*	*0*		*172.1373705*	
Y2 Off Park	*0*	*0*	*0*	*0*	*0*		*0*	
Year 3								
Y3 On Building A	41730.64669	0	0	2.981356751	3.109419267		41736.73746	0.003483635
Y3 On Building B	43931.70726	0	0	3.152699093	3.288121523		43938.14808	0.00366738
Y3 On Building C	25063.76766	0	0	2.136067864	2.227821467		25068.13155	0.002092359
Y3 On Park	0	0	0	0	0		0	0
Y3 Off (West of Site)	0	0	0	247.2766989	0	70.96907414	318.245773	2.6563E-05
Y3 Off (East of Site)	0	0	0	247.2766989	0	70.96907414	318.245773	2.6563E-05
Y3 Off Building A	*0*	*0*	*0*	*178.2851337*	*0*	*141.9381483*	*320.223282*	
Y3 Off Building B	*0*	*0*	*0*	*188.5314058*	*0*		*188.5314058*	
Y3 Off Building C	*0*	*0*	*0*	*127.7368583*	*0*		*127.7368583*	
Y3 Off Park	*0*	*0*	*0*	*0*	*0*		*0*	
Year 4								
Y4 On Building A	4402.121143	0	0	0.342684684	0.357404513		4402.821232	0.00036749
Y4 On Building B	8804.242286	0	0	0.685369368	0.714809027		8805.642464	0.00073498
Y4 On Building C	74836.05943	0	0	5.825639629	6.075876728		74847.96094	0.006247326
Y4 On Park	36756.38674	0	0	1.028054052	1.07221354		36758.48701	0.003068116
Y4 Off (West of Site)	0	0	0	235.6642572	0	87.34655278	323.01081	2.69607E-05
Y4 Off (East of Site)	0	0	0	235.6642572	0	87.34655278	323.01081	2.69607E-05
Y4 Off Building A	*0*	*0*	*0*	*20.49254411*	*0*	*174.6931056*	*195.1856497*	

Y4 Off Building B	*0*	*0*	*0*	*40.98508821*	*0*		*40.98508821*	
Y4 Off Building C	*0*	*0*	*0*	*348.3732498*	*0*		*348.3732498*	
Y4 Off Park	*0*	*0*	*0*	*61.47763232*	*0*		*61.47763232*	

Notes: One mile of running hauling emissions distributed across all on-site areas to capture haul truck activity at the site.
Half-a-mile of running vendor emissions allocated to on-site activites for material delivery.
All hauling expected to go to location south of site; thus, all emissions modeled to travel on segment of Highway 101 south of the site.
Emissions rates calculated based construction occuring 7 AM to 6 PM, Monday through Friday, and 9 AM to 6 PM on Saturdays.

Table 3-2: Santa Clara Construction Hours (EIR MM 13-2)

	Daily			
	Mon - Fri, 7 AM to 6 PM	**Saturday, 9 AM to 6 PM**	**Weekly**	**Annually**
Total Daily Time (hours)	11	9	64	3328
Total Daily Time (seconds)	39600	32400	230400	11980800

Sheet 4: Scenario 1 - PM 2.5 Emissions Compilation

Table 4-1: Scenario 1 - PM2.5 Monthly Emissions Compilation (Tons)

Phase / Task	Month & Year	Linear Month	PM2.5 Emissions (Tons)																							
			Heavy Duty Off-Road				Hauling (Running)				Hauling (Idle)				Vendor (Running)				Vendor (Idle)				Worker			
			A	B	C	Park	A	B	C	Park	A	B	C	Park	A	B	C	Park	A	B	C	Park	A	B	C	Park
Clear and Grub	Jul-23	1	0.0004	0.0004	0.0004	0.0004					0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	3E-06			
Mass Excavation	Aug-23	2	0.0011	0.0011	0.0011	0.0011					0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	4E-06			
Mass Excavation	Sep-23	3	0.0011	0.0011	0.0011	0.0011	0.02				0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	4E-06			
Mass Excavation	Oct-23	4	0.0011	0.0011	0.0011	0.0011					0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	4E-06			
Mass Excavation	Nov-23	5	0.0011	0.0011	0.0011	0.0011					0.00	0.00	0.00	0.00	0	0	0	0	0	0	0	0	4E-06			
Structural Concrete	Dec-23	6	0.0014	0	0	0					0.00	0.00	0.00	0.00	0.0001	0	0	0	2E-06	0	0	0	1E-05			
Structural Concrete	Jan-24	7	0.0014	0	0	0									0.0001	0	0	0	2E-06	0	0	0	1E-05			
Structural Concrete	Feb-24	8	0.0007	0.0007	0	0									5E-05	5E-05	0	0	9E-07	9E-07	0	0	1E-05			
Structural Concrete	Mar-24	9	0.0007	0.0007	0	0									5E-05	5E-05	0	0	9E-07	9E-07	0	0	1E-05			
Structural Concrete	Apr-24	10	0.0005	0.0005	0.0005	0									4E-05	4E-05	4E-05	0	6E-07	6E-07	6E-07	0	1E-05			
Structural Concrete + Frami	May-24	11	0.0019	0.0024	0.0024	0									4E-05	5E-05	5E-05	0	7E-07	9E-07	9E-07	0	1E-05			
Structural Concrete + Frami	Jun-24	12	0.0019	0.0047	0	0									4E-05	0.0001	0	0	7E-07	2E-06	0	0	1E-05			
Structural Concrete + Frami	Jul-24	13	0.0019	0.0047	0	0									4E-05	0.0001	0	0	7E-07	2E-06	0	0	1E-05			
Structural Concrete + Frami	Aug-24	14	0.0009	0.0033	0.0024	0									2E-05	8E-05	5E-05	0	4E-07	1E-06	9E-07	0	1E-05			
Structural Concrete + Frami	Sep-24	15	0.0019	0.0024	0.0024	0									4E-05	5E-05	5E-05	0	7E-07	9E-07	9E-07	0	1E-05			
Framing / Rough In	Oct-24	16	0.0024	0.0024	0	0									2E-05	2E-05	0	0	4E-07	4E-07	0	0	1E-05			
Framing / Rough In	Nov-24	17	0.0024	0.0024	0	0									2E-05	2E-05	0	0	4E-07	4E-07	0	0	1E-05			
Framing / Rough In	Dec-24	18	0.0024	0.0024	0	0									2E-05	2E-05	0	0	4E-07	4E-07	0	0	1E-05			
Framing / Rough In	Jan-25	19	0.0024	0.0024	0	0									2E-05	2E-05	0	0	4E-07	4E-07	0	0	1E-05			
Framing / Rough In	Feb-25	20	0.0016	0.0016	0.0016	0									1E-05	1E-05	1E-05	0	2E-07	2E-07	2E-07	0	1E-05			
Framing / Rough In	Mar-25	21	0	0.0024	0.0024	0									0	2E-05	2E-05	0	0	4E-07	4E-07	0	1E-05			
Framing / Rough In + Exterio	Apr-25	22	0.0033	0.0033	0.0033	0									1E-05	1E-05	1E-05	0	2E-07	2E-07	2E-07	0	1E-05			
Framing / Rough In + Exterio	May-25	23	0.0033	0.0033	0.0033	0									1E-05	1E-05	1E-05	0	2E-07	2E-07	2E-07	0	1E-05			
Framing / Rough In + Exterio	Jun-25	24	0.0049	0	0.0049	0									2E-05	0	2E-05	0	4E-07	0	4E-07	0	1E-05			
Framing / Rough In + Exterio	Jul-25	25	0.0033	0.0033	0.0033	0									1E-05	1E-05	1E-05	0	2E-07	2E-07	2E-07	0	1E-05			
Framing / Rough In + Exterio	Aug-25	26	0.0033	0.0033	0.0033	0									1E-05	1E-05	1E-05	0	2E-07	2E-07	2E-07	0	1E-05			
Framing / Rough In + Exterio	Sep-25	27	0.0033	0.0033	0.0033	0									1E-05	1E-05	1E-05	0	2E-07	2E-07	2E-07	0	1E-05			
Framing / Rough In + Exterio	Oct-25	28	0.002	0.002	0.0057	0									2E-05	2E-05	4E-05	0	3E-07	3E-07	7E-07	0	1E-05			
Exterior / Interior Work	Nov-25	29	0.0049	0.0049	0	0									2E-05	2E-05	0	0	3E-07	3E-07	0	0	1E-05			
Exterior / Interior Work	Dec-25	30	0.0049	0.0049	0	0									2E-05	2E-05	0	0	3E-07	3E-07	0	0	1E-05			
Exterior / Interior Work	Jan-26	31	0.0049	0.0049	0	0									2E-05	2E-05	0	0	3E-07	3E-07	0	0	1E-05			
Exterior / Interior Work	Feb-26	32	0.0049	0.0049	0	0									2E-05	2E-05	0	0	3E-07	3E-07	0	0	1E-05			
Exterior / Interior Work	Mar-26	33	0.0049	0.0049	0	0									2E-05	2E-05	0	0	3E-07	3E-07	0	0	1E-05			
Exterior / Interior Work + Si	Apr-26	34	0.0032	0.004	0.004	0									2E-05	2E-05	2E-05	0	3E-07	3E-07	3E-07	0	2E-05			
Exterior / Interior Work + Si	May-26	35	0.0032	0.004	0.004	0									2E-05	2E-05	2E-05	0	3E-07	3E-07	3E-07	0	2E-05			
Exterior / Interior Work + Si	Jun-26	36	0.0032	0.004	0.004	0									2E-05	2E-05	2E-05	0	3E-07	3E-07	3E-07	0	2E-05			
Exterior / Interior Work + Si	Jul-26	37	0.0016	0.0016	0.0081	0									8E-06	8E-06	4E-05	0	1E-07	1E-07	7E-07	0	2E-05			
Exterior / Interior Work + Si	Aug-26	38	0.0016	0.0016	0.0081	0									8E-06	8E-06	4E-05	0	1E-07	1E-07	7E-07	0	2E-05			
Exterior / Interior Work + Si	Sep-26	39	0.0016	0.0016	0.0081	0									8E-06	8E-06	4E-05	0	1E-07	1E-07	7E-07	0	2E-05			
Exterior / Interior Work + Si	Oct-26	40	0	0.0016	0.0097	0									0	8E-06	5E-05	0	0	1E-07	8E-07	0	2E-05			
Exterior / Interior Work + Si	Nov-26	41	0	0.0016	0.0097	0									0	8E-06	5E-05	0	0	1E-07	8E-07	0	2E-05			

Exterior / Interior Work + Si	Dec-26	42	0	0.0016	0.0097	0									0	8E-06	5E-05	0	0	1E-07	8E-07	0	2E-05			
Exterior / Interior Work + Si	Jan-27	43	0	0	0.0097	0.0016									0	0	5E-05	8E-06	0	0	8E-07	1E-07	2E-05			
Exterior / Interior Work + Si	Feb-27	44	0	0	0.0097	0.0016									0	0	5E-05	8E-06	0	0	8E-07	1E-07	2E-05			
Exterior / Interior Work + Si	Mar-27	45	0	0	0.0097	0.0016									0	0	5E-05	8E-06	0	0	8E-07	1E-07	2E-05			
Site Work / Landscape	Apr-27	46	0	0	0	0.0119									0	0	0	2E-05	0	0	0	3E-07	2E-05			
Site Work / Landscape	May-27	47	0	0	0	0.0119									0	0	0	2E-05	0	0	0	3E-07	2E-05			
Site Work / Landscape	Jun-27	48	0	0	0	0.0119									0	0	0	2E-05	0	0	0	3E-07	2E-05			
Linear Year 1 Total			0.0133	0.0138	0.0076	0.0048	0.0223	0	0	0	1E-05	1E-05	1E-05	1E-05	0.0004	0.0003	9E-05	0	8E-06	5E-06	2E-06	0	0.0001	0	0	0
Linear Year 2 Total			0.0276	0.0308	0.0202	0	0	0	0	0	0	0	0	0	0.0003	0.0004	0.0002	0	4E-06	7E-06	3E-06	0	0.0001	0	0	0
Linear Year 3 Total			0.046	0.0484	0.0276	0	0	0	0	0	0	0	0	0	0.0002	0.0002	0.0001	0	3E-06	4E-06	2E-06	0	0.0002	0	0	0
Linear Year 4 Total			0.0049	0.0097	0.0825	0.0405	0	0	0	0	0	0	0	0	2E-05	5E-05	0.0004	7E-05	4E-07	8E-07	7E-06	1E-06	0.0002	0	0	0

Table 4-2: Conversions

lbs / ton	grams / lbs
2000	453.592

Table 4-3: Scenario 1 - PM2.5 Annual Emissions Compilation (Grams)

Year	PM2.5 Emissions (Grams)																							
	Heavy Duty Off-Road				Hauling (Running)				Hauling (Idle)				Vendor (Running)				Vendor (Idle)				Worker			
	A	B	C	Park	A	B	C	Park	A	B	C	Park	A	B	C	Park	A	B	C	Park	A	B	C	Park
Linear Year 1 Total	12037	12507	6930	4354	20236	0	0	0	9.362	9.362	9.362	9.362	401.9	275.5	81.03	0	6.894	4.726	1.39	0	93.41	0	0	0
Linear Year 2 Total	25027	27974	18365	0	0	0	0	0	0	0	0	0	233.4	350	175	0	4.003	6.004	3.002	0	131	0	0	0
Linear Year 3 Total	41731	43932	25064	0	0	0	0	0	0	0	0	0	181.3	191.7	129.9	0	3.109	3.288	2.228	0	141.9	0	0	0
Linear Year 4 Total	4402	8804	74836	36756	0	0	0	0	0	0	0	0	20.84	41.67	354.2	62.51	0.357	0.715	6.076	1.072	174.7	0	0	0

Sheet 5: Worker Trips (PM2.5 Exhaust)

Table 5-1: Worker Trips and PM2.5 Exhaust

Phase / Year	Month & Year	Linear Month	Area	Number of Workers	Days of Construction per Month	Monthly Trips (One-way)	Average Trip Distance	VMT	Grams PM2.5 (Exh)	Tons PM2.5 (Exh)
Clear and Grub	Jul-23	1	All	100	20	4000	14.7	58800	2.426293133	2.67453E-06
Mass Excavation	Aug-23	2	All	150		6000		88200	3.639439699	4.0118E-06
Mass Excavation	Sep-23	3	All	150		6000		88200	3.639439699	4.0118E-06
Mass Excavation	Oct-23	4	All	150		6000		88200	3.639439699	4.0118E-06
Mass Excavation	Nov-23	5	All	150		6000		88200	3.639439699	4.0118E-06
Structural Concrete	Dec-23	6	A	450		18000		264600	10.9183191	1.20354E-05
Structural Concrete	Jan-24	7	A	450		18000		264600	10.9183191	1.20354E-05
Structural Concrete	Feb-24	8	A, B	450		18000		264600	10.9183191	1.20354E-05
Structural Concrete	Mar-24	9	A, B	450		18000		264600	10.9183191	1.20354E-05
Structural Concrete	Apr-24	10	A, B, C	450		18000		264600	10.9183191	1.20354E-05
Structural Concrete + Framing / Rough In	May-24	11	A (Frame), B (Concrete), C (Concrete)	450		18000		264600	10.9183191	1.20354E-05
Structural Concrete + Framing / Rough In	Jun-24	12	A (Frame), B (Concrete)	450		18000		264600	10.9183191	1.20354E-05
Structural Concrete + Framing / Rough In	Jul-24	13	A (Frame), B (Concrete)	450		18000		264600	10.9183191	1.20354E-05
Structural Concrete + Framing / Rough In	Aug-24	14	A (Frame), B (Concrete, Frame), C (Concrete)	450		18000		264600	10.9183191	1.20354E-05
Structural Concrete + Framing / Rough In	Sep-24	15	A (Frame), B (Concrete), C (Concrete)	450		18000		264600	10.9183191	1.20354E-05
Framing / Rough In	Oct-24	16	A (Frame), B (Frame)	450		18000		264600	10.9183191	1.20354E-05
Framing / Rough In	Nov-24	17	A (Frame), B (Frame)	450		18000		264600	10.9183191	1.20354E-05
Framing / Rough In	Dec-24	18	A (Frame), B (Frame)	450		18000		264600	10.9183191	1.20354E-05
Framing / Rough In	Jan-25	19	A (Frame), B (Frame)	450		18000		264600	10.9183191	1.20354E-05
Framing / Rough In	Feb-25	20	A (Frame), B (Frame), C (Frame)	450		18000		264600	10.9183191	1.20354E-05
Framing / Rough In	Mar-25	21	B (Frame), C (Frame)	450		18000		264600	10.9183191	1.20354E-05
Framing / Rough In + Exterior / Interior Work	Apr-25	22	A (E/I), B (Framing), C (Framing)	450		18000		264600	10.9183191	1.20354E-05
Framing / Rough In + Exterior / Interior Work	May-25	23	A (E/I), B (Framing), C (Framing)	450		18000		264600	10.9183191	1.20354E-05
Framing / Rough In + Exterior / Interior Work	Jun-25	24	A (E/I), C (Framing)	450		18000		264600	10.9183191	1.20354E-05
Framing / Rough In + Exterior / Interior Work	Jul-25	25	A (E/I), B (E/I), C (Framing)	450		18000		264600	10.9183191	1.20354E-05
Framing / Rough In + Exterior / Interior Work	Aug-25	26	A (E/I), B (E/I), C (Framing)	450		18000		264600	10.9183191	1.20354E-05
Framing / Rough In + Exterior / Interior Work	Sep-25	27	A (E/I), B (E/I), C (Framing)	450		18000		264600	10.9183191	1.20354E-05
Framing / Rough In + Exterior / Interior Work	Oct-25	28	A (E/I), B (E/I), C (Framing)	450		18000		264600	10.9183191	1.20354E-05
Exterior / Interior Work	Nov-25	29	A (E/I), B (E/I)	450		18000		264600	10.9183191	1.20354E-05
Exterior / Interior Work	Dec-25	30	A (E/I), B (E/I)	450		18000		264600	10.9183191	1.20354E-05
Exterior / Interior Work	Jan-26	31	A (E/I), B (E/I)	450		18000		264600	10.9183191	1.20354E-05
Exterior / Interior Work	Feb-26	32	A (E/I), B (E/I)	450		18000		264600	10.9183191	1.20354E-05
Exterior / Interior Work	Mar-26	33	A (E/I), B (E/I)	450		18000		264600	10.9183191	1.20354E-05
Exterior / Interior Work + Site Work / Landscape	Apr-26	34	A (Site Work/ Landscape), B (E/I), C (E/I)	600		24000		352800	14.5577588	1.60472E-05
Exterior / Interior Work + Site Work / Landscape	May-26	35	A (Site Work/ Landscape), B (E/I), C (E/I)	600		24000		352800	14.5577588	1.60472E-05
Exterior / Interior Work + Site Work / Landscape	Jun-26	36	A (Site Work/ Landscape), B (E/I), C (E/I)	600		24000		352800	14.5577588	1.60472E-05
Exterior / Interior Work + Site Work / Landscape	Jul-26	37	A (Site Work/Landscape), B (Site Work/Landscape), C (E/I)	600		24000		352800	14.5577588	1.60472E-05
Exterior / Interior Work + Site Work / Landscape	Aug-26	38	A (Site Work/Landscape), B (Site Work/Landscape), C (E/I)	600		24000		352800	14.5577588	1.60472E-05
Exterior / Interior Work + Site Work / Landscape	Sep-26	39	A (Site Work/Landscape), B (Site Work/Landscape), C (E/I)	600		24000		352800	14.5577588	1.60472E-05
Exterior / Interior Work + Site Work / Landscape	Oct-26	40	B (Site Work/Landscape), C (E/I + Site Work/Landscape)	600		24000		352800	14.5577588	1.60472E-05
Exterior / Interior Work + Site Work / Landscape	Nov-26	41	B (Site Work/Landscape), C (E/I + Site Work/Landscape)	600		24000		352800	14.5577588	1.60472E-05
Exterior / Interior Work + Site Work / Landscape	Dec-26	42	B (Site Work/Landscape), C (E/I + Site Work/Landscape)	600		24000		352800	14.5577588	1.60472E-05

Exterior / Interior Work + Site Work / Landscape	Jan-27	43	C (E/I + Site Work/Landscape) + Park (Site Work/Landscape)	600		24000		352800	14.5577588	1.60472E-05
Exterior / Interior Work + Site Work / Landscape	Feb-27	44	C (E/I + Site Work/Landscape) + Park (Site Work/Landscape)	600		24000		352800	14.5577588	1.60472E-05
Exterior / Interior Work + Site Work / Landscape	Mar-27	45	C (E/I + Site Work/Landscape) + Park (Site Work/Landscape)	600		24000		352800	14.5577588	1.60472E-05
Site Work / Landscape	Apr-27	46	Park (Site Work/Landscape)	600		24000		352800	14.5577588	1.60472E-05
Site Work / Landscape	May-27	47	Park (Site Work/Landscape)	600		24000		352800	14.5577588	1.60472E-05
Site Work / Landscape	Jun-27	48	Park (Site Work/Landscape)	600		24000		352800	14.5577588	1.60472E-05
			Linear Year 1 Total	3850		154000		2263800	93.41228561	0.000102969
			Linear Year 2 Total	5400		216000		3175200	131.0198292	0.000144425
			Linear Year 3 Total	5850		234000		3439800	141.9381483	0.00015646
			Linear Year 4 Total	7200		288000		4233600	174.6931056	0.000192566

Table 5-4: Conversions

lbs / ton	grams / lbs
2000	453.59237

Sheet 6: Vendor Trips (PM2.5 Exhaust)

Table 6-1: Vendor Trips Information

Phase / Year	Month & Year	Linear Month	Area	Vendor Deliveries Per Week									Monthly Multiplier	Monthly Trips (One-way)	Average Trip Distance	VMT
				Concrete	Rebar	Lumber	MEP	Rec Lumber	Rec Const	Int/Ext	Site	Total				
Clear and Grub	Jul-23	1	All									0	4	0	7.3	0
Mass Excavation	Aug-23	2	All									0		0		0
Mass Excavation	Sep-23	3	All									0		0		0
Mass Excavation	Oct-23	4	All									0		0		0
Mass Excavation	Nov-23	5	All									0		0		0
Structural Concrete	Dec-23	6	A	50	20							70		560		4088
Structural Concrete	Jan-24	7	A	50	20							70		560		4088
Structural Concrete	Feb-24	8	A, B	50	20							70		560		4088
Structural Concrete	Mar-24	9	A, B	50	20							70		560		4088
Structural Concrete	Apr-24	10	A, B, C	50	20							70		560		4088
Structural Concrete + F	May-24	11	A (Frame), B (Concrete), C (Concrete)	50	20	8	10	5	5			98		784		5723.2
Structural Concrete + F	Jun-24	12	A (Frame), B (Concrete)	50	20	8	10	5	5			98		784		5723.2
Structural Concrete + F	Jul-24	13	A (Frame), B (Concrete)	50	20	8	10	5	5			98		784		5723.2
Structural Concrete + F	Aug-24	14	A (Frame), B (Concrete, Frame), C (Concrete)	50	20	8	10	5	5			98		784		5723.2
Structural Concrete + F	Sep-24	15	A (Frame), B (Concrete), C (Concrete)	50	20	8	10	5	5			98		784		5723.2
Framing / Rough In	Oct-24	16	A (Frame), B (Frame)			8	10	5	5			28		224		1635.2
Framing / Rough In	Nov-24	17	A (Frame), B (Frame)			8	10	5	5			28		224		1635.2
Framing / Rough In	Dec-24	18	A (Frame), B (Frame)			8	10	5	5			28		224		1635.2
Framing / Rough In	Jan-25	19	A (Frame), B (Frame)			8	10	5	5			28		224		1635.2
Framing / Rough In	Feb-25	20	A (Frame), B (Frame), C (Frame)			8	10	5	5			28		224		1635.2
Framing / Rough In	Mar-25	21	B (Frame), C (Frame)			8	10	5	5			28		224		1635.2
Framing / Rough In + E	Apr-25	22	A (E/I), B (Framing), C (Framing)			8	10	5	5			28		224		1635.2
Framing / Rough In + E	May-25	23	A (E/I), B (Framing), C (Framing)			8	10	5	5			28		224		1635.2
Framing / Rough In + E	Jun-25	24	A (E/I), C (Framing)			8	10	5	5			28		224		1635.2
Framing / Rough In + E	Jul-25	25	A (E/I), B (E/I), C (Framing)			8	10	5	5			28		224		1635.2
Framing / Rough In + E	Aug-25	26	A (E/I), B (E/I), C (Framing)			8	10	5	5			28		224		1635.2
Framing / Rough In + E	Sep-25	27	A (E/I), B (E/I), C (Framing)			8	10	5	5			28		224		1635.2
Framing / Rough In + E	Oct-25	28	A (E/I), B (E/I), C (Framing)			8	10	5	5	20		48		384		2803.2
Exterior / Interior Wor	Nov-25	29	A (E/I), B (E/I)						5	20		25		200		1460
Exterior / Interior Wor	Dec-25	30	A (E/I), B (E/I)						5	20		25		200		1460
Exterior / Interior Wor	Jan-26	31	A (E/I), B (E/I)						5	20		25		200		1460
Exterior / Interior Wor	Feb-26	32	A (E/I), B (E/I)						5	20		25		200		1460
Exterior / Interior Wor	Mar-26	33	A (E/I), B (E/I)						5	20		25		200		1460
Exterior / Interior Wor	Apr-26	34	A (Site Work/ Landscape), B (E/I), C (E/I)						5	20	10	35		280		2044
Exterior / Interior Wor	May-26	35	A (Site Work/ Landscape), B (E/I), C (E/I)						5	20	10	35		280		2044
Exterior / Interior Wor	Jun-26	36	A (Site Work/ Landscape), B (E/I), C (E/I)						5	20	10	35		280		2044
Exterior / Interior Wor	Jul-26	37	A (Site Work/Landscape), B (Site Work/Landscape), C (E/I)						5	20	10	35		280		2044
Exterior / Interior Wor	Aug-26	38	A (Site Work/Landscape), B (Site Work/Landscape), C (E/I)						5	20	10	35		280		2044
Exterior / Interior Wor	Sep-26	39	A (Site Work/Landscape), B (Site Work/Landscape), C (E/I)						5	20	10	35		280		2044
Exterior / Interior Wor	Oct-26	40	B (Site Work/Landscape), C (E/I + Site Work/Landscape)						5	20	10	35		280		2044
Exterior / Interior Wor	Nov-26	41	B (Site Work/Landscape), C (E/I + Site Work/Landscape)						5	20	10	35		280		2044

Exterior / Interior Worl	Dec-26	42	B (Site Work/Landscape), C (E/I + Site Work/Landscape)						5	20	10	35		280		2044
Exterior / Interior Worl	Jan-27	43	C (E/I + Site Work/Landscape) + Park (Site Work/Landscape)						5	20	10	35		280		2044
Exterior / Interior Worl	Feb-27	44	C (E/I + Site Work/Landscape) + Park (Site Work/Landscape)						5	20	10	35		280		2044
Exterior / Interior Worl	Mar-27	45	C (E/I + Site Work/Landscape) + Park (Site Work/Landscape)						5	20	10	35		280		2044
Site Work / Landscape	Apr-27	46	Park (Site Work/Landscape)								10	10		80		584
Site Work / Landscape	May-27	47	Park (Site Work/Landscape)								10	10		80		584
Site Work / Landscape	Jun-27	48	Park (Site Work/Landscape)								10	10		80		584
													Linear Year 1 Total	4368		31886
													Linear Year 2 Total	4368		31886
													Linear Year 3 Total	2896		21141
													Linear Year 4 Total	2760		20148

Table 6-2: Conversions

lbs / ton	grams / lbs
2000	453.592

Table 6-3: Vendor Trips PM2.5 Emissions

Phase / Year	Month & Year	Linear Month	Area	Grams (Running)	Tons (Running)	Grams (Emissions per Trip; Idle for PM2.5)	Tons (Emissions per Trip; Idle for PM2.5 and PM10)	Activity Breakdown by Area (%)				Total	PM2.5 Running Emissions Breakdown by Area (tons)				PM2.5 Idle Emissions Breakdown by Area (tons)			
				PM2.5 (Exh)	PM2.5 (Exh)	PM2.5 (Exh)	PM2.5 (Exh)	A	B	C	Park		A	B	C	Park	A	B	C	Park
Clear and Grub	Jul-23	1	All	0.00	0	0.00	0					0%	0	0	0	0	0	0	0	0
Mass Excavation	Aug-23	2	All	0.00	0	0.00	0					0%	0	0	0	0	0	0	0	0
Mass Excavation	Sep-23	3	All	0.00	0	0.00	0					0%	0	0	0	0	0	0	0	0
Mass Excavation	Oct-23	4	All	0.00	0	0.00	0					0%	0	0	0	0	0	0	0	0
Mass Excavation	Nov-23	5	All	0.00	0	0.00	0					0%	0	0	0	0	0	0	0	0
Structural Concrete	Dec-23	6	A	97.23	0.0001	1.67	2E-06	100%				100%	0.0001	0	0	0	2E-06	0	0	0
Structural Concrete	Jan-24	7	A	97.23	0.0001	1.67	2E-06	100%	0%			100%	0.0001	0	0	0	2E-06	0	0	0
Structural Concrete	Feb-24	8	A, B	97.23	0.0001	1.67	2E-06	50%	50%			100%	5E-05	5E-05	0	0	9E-07	9E-07	0	0
Structural Concrete	Mar-24	9	A, B	97.23	0.0001	1.67	2E-06	50%	50%			100%	5E-05	5E-05	0	0	9E-07	9E-07	0	0
Structural Concrete	Apr-24	10	A, B, C	97.23	0.0001	1.67	2E-06	33%	33%	33%		100%	4E-05	4E-05	4E-05	0	6E-07	6E-07	6E-07	0
Structural Concrete + F	May-24	11	A (Frame), B (Concrete), C (Concrete)	136.12	0.0002	2.34	3E-06	29%	36%	36%		100%	4E-05	5E-05	5E-05	0	7E-07	9E-07	9E-07	0
Structural Concrete + F	Jun-24	12	A (Frame), B (Concrete)	136.12	0.0002	2.34	3E-06	29%	71%			100%	4E-05	0.0001	0	0	7E-07	2E-06	0	0
Structural Concrete + F	Jul-24	13	A (Frame), B (Concrete)	136.12	0.0002	2.34	3E-06	29%	71%			100%	4E-05	0.0001	0	0	7E-07	2E-06	0	0
Structural Concrete + F	Aug-24	14	A (Frame), B (Concrete, Frame), C (Concrete)	136.12	0.0002	2.34	3E-06	14%	50%	36%		100%	2E-05	8E-05	5E-05	0	4E-07	1E-06	9E-07	0
Structural Concrete + F	Sep-24	15	A (Frame), B (Concrete), C (Concrete)	136.12	0.0002	2.34	3E-06	29%	36%	36%		100%	4E-05	5E-05	5E-05	0	7E-07	9E-07	9E-07	0
Framing / Rough In	Oct-24	16	A (Frame), B (Frame)	38.89	4E-05	0.67	7E-07	50%	50%			100%	2E-05	2E-05	0	0	4E-07	4E-07	0	0
Framing / Rough In	Nov-24	17	A (Frame), B (Frame)	38.89	4E-05	0.67	7E-07	50%	50%			100%	2E-05	2E-05	0	0	4E-07	4E-07	0	0
Framing / Rough In	Dec-24	18	A (Frame), B (Frame)	38.89	4E-05	0.67	7E-07	50%	50%			100%	2E-05	2E-05	0	0	4E-07	4E-07	0	0
Framing / Rough In	Jan-25	19	A (Frame), B (Frame)	38.89	4E-05	0.67	7E-07	50%	50%			100%	2E-05	2E-05	0	0	4E-07	4E-07	0	0
Framing / Rough In	Feb-25	20	A (Frame), B (Frame), C (Frame)	38.89	4E-05	0.67	7E-07	33%	33%	33%		100%	1E-05	1E-05	1E-05	0	2E-07	2E-07	2E-07	0
Framing / Rough In	Mar-25	21	B (Frame), C (Frame)	38.89	4E-05	0.67	7E-07		50%	50%		100%	0	2E-05	2E-05	0	0	4E-07	4E-07	0
Framing / Rough In + E	Apr-25	22	A (E/I), B (Framing), C (Framing)	38.89	4E-05	0.67	7E-07	33%	33%	33%		100%	1E-05	1E-05	1E-05	0	2E-07	2E-07	2E-07	0
Framing / Rough In + E	May-25	23	A (E/I), B (Framing), C (Framing)	38.89	4E-05	0.67	7E-07	33%	33%	33%		100%	1E-05	1E-05	1E-05	0	2E-07	2E-07	2E-07	0
Framing / Rough In + E	Jun-25	24	A (E/I), C (Framing)	38.89	4E-05	0.67	7E-07	50%		50%		100%	2E-05	0	2E-05	0	4E-07	0	4E-07	0

Framing / Rough In + E	Jul-25	25	A (E/I), B (E/I), C (Framing)	38.89	4E-05	0.67	7E-07	33%	33%	33%		100%	1E-05	1E-05	1E-05	0	2E-07	2E-07	2E-07	0
Framing / Rough In + E	Aug-25	26	A (E/I), B (E/I), C (Framing)	38.89	4E-05	0.67	7E-07	33%	33%	33%		100%	1E-05	1E-05	1E-05	0	2E-07	2E-07	2E-07	0
Framing / Rough In + E	Sep-25	27	A (E/I), B (E/I), C (Framing)	38.89	4E-05	0.67	7E-07	33%	33%	33%		100%	1E-05	1E-05	1E-05	0	2E-07	2E-07	2E-07	0
Framing / Rough In + E	Oct-25	28	A (E/I), B (E/I), C (Framing)	66.67	7E-05	1.14	1E-06	21%	21%	58%		100%	2E-05	2E-05	4E-05	0	3E-07	3E-07	7E-07	0
Exterior / Interior Work	Nov-25	29	A (E/I), B (E/I)	34.73	4E-05	0.60	7E-07	50%	50%			100%	2E-05	2E-05	0	0	3E-07	3E-07	0	0
Exterior / Interior Work	Dec-25	30	A (E/I), B (E/I)	34.73	4E-05	0.60	7E-07	50%	50%			100%	2E-05	2E-05	0	0	3E-07	3E-07	0	0
Exterior / Interior Work	Jan-26	31	A (E/I), B (E/I)	34.73	4E-05	0.60	7E-07	50%	50%			100%	2E-05	2E-05	0	0	3E-07	3E-07	0	0
Exterior / Interior Work	Feb-26	32	A (E/I), B (E/I)	34.73	4E-05	0.60	7E-07	50%	50%			100%	2E-05	2E-05	0	0	3E-07	3E-07	0	0
Exterior / Interior Work	Mar-26	33	A (E/I), B (E/I)	34.73	4E-05	0.60	7E-07	50%	50%			100%	2E-05	2E-05	0	0	3E-07	3E-07	0	0
Exterior / Interior Work	Apr-26	34	A (Site Work/ Landscape), B (E/I), C (E/I)	48.62	5E-05	0.83	9E-07	29%	36%	36%		100%	2E-05	2E-05	2E-05	0	3E-07	3E-07	3E-07	0
Exterior / Interior Work	May-26	35	A (Site Work/ Landscape), B (E/I), C (E/I)	48.62	5E-05	0.83	9E-07	29%	36%	36%		100%	2E-05	2E-05	2E-05	0	3E-07	3E-07	3E-07	0
Exterior / Interior Work	Jun-26	36	A (Site Work/ Landscape), B (E/I), C (E/I)	48.62	5E-05	0.83	9E-07	29%	36%	36%		100%	2E-05	2E-05	2E-05	0	3E-07	3E-07	3E-07	0
Exterior / Interior Work	Jul-26	37	A (Site Work/Landscape), B (Site Work/Landscape), C (E/I)	48.62	5E-05	0.83	9E-07	14%	14%	71%		100%	8E-06	8E-06	4E-05	0	1E-07	1E-07	7E-07	0
Exterior / Interior Work	Aug-26	38	A (Site Work/Landscape), B (Site Work/Landscape), C (E/I)	48.62	5E-05	0.83	9E-07	14%	14%	71%		100%	8E-06	8E-06	4E-05	0	1E-07	1E-07	7E-07	0
Exterior / Interior Work	Sep-26	39	A (Site Work/Landscape), B (Site Work/Landscape), C (E/I)	48.62	5E-05	0.83	9E-07	14%	14%	71%		100%	8E-06	8E-06	4E-05	0	1E-07	1E-07	7E-07	0
Exterior / Interior Work	Oct-26	40	B (Site Work/Landscape), C (E/I + Site Work/Landscape)	48.62	5E-05	0.83	9E-07		14%	86%		100%	0	8E-06	5E-05	0	0	1E-07	8E-07	0
Exterior / Interior Work	Nov-26	41	B (Site Work/Landscape), C (E/I + Site Work/Landscape)	48.62	5E-05	0.83	9E-07		14%	86%		100%	0	8E-06	5E-05	0	0	1E-07	8E-07	0
Exterior / Interior Work	Dec-26	42	B (Site Work/Landscape), C (E/I + Site Work/Landscape)	48.62	5E-05	0.83	9E-07		14%	86%		100%	0	8E-06	5E-05	0	0	1E-07	8E-07	0
Exterior / Interior Work	Jan-27	43	C (E/I + Site Work/Landscape) + Park (Site Work/Landscape)	48.62	5E-05	0.83	9E-07			86%	14%	100%	0	0	5E-05	8E-06	0	0	8E-07	1E-07
Exterior / Interior Work	Feb-27	44	C (E/I + Site Work/Landscape) + Park (Site Work/Landscape)	48.62	5E-05	0.83	9E-07			86%	14%	100%	0	0	5E-05	8E-06	0	0	8E-07	1E-07
Exterior / Interior Work	Mar-27	45	C (E/I + Site Work/Landscape) + Park (Site Work/Landscape)	48.62	5E-05	0.83	9E-07			86%	14%	100%	0	0	5E-05	8E-06	0	0	8E-07	1E-07
Site Work / Landscape	Apr-27	46	Park (Site Work/Landscape)	13.89	2E-05	0.24	3E-07				100%	100%	0	0	0	2E-05	0	0	0	3E-07
Site Work / Landscape	May-27	47	Park (Site Work/Landscape)	13.89	2E-05	0.24	3E-07				100%	100%	0	0	0	2E-05	0	0	0	3E-07
Site Work / Landscape	Jun-27	48	Park (Site Work/Landscape)	13.89	2E-05	0.24	3E-07				100%	100%	0	0	0	2E-05	0	0	0	3E-07
			Linear Year 1 Total	758.4	0.0008	13.01	1E-05													
			Linear Year 2 Total	758.4	0.0008	13.01	1E-05													
			Linear Year 3 Total	502.82	0.0006	8.6254	1E-05													
			Linear Year 4 Total	479.21	0.0005	8.2203	9E-06													

Sheet 7: Off-road Hauling Emissions (Exhaust)

Table 7-1: Earthwork Quantities (CY)

Year / Phase	Net Soil Export
Clear and Grub 2023	71,500
Mass Excavation 2023	

Source: Greystar, 2021

Table 7-2: Size of Haul Truck (CY)

9

Table 7-3: Haul Trips Required (One-way)

Year / Phase	Total
Clear and Grub 2023	15,889
Mass Excavation 2023	

Table 7-4: Average Off-site One-way Haul Truck Trip Distance (mi)

46.7

Table 7-5: Annual Haul Trip Distribution (VMT)

Year / Phase	Total VMT
Clear and Grub 2023	742,011
Mass Excavation 2023	

Table 7-6: Hauling - Annual Running and Non-Running Emissions (grams)

Year	PM2.5 (Exh Running)	PM2.5 (Exh Idle)	PM2.5 (Exh Total)
2023	20,236	37	20,273

Table 7-7: Conversions

lbs / ton	grams / lbs
2000	453.59237

Table 7-8: Hauling - Annual Running and Non-running Emissions (tons)

Year	PM2.5 (Exh Running)	PM2.5 (Exh Idle)	PM2.5 (Exh Total)
2023	0.02	0.00	0.02

Sheet 8: On-road Motor Vehicle Emission Factors (PM2.5 Exhaust)

Table 8-1: Mobile Source Emissions Running Rate (g/mi)

Vehicle Type	PM2.5 (Exh)
LDA-LDT1-LDT2	0.00004
LHDT1-LHDT2	0.01739
MHDT	0.02030
HHDT	0.02727

Source: EMFAC2021 (v1.0.0); note exhaust emissions are only for diesel vehicles. Rate for LDA-LDT1-LDT2 based on % of diesel emissions per overall population. Rate for MHDT and HHDT based on diesel emissions per diesel population (i.e., assumes all MHDT and HHDT trips would be diesel).

Table 8-2: Mobile Source Emissions Trip Rate (g/trip)

Vehicle Type	PM2.5 (Exh)
LDA-LDT1-LDT2	0.00000
LHDT1-LHDT2	0.00023
MHDT	0.00360
HHDT	2.36E-03

Source: EMFAC2021 (v1.0.0); note exhaust emissions are only for diesel vehicles. Rate for LDA-LDT1-LDT2 based on % of diesel emissions per overall population. Rate for MHDT and HHDT based on diesel emissions per diesel population (i.e., assumes all MHDT and HHDT trips would be diesel).

Sheet 9: Scenario 1 - Off-road PM2.5 Exhaust Emissions by Month, Area, and Linear Construction Year

Table 9-1: Scenario 1 Off-road Emissions by Month / Area

Phase / Task	Month & Year	Linear Month	Area	Emissions (tons)	Activity Breakdown by Area (%)				Total	PM2.5 Emissions Breakdown by Area (tons)			
				PM2.5 (Exh)	A	B	C	Park		A	B	C	Park
Clear and Grub	Jul-23	1	All	0.00	25%	25%	25%	25%	100%	0.00038927	0.00038927	0.00038927	0.00038927
Mass Excavation	Aug-23	2	All	0.00	25%	25%	25%	25%	100%	0.0011025	0.0011025	0.0011025	0.0011025
Mass Excavation	Sep-23	3	All	0.00	25%	25%	25%	25%	100%	0.0011025	0.0011025	0.0011025	0.0011025
Mass Excavation	Oct-23	4	All	0.00	25%	25%	25%	25%	100%	0.0011025	0.0011025	0.0011025	0.0011025
Mass Excavation	Nov-23	5	All	0.00	25%	25%	25%	25%	100%	0.0011025	0.0011025	0.0011025	0.0011025
Structural Concrete	Dec-23	6	A	0.00	100%				100%	0.00140193	0	0	0
Structural Concrete	Jan-24	7	A	0.00	100%				100%	0.00140193	0	0	0
Structural Concrete	Feb-24	8	A, B	0.00	50%	50%			100%	0.00070096	0.00070096	0	0
Structural Concrete	Mar-24	9	A, B	0.00	50%	50%			100%	0.00070096	0.00070096	0	0
Structural Concrete	Apr-24	10	A, B, C	0.00	33%	33%	33%		100%	0.00046731	0.00046731	0.00046731	0
Structural Concrete + Framing / Rough In	May-24	11	A (Frame), B (Concrete), C (Concrete)	0.01	29%	36%	36%		100%	0.00189803	0.00237253	0.00237253	0
Structural Concrete + Framing / Rough In	Jun-24	12	A (Frame), B (Concrete)	0.01	29%	71%			100%	0.00189803	0.00474507	0	0
Structural Concrete + Framing / Rough In	Jul-24	13	A (Frame), B (Concrete)	0.01	29%	71%			100%	0.00189803	0.00474507	0	0
Structural Concrete + Framing / Rough In	Aug-24	14	A (Frame), B (Concrete, Frame), C (Concrete)	0.01	14%	50%	36%		100%	0.00094901	0.00332155	0.00237253	0
Structural Concrete + Framing / Rough In	Sep-24	15	A (Frame), B (Concrete), C (Concrete)	0.01	29%	36%	36%		100%	0.00189803	0.00237253	0.00237253	0
Framing / Rough In	Oct-24	16	A (Frame), B (Frame)	0.00	50%	50%			100%	0.00244802	0.00244802	0	0
Framing / Rough In	Nov-24	17	A (Frame), B (Frame)	0.00	50%	50%			100%	0.00244802	0.00244802	0	0
Framing / Rough In	Dec-24	18	A (Frame), B (Frame)	0.00	50%	50%			100%	0.00244802	0.00244802	0	0
Framing / Rough In	Jan-25	19	A (Frame), B (Frame)	0.00	50%	50%			100%	0.00244802	0.00244802	0	0
Framing / Rough In	Feb-25	20	A (Frame), B (Frame), C (Frame)	0.00	33%	33%	33%		100%	0.00163201	0.00163201	0.00163201	0
Framing / Rough In	Mar-25	21	B (Frame), C (Frame)	0.00		50%	50%		100%	0	0.00244802	0.00244802	0
Framing / Rough In + Exterior / Interior Work	Apr-25	22	A (E/I), B (Framing), C (Framing)	0.01	33%	33%	33%		100%	0.00326249	0.00326249	0.00326249	0
Framing / Rough In + Exterior / Interior Work	May-25	23	A (E/I), B (Framing), C (Framing)	0.01	33%	33%	33%		100%	0.00326249	0.00326249	0.00326249	0
Framing / Rough In + Exterior / Interior Work	Jun-25	24	A (E/I), C (Framing)	0.01	50%		50%		100%	0.00489373	0	0.00489373	0
Framing / Rough In + Exterior / Interior Work	Jul-25	25	A (E/I), B (E/I), C (Framing)	0.01	33%	33%	33%		100%	0.00326249	0.00326249	0.00326249	0
Framing / Rough In + Exterior / Interior Work	Aug-25	26	A (E/I), B (E/I), C (Framing)	0.01	33%	33%	33%		100%	0.00326249	0.00326249	0.00326249	0
Framing / Rough In + Exterior / Interior Work	Sep-25	27	A (E/I), B (E/I), C (Framing)	0.01	33%	33%	33%		100%	0.00326249	0.00326249	0.00326249	0
Framing / Rough In + Exterior / Interior Work	Oct-25	28	A (E/I), B (E/I), C (Framing)	0.01	21%	21%	58%		100%	0.00203905	0.00203905	0.00570935	0
Exterior / Interior Work	Nov-25	29	A (E/I), B (E/I)	0.01	50%	50%			100%	0.00489373	0.00489373	0	0
Exterior / Interior Work	Dec-25	30	A (E/I), B (E/I)	0.01	50%	50%			100%	0.00489373	0.00489373	0	0
Exterior / Interior Work	Jan-26	31	A (E/I), B (E/I)	0.01	50%	50%			100%	0.00489373	0.00489373	0	0
Exterior / Interior Work	Feb-26	32	A (E/I), B (E/I)	0.01	50%	50%			100%	0.00489373	0.00489373	0	0
Exterior / Interior Work	Mar-26	33	A (E/I), B (E/I)	0.01	50%	50%			100%	0.00489373	0.00489373	0	0
Exterior / Interior Work + Site Work / Landscape	Apr-26	34	A (Site Work/ Landscape), B (E/I), C (E/I)	0.01	29%	36%	36%		100%	0.00323501	0.00404376	0.00404376	0
Exterior / Interior Work + Site Work / Landscape	May-26	35	A (Site Work/ Landscape), B (E/I), C (E/I)	0.01	29%	36%	36%		100%	0.00323501	0.00404376	0.00404376	0
Exterior / Interior Work + Site Work / Landscape	Jun-26	36	A (Site Work/ Landscape), B (E/I), C (E/I)	0.01	29%	36%	36%		100%	0.00323501	0.00404376	0.00404376	0
Exterior / Interior Work + Site Work / Landscape	Jul-26	37	A (Site Work/Landscape), B (Site Work/Landscape), C (E/I)	0.01	14%	14%	71%		100%	0.0016175	0.0016175	0.00808751	0
Exterior / Interior Work + Site Work / Landscape	Aug-26	38	A (Site Work/Landscape), B (Site Work/Landscape), C (E/I)	0.01	14%	14%	71%		100%	0.0016175	0.0016175	0.00808751	0
Exterior / Interior Work + Site Work / Landscape	Sep-26	39	A (Site Work/Landscape), B (Site Work/Landscape), C (E/I)	0.01	14%	14%	71%		100%	0.0016175	0.0016175	0.00808751	0
Exterior / Interior Work + Site Work / Landscape	Oct-26	40	B (Site Work/Landscape), C (E/I + Site Work/Landscape)	0.01		14%	86%		100%	0	0.0016175	0.00970502	0
Exterior / Interior Work + Site Work / Landscape	Nov-26	41	B (Site Work/Landscape), C (E/I + Site Work/Landscape)	0.01		14%	86%		100%	0	0.0016175	0.00970502	0
Exterior / Interior Work + Site Work / Landscape	Dec-26	42	B (Site Work/Landscape), C (E/I + Site Work/Landscape)	0.01		14%	86%		100%	0	0.0016175	0.00970502	0

Exterior / Interior Work + Site Work / Landscape	Jan-27	43	C (E/I + Site Work/Landscape) + Park (Site Work/Landscape)	0.01			86%	14%	100%	0	0	0.00970502	0.0016175
Exterior / Interior Work + Site Work / Landscape	Feb-27	44	C (E/I + Site Work/Landscape) + Park (Site Work/Landscape)	0.01			86%	14%	100%	0	0	0.00970502	0.0016175
Exterior / Interior Work + Site Work / Landscape	Mar-27	45	C (E/I + Site Work/Landscape) + Park (Site Work/Landscape)	0.01			86%	14%	100%	0	0	0.00970502	0.0016175
Site Work / Landscape	Apr-27	46	Park (Site Work/Landscape)	0.01				100%	100%	0	0	0	0.01188816
Site Work / Landscape	May-27	47	Park (Site Work/Landscape)	0.01				100%	100%	0	0	0	0.01188816
Site Work / Landscape	Jun-27	48	Park (Site Work/Landscape)	0.01				100%	100%	0	0	0	0.01188816
			Linear Year 1 Total	0.04									
			Linear Year 2 Total	0.08									
			Linear Year 3 Total	0.12									
			Linear Year 4 Total	0.14									

Sheet 10: Scenario 2 - Off-road PM2.5 Exhaust Emissions by Month, Area, and Linear Construction Year

Table 10-1: Scenario 2 Off-road Emissions by Month / Area

Phase / Task	Month & Year	Linear Month	Area	Emissions (tons)	Activity Breakdown by Area (%)					PM2.5 Emissions Breakdown by Area (tons)			
				PM2.5 (Exh)	A	B	C	Park	Total	A	B	C	Park
Clear and Grub	Jul-23	1	All	0.01	25%	25%	25%	25%	100%	0.001681	0.001681	0.001681	0.00168099
Mass Excavation	Aug-23	2	All	0.02	25%	25%	25%	25%	100%	0.004	0.004	0.004	0.00399963
Mass Excavation	Sep-23	3	All	0.02	25%	25%	25%	25%	100%	0.004	0.004	0.004	0.00399963
Mass Excavation	Oct-23	4	All	0.02	25%	25%	25%	25%	100%	0.004	0.004	0.004	0.00399963
Mass Excavation	Nov-23	5	All	0.02	25%	25%	25%	25%	100%	0.004	0.004	0.004	0.00399963
Structural Concrete	Dec-23	6	A	0.01	100%	0%	0%	0%	100%	0.005609	0	0	0
Structural Concrete	Jan-24	7	A	0.01	100%	0%	0%	0%	100%	0.005609	0	0	0
Structural Concrete	Feb-24	8	A, B	0.01	50%	50%	0%	0%	100%	0.002805	0.002805	0	0
Structural Concrete	Mar-24	9	A, B	0.01	50%	50%	0%	0%	100%	0.002805	0.002805	0	0
Structural Concrete	Apr-24	10	A, B, C	0.01	33%	33%	33%	0%	100%	0.00187	0.00187	0.00187	0
Structural Concrete + Framing / Rough In	May-24	11	A (Frame), B (Concrete), C (Concrete)	0.01	29%	36%	36%	0%	100%	0.001848	0.002311	0.002311	0
Structural Concrete + Framing / Rough In	Jun-24	12	A (Frame), B (Concrete)	0.01	29%	71%	0%	0%	100%	0.001848	0.004621	0	0
Structural Concrete + Framing / Rough In	Jul-24	13	A (Frame), B (Concrete)	0.01	29%	71%	0%	0%	100%	0.001848	0.004621	0	0
Structural Concrete + Framing / Rough In	Aug-24	14	A (Frame), B (Concrete, Frame), C (Concrete)	0.01	14%	50%	36%	0%	100%	0.000924	0.003235	0.002311	0
Structural Concrete + Framing / Rough In	Sep-24	15	A (Frame), B (Concrete), C (Concrete)	0.01	29%	36%	36%	0%	100%	0.001848	0.002311	0.002311	0
Framing / Rough In	Oct-24	16	A (Frame), B (Frame)	0.01	50%	50%	0%	0%	100%	0.003091	0.003091	0	0
Framing / Rough In	Nov-24	17	A (Frame), B (Frame)	0.01	50%	50%	0%	0%	100%	0.003091	0.003091	0	0
Framing / Rough In	Dec-24	18	A (Frame), B (Frame)	0.01	50%	50%	0%	0%	100%	0.003091	0.003091	0	0
Framing / Rough In	Jan-25	19	A (Frame), B (Frame)	0.01	50%	50%	0%	0%	100%	0.003091	0.003091	0	0
Framing / Rough In	Feb-25	20	A (Frame), B (Frame), C (Frame)	0.01	33%	33%	33%	0%	100%	0.002061	0.002061	0.002061	0
Framing / Rough In	Mar-25	21	B (Frame), C (Frame)	0.01	0%	50%	50%	0%	100%	0	0.003091	0.003091	0
Framing / Rough In + Exterior / Interior Work	Apr-25	22	A (E/I), B (Framing), C (Framing)	0.01	33%	33%	33%	0%	100%	0.002545	0.002545	0.002545	0
Framing / Rough In + Exterior / Interior Work	May-25	23	A (E/I), B (Framing), C (Framing)	0.01	33%	33%	33%	0%	100%	0.002545	0.002545	0.002545	0
Framing / Rough In + Exterior / Interior Work	Jun-25	24	A (E/I), C (Framing)	0.01	50%	0%	50%	0%	100%	0.003818	0	0.003818	0
Framing / Rough In + Exterior / Interior Work	Jul-25	25	A (E/I), B (E/I), C (Framing)	0.01	33%	33%	33%	0%	100%	0.002545	0.002545	0.002545	0
Framing / Rough In + Exterior / Interior Work	Aug-25	26	A (E/I), B (E/I), C (Framing)	0.01	33%	33%	33%	0%	100%	0.002545	0.002545	0.002545	0
Framing / Rough In + Exterior / Interior Work	Sep-25	27	A (E/I), B (E/I), C (Framing)	0.01	33%	33%	33%	0%	100%	0.002545	0.002545	0.002545	0
Framing / Rough In + Exterior / Interior Work	Oct-25	28	A (E/I), B (E/I), C (Framing)	0.01	21%	21%	58%	0%	100%	0.001591	0.001591	0.004455	0
Exterior / Interior Work	Nov-25	29	A (E/I), B (E/I)	0.01	50%	50%	0%	0%	100%	0.003818	0.003818	0	0
Exterior / Interior Work	Dec-25	30	A (E/I), B (E/I)	0.01	50%	50%	0%	0%	100%	0.003818	0.003818	0	0
Exterior / Interior Work	Jan-26	31	A (E/I), B (E/I)	0.01	50%	50%	0%	0%	100%	0.003818	0.003818	0	0
Exterior / Interior Work	Feb-26	32	A (E/I), B (E/I)	0.01	50%	50%	0%	0%	100%	0.003818	0.003818	0	0
Exterior / Interior Work	Mar-26	33	A (E/I), B (E/I)	0.01	50%	50%	0%	0%	100%	0.003818	0.003818	0	0
Exterior / Interior Work + Site Work / Landscape	Apr-26	34	A (Site Work/ Landscape), B (E/I), C (E/I)	0.01	29%	36%	36%	0%	100%	0.002015	0.002519	0.002519	0
Exterior / Interior Work + Site Work / Landscape	May-26	35	A (Site Work/ Landscape), B (E/I), C (E/I)	0.01	29%	36%	36%	0%	100%	0.002015	0.002519	0.002519	0
Exterior / Interior Work + Site Work / Landscape	Jun-26	36	A (Site Work/ Landscape), B (E/I), C (E/I)	0.01	29%	36%	36%	0%	100%	0.002015	0.002519	0.002519	0
Exterior / Interior Work + Site Work / Landscape	Jul-26	37	A (Site Work/Landscape), B (Site Work/Landscape), C (E/I)	0.01	14%	14%	71%	0%	100%	0.001008	0.001008	0.005038	0
Exterior / Interior Work + Site Work / Landscape	Aug-26	38	A (Site Work/Landscape), B (Site Work/Landscape), C (E/I)	0.01	14%	14%	71%	0%	100%	0.001008	0.001008	0.005038	0
Exterior / Interior Work + Site Work / Landscape	Sep-26	39	A (Site Work/Landscape), B (Site Work/Landscape), C (E/I)	0.01	14%	14%	71%	0%	100%	0.001008	0.001008	0.005038	0
Exterior / Interior Work + Site Work / Landscape	Oct-26	40	B (Site Work/Landscape), C (E/I + Site Work/Landscape)	0.01	0%	14%	86%	0%	100%	0	0.001008	0.006046	0
Exterior / Interior Work + Site Work / Landscape	Nov-26	41	B (Site Work/Landscape), C (E/I + Site Work/Landscape)	0.01	0%	14%	86%	0%	100%	0	0.001008	0.006046	0
Exterior / Interior Work + Site Work / Landscape	Dec-26	42	B (Site Work/Landscape), C (E/I + Site Work/Landscape)	0.01	0%	14%	86%	0%	100%	0	0.001008	0.006046	0

Exterior / Interior Work + Site Work / Landscape	Jan-27	43	C (E/I + Site Work/Landscape) + Park (Site Work/Landscape)	0.01	0%	0%	86%	14%	100%	0	0	0.006046	0.00100767
Exterior / Interior Work + Site Work / Landscape	Feb-27	44	C (E/I + Site Work/Landscape) + Park (Site Work/Landscape)	0.01	0%	0%	86%	14%	100%	0	0	0.006046	0.00100767
Exterior / Interior Work + Site Work / Landscape	Mar-27	45	C (E/I + Site Work/Landscape) + Park (Site Work/Landscape)	0.01	0%	0%	86%	14%	100%	0	0	0.006046	0.00100767
Site Work / Landscape	Apr-27	46	Park (Site Work/Landscape)	0.00	0%	0%	0%	100%	100%	0	0	0	0.00475591
Site Work / Landscape	May-27	47	Park (Site Work/Landscape)	0.00	0%	0%	0%	100%	100%	0	0	0	0.00475591
Site Work / Landscape	Jun-27	48	Park (Site Work/Landscape)	0.00	0%	0%	0%	100%	100%	0	0	0	0.00475591
			Linear Year 1 Total	0.11									
			Linear Year 2 Total	0.08									
			Linear Year 3 Total	0.09									
			Linear Year 4 Total	0.08									

Sheet 11: Scenario 1 - Monthly PM2.5 Exhaust Emissions by Phase

Table 11-1: Scenario 1 - Monthly Emissions Calculations

Phase	Equipment	Quantity	Daily Hours In Use	Anticipated Duration of Use (days)	Total Runtime Hours	Horsepower	Load Factor	Emission Factor (g/hp-hr)	Emissions (tons)
								PM2.5	PM2.5
Clear and Grub, Jul 2023	CAT 140 Grader T4	4	8	20	640	179	0.41	0.0138	0.000714497
	CAT D7 Dozer T4	2	8	20	320	265	0.40	0.0138	0.000515988
	CAT 320 Excavator T4	1	8	20	160	172	0.38	0.0138	0.00015908
	CAT 415 Backhoe T4	2	8	20	320	93	0.37	0.0138	0.000167501
Mass Excavation, Aug - Nov 2023	CAT 140 Grader T4	4	8	20	640	179	0.41	0.0138	0.000714497
	CAT D7 Dozer T4	2	8	20	320	265	0.40	0.0138	0.000515988
	CAT 320 Excavator T4	1	8	20	160	172	0.38	0.0138	0.00015908
	CAT 623K Scraper T4	6	8	20	960	407	0.48	0.0138	0.002852924
	CAT 415 Backhoe T4	2	8	20	320	93	0.37	0.0138	0.000167501
Structural Concrete, Dec 2023	Telehandler: Gradall T4	9	8	20	1440	160	0.40	0.0138	0.001401928
Structural Concrete, Jan 2024 - Apr 2024	Telehandler: Gradall T4	9	8	20	1440	160	0.40	0.0138	0.001401928
Structural Concrete, Structural Framing / Rough-In, May 2024 - Sep 2024	Telehandler: Gradall T4	9	8	20	1440	160	0.40	0.0138	0.001401928
	TLB (T3)	3	8	20	480	97	0.37	0.276	0.005241168
Structural Concrete, Structural Framing / Rough-	Telehandler: Gradall T4	9	8	20	1440	160	0.40	0.0138	0.001401928
	TLB (T3)	2	8	20	320	97	0.37	0.276	0.003494112
Structural Concrete, Structural Framing / Rough-	Telehandler: Gradall T4	9	8	20	1440	160	0.40	0.0138	0.001401928
	TLB (T3)	2	8	20	320	97	0.37	0.276	0.003494112
Exterior / Interior Work, Structural Framing / Rough- In,	Telehandler: Gradall T4	9	8	20	1440	160	0.40	0.0138	0.001401928
	TLB (T3)	2	8	20	320	97	0.37	0.276	0.003494112
	Crane (T3)	3	8	20	480	231	0.29	0.138	0.004891416
Exterior / Interior Work, Nov 2025 - Dec 2025	Telehandler: Gradall T4	9	8	20	1440	160	0.40	0.0138	0.001401928
	TLB (T3)	2	8	20	320	97	0.37	0.276	0.003494112
	Crane (T3)	3	8	20	480	231	0.29	0.138	0.004891416
Exterior / Interior Work, Jan 2026 - Mar 2026	Telehandler: Gradall T4	9	8	20	1440	160	0.40	0.0138	0.001401928
	TLB (T3)	2	8	20	320	97	0.37	0.276	0.003494112
	Crane (T3)	3	8	20	480	231	0.29	0.138	0.004891416
Exterior / Interior Work Site Work / Landscape Apr 2026 - Dec 2026	Telehandler: Gradall T4	4	8	20	640	160	0.40	0.0138	0.000623079
	Backhoe T3	6	8	20	960	86	0.37	0.276	0.009293617
	Mini Excavator T4	6	8	20	960	19	0.38	0.184	0.001405823
Exterior / Interior Work, Site Work / Landscape, Jan 2027 - Mar 2027	Telehandler: Gradall T4	4	8	20	640	160	0.40	0.0138	0.000623079
	Backhoe T3	6	8	20	960	86	0.37	0.276	0.009293617
	Mini Excavator T4	6	8	20	960	19	0.38	0.184	0.001405823
Exterior / Interior Work, Site Work / Landscape,	Backhoe T3	6	8	20	960	97	0.37	0.276	0.010482335
	Mini Excavator T4	6	8	20	960	19	0.38	0.184	0.001405823

Source: OFFROAD2021

Sheet 12: Scenario 2 - Monthly PM2.5 Exhaust Emissions by Phase

Table 12-1: Scenario 2 - Monthly Emissions Calculations

Phase	Equipment	Quantity	Daily Hours In Use	Anticipated Duration of Use (days)	Total Runtime Hours	Horsepower	Load Factor	Emission Factor (g/hp-hr) PM2.5	Emissions (tons) PM2.5
Clear and Grub, Jul 2023	CAT 140 Grader T4	4	8	20	640	179	0.41	0.044760064	0.002317458
	CAT D7 Dozer T4	2	8	20	320	265	0.40	0.098203865	0.003671882
	CAT 320 Excavator T4	1	8	20	160	172	0.38	0.01602342	0.00018471
	CAT 415 Backhoe T4	2	8	20	320	93	0.37	0.045305859	0.000549912
Mass Excavation, Aug - Nov 2023	CAT 140 Grader T4	4	8	20	640	179	0.41	0.044760064	0.002317458
	CAT D7 Dozer T4	2	8	20	320	265	0.40	0.098203865	0.003671882
	CAT 320 Excavator T4	1	8	20	160	172	0.38	0.01602342	0.00018471
	CAT 623K Scraper T4	6	8	20	960	407	0.48	0.044862305	0.009274548
	CAT 415 Backhoe T4	2	8	20	320	93	0.37	0.045305859	0.000549912
Structural Concrete, Dec 2023	Telehandler: Gradall T4	9	8	20	1440	160	0.40	0.05521352	0.005609087
Structural Concrete, Jan 2024 - Apr 2024	Telehandler: Gradall T4	9	8	20	1440	160	0.40	0.05521352	0.005609087
Structural Concrete, Structural Framing / Rough-In, May 2024 - Sep 2024	Telehandler: Gradall T4	9	8	20	1440	160	0.40	0.05521352	0.005609087
	TLB (T3)	3	8	20	480	97	0.37	0.045305859	0.000860346
Structural Concrete, Structural Framing / Rough-	Telehandler: Gradall T4	9	8	20	1440	160	0.40	0.05521352	0.005609087
	TLB (T3)	2	8	20	320	97	0.37	0.045305859	0.000573564
Structural Concrete, Structural Framing / Rough-	Telehandler: Gradall T4	9	8	20	1440	160	0.40	0.05521352	0.005609087
	TLB (T3)	2	8	20	320	97	0.37	0.045305859	0.000573564
Exterior / Interior Work, Structural Framing / Rough-In,	Telehandler: Gradall T4	9	8	20	1440	160	0.40	0.05521352	0.005609087
	TLB (T3)	2	8	20	320	97	0.37	0.045305859	0.000573564
	Crane (T3)	3	8	20	480	231	0.29	0.041012351	0.001453684
Exterior / Interior Work, Nov 2025 - Dec 2025	Telehandler: Gradall T4	9	8	20	1440	160	0.40	0.05521352	0.005609087
	TLB (T3)	2	8	20	320	97	0.37	0.045305859	0.000573564
	Crane (T3)	3	8	20	480	231	0.29	0.041012351	0.001453684
Exterior / Interior Work, Jan 2026 - Mar 2026	Telehandler: Gradall T4	9	8	20	1440	160	0.40	0.05521352	0.005609087
	TLB (T3)	2	8	20	320	97	0.37	0.045305859	0.000573564
	Crane (T3)	3	8	20	480	231	0.29	0.041012351	0.001453684
Exterior / Interior Work Site Work / Landscape Apr 2026 - Dec 2026	Telehandler: Gradall T4	4	8	20	640	160	0.40	0.05521352	0.002492927
	Backhoe T3	6	8	20	960	86	0.37	0.045305859	0.001525563
	Mini Excavator T4	6	8	20	960	19	0.38	0.397261426	0.003035212
Exterior / Interior Work, Site Work / Landscape, Jan 2027 - Mar 2027	Telehandler: Gradall T4	4	8	20	640	160	0.40	0.05521352	0.002492927
	Backhoe T3	6	8	20	960	86	0.37	0.045305859	0.001525563
	Mini Excavator T4	6	8	20	960	19	0.38	0.397261426	0.003035212
Exterior / Interior Work, Site Work / Landscape,	Backhoe T3	6	8	20	960	97	0.37	0.045305859	0.001720693
	Mini Excavator T4	6	8	20	960	19	0.38	0.397261426	0.003035212

Source: CARB 2017a for load factor information

Sheet 13: Scenario 1 - Equipment Category and PM2.5 Emissions Assignment

Table 13-1: Scenario 1 - Equipment Category and PM2.5 Emissions Assignment

Row Labels	Average of Horsepower	OFFROAD Cat	HP_Bin	Load Factor	PM2_5 g_hp-hr
Backhoe T3	97	ConstMin - Tractors/Loaders/Backhoes	100	0.37	0.276
CAT 140 Grader T4	179	ConstMin - Graders	300	0.41	0.014
CAT 320 Excavator T4	172	ConstMin - Excavators	300	0.38	0.014
CAT 415 Backhoe T4	93	ConstMin - Tractors/Loaders/Backhoes	100	0.37	0.014
CAT 623K Scraper T4	407	ConstMin - Scrapers	600	0.48	0.014
CAT D7 Dozer T4	265	ConstMin - Rubber Tired Dozers	300	0.40	0.014
Crane (T3)	231	ConstMin - Cranes	300	0.29	0.138
Mini Excavator T4	19	ConstMin - Excavators	75	0.38	0.184
Telehandler: Gradall T4	160	ConstMin - Rough Terrain Forklifts	175	0.4	0.014
TLB (T3)	86	ConstMin - Tractors/Loaders/Backhoes	100	0.37	0.276

Source: CARB 2017a

Sheet 14: Scenario 2 - Equipment Category and PM2.5 Emissions Assignment

Table 14-1: Scenario 2 - Equipment Category and PM2.5 Emissions Assignment

Row Labels	Average of Horsepower	OFFROAD Cat	HP_Bin	Load Factor	PM2_5 g_hp-hr
Backhoe T3	97	ConstMin - Tractors/Loaders/Backhoes	100	0.37	0.045
CAT 140 Grader T4	179	ConstMin - Graders	300	0.41	0.045
CAT 320 Excavator T4	172	ConstMin - Excavators	300	0.38	0.016
CAT 415 Backhoe T4	93	ConstMin - Tractors/Loaders/Backhoes	100	0.37	0.045
CAT 623K Scraper T4	407	ConstMin - Scrapers	600	0.48	0.045
CAT D7 Dozer T4	265	ConstMin - Rubber Tired Dozers	300	0.40	0.098
Crane (T3)	231	ConstMin - Cranes	300	0.29	0.041
Mini Excavator T4	19	ConstMin - Excavators	75	0.38	0.397
Telehandler: Gradall T4	160	ConstMin - Rough Terrain Forklifts	175	0.4	0.055
TLB (T3)	86	ConstMin - Tractors/Loaders/Backhoes	100	0.37	0.045

Source: OFFROAD2021

Sheet 15: Tier III and Tier IV Emission Factors

Table 15-1: U.S. EPA Tier III Emission Standards

Maximum Horsepower	Assigned HP Bin	EMFAC (g/hp-hr)		
		PM	PM10	PM2.5
50≤hp<75 (I-T4)	75	0.22	0.22	0.2024
75≤hp<100	100	0.3	0.3	0.276
100≤hp<175	175	0.22	0.22	0.2024
175≤hp<300	300	0.15	0.15	0.138
300≤hp<600	600	0.15	0.15	0.138
600≤hp<750	750	0.15	0.15	0.138
Mobile > 750 hp (I-T4)	9999	0.07	0.07	0.0644

Source: CARB 2017b; CARB 2005

Table 11-5: U.S. EPA Tier IV Emission Standards

Maximum Horsepower	Assigned HP Bin	EMFAC (g/hp-hr)		
		PM	PM10	PM2.5
50≤hp<75 (I-T4)	75	0.2	0.2	0.184
75≤hp<100	100	0.015	0.015	0.0138
100≤hp<175	175	0.015	0.015	0.0138
175≤hp<300	300	0.015	0.015	0.0138
300≤hp<600	600	0.015	0.015	0.0138
600≤hp<750	750	0.015	0.015	0.0138
Mobile > 750 hp (I-T4)	9999	0.03	0.03	0.0276

Source: CARB 2017b; CARB 2005

Table 11-3: U.S. EPA Tier III Emission Standards - Reformat

Maximum Horsepower	Assigned HP Bin	PM2.5
50≤hp<75	75	0
75≤hp<100	100	0
100≤hp<175	175	0
175≤hp<300	300	0
300≤hp<600	600	0
600≤hp<750	750	0
Mobile > 750 hp	9999	0

Table 11-4: U.S. EPA Tier IV Emission Standards - Reformat

Maximum Horsepower	Assigned HP Bin	PM2.5
50≤hp<75	75	0
75≤hp<100	100	0
100≤hp<175	175	0
175≤hp<300	300	0
300≤hp<600	600	0
600≤hp<750	750	0
Mobile > 750 hp	9999	0

Sheet 16: Off-road Construction Equipment List by Phase

Table 16-1: Phased Equipment List

Phase	Equipment	Horsepower	Quantity	Anticipated Duration of Use (days)
Clear and Grub, Jul 2023	CAT 140 Grader T4	179	4	20
	CAT D7 Dozer T4	265	2	20
	CAT 320 Excavator T4	172	1	20
	CAT 415 Backhoe T4	93	2	20
Mass Excavation, Aug - Nov 2023	CAT 140 Grader T4	179	4	80
	CAT D7 Dozer T4	265	2	80
	CAT 320 Excavator T4	172	1	80
	CAT 623K Scraper T4	407	6	80
	CAT 415 Backhoe T4	93	2	80
Structural Concrete, Dec 2023	Telehandler: Gradall T4	160	9	20
Structural Concrete, Jan 2024 - Apr 2024	Telehandler: Gradall T4	160	9	80
Structural Concrete, Structural Framing / Rough-In,	Telehandler: Gradall T4	160	9	100
	TLB (T3)	97	3	100
Structural Concrete, Structural Framing / Rough-In,	Telehandler: Gradall T4	160	9	60
	TLB (T3)	97	2	60
Structural Concrete, Structural Framing / Rough-In,	Telehandler: Gradall T4	160	9	60
	TLB (T3)	97	2	60
Exterior / Interior Work, Structural Framing / Rough-In, Apr 2025 - Oct 2025	Telehandler: Gradall T4	160	9	140
	TLB (T3)	97	2	140
	Crane (T3)	231	3	140
Exterior / Interior Work, Nov 2025 - Dec 2025	Telehandler: Gradall T4	160	9	40
	TLB (T3)	97	2	40
	Crane (T3)	231	3	40
Exterior / Interior Work, Jan 2026 - Mar 2026	Telehandler: Gradall T4	160	9	60
	TLB (T3)	97	2	60
	Crane (T3)	231	3	60
Exterior / Interior Work Site Work / Landscape Apr 2026 - Dec 2026	Telehandler: Gradall T4	160	4	180
	Backhoe T3	86	6	180
	Mini Excavator T4	19	6	180
Exterior / Interior Work, Site Work / Landscape, Jan 2027 - Mar 2027	Telehandler: Gradall T4	160	4	60
	Backhoe T3	86	6	60
	Mini Excavator T4	19	6	60
Exterior / Interior Work, Site Work / Landscape,	Backhoe T3	97	6	60
	Mini Excavator T4	19	6	60

Sheet 17: OFFROAD2021 Output File for Santa Clara (SF) Sub-Area, Year 2022

Model Output: OFFROAD2021 (v1.0.2) Emissions Inventory
Region Type: Sub-Area
Region: Santa Clara (SF)
Calendar Year: 2022
Scenario: All Adopted Rules - Exhaust
Vehicle Classification: OFFROAD2021 Equipment Types
Units: tons/day for Emissions, gallons/year for Fuel, hours/year for Activity, Horsepower-hours/year for Horsepower-hours

Region	Calendar	Vehicle Category	Model Yea	Horsepo	Fuel	HC_tpd	ROG_tpd	TOG_tpd	CO_tpd	NOx_tpd	CO2_tpd	PM10_tp	PM2.5_tp	SOx_tpd	NH3_tpd	Fuel Cons	Total_Act	Total_Po	Horsepo
Santa Clara	2022	Construction and Mining - Cranes	Aggregate	25	Diesel	1.4E-06	1.7E-06	2E-06	7.9E-06	6.9E-06	0.00085	5.3E-07	4.9E-07	7.8E-09	6.9E-09	27.4511	66.3109	0.13843	1657.77
Santa Clara	2022	Construction and Mining - Cranes	Aggregate	50	Diesel	4.1E-05	4.9E-05	5.9E-05	0.00018	0.00014	0.01371	1.5E-05	1.3E-05	1.3E-07	1.1E-07	444.753	645.081	1.47659	26596.1
Santa Clara	2022	Construction and Mining - Cranes	Aggregate	75	Diesel	1.1E-05	1.4E-05	1.6E-05	4.7E-05	0.0001	0.00553	9.6E-06	8.9E-06	5.1E-08	4.5E-08	179.403	172.05	0.46143	11972
Santa Clara	2022	Construction and Mining - Cranes	Aggregate	100	Diesel	0.00028	0.00034	0.0004	0.00234	0.00302	0.30978	0.0002	0.00018	2.9E-06	2.5E-06	10050.5	7700.34	17.3499	676570
Santa Clara	2022	Construction and Mining - Cranes	Aggregate	175	Diesel	0.00068	0.00082	0.00097	0.00623	0.00825	0.94858	0.00044	0.00041	8.7E-06	7.7E-06	30775.8	14102.1	30.8699	2062738
Santa Clara	2022	Construction and Mining - Cranes	Aggregate	300	Diesel	0.00084	0.00102	0.00121	0.0056	0.01159	1.63565	0.00048	0.00044	1.5E-05	1.3E-05	53067	16161.5	34.2846	3565167
Santa Clara	2022	Construction and Mining - Cranes	Aggregate	600	Diesel	0.00106	0.00128	0.00152	0.01026	0.01407	2.85185	0.00056	0.00052	2.6E-05	2.3E-05	92525.2	16929.3	34.1461	6213774
Santa Clara	2022	Construction and Mining - Crawler Tractors	Aggregate	25	Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Santa Clara	2022	Construction and Mining - Crawler Tractors	Aggregate	50	Diesel	0.00012	0.00015	0.00017	0.00054	0.00041	0.0444	4.1E-05	3.8E-05	4.1E-07	3.6E-07	1440.46	1397.59	4.09535	58755.1
Santa Clara	2022	Construction and Mining - Crawler Tractors	Aggregate	75	Diesel	1.5E-05	1.8E-05	2.1E-05	5.7E-05	0.00014	0.00478	1E-05	9.4E-06	4.4E-08	3.9E-08	155.032	99.7408	0.49144	6976.26
Santa Clara	2022	Construction and Mining - Crawler Tractors	Aggregate	100	Diesel	0.00181	0.00219	0.0026	0.01439	0.01861	1.95605	0.00149	0.00137	1.8E-05	1.6E-05	63461.9	32668.3	69.8667	2854311
Santa Clara	2022	Construction and Mining - Crawler Tractors	Aggregate	175	Diesel	0.00131	0.00158	0.00188	0.01325	0.01556	2.13941	0.00087	0.0008	2E-05	1.7E-05	69410.7	20963.2	46.2365	3127562
Santa Clara	2022	Construction and Mining - Crawler Tractors	Aggregate	300	Diesel	0.00124	0.00151	0.00179	0.00834	0.01789	2.24435	0.00072	0.00066	2.1E-05	1.8E-05	72815.6	15991.4	35.8343	3285895
Santa Clara	2022	Construction and Mining - Crawler Tractors	Aggregate	600	Diesel	0.00271	0.00328	0.00391	0.02301	0.03539	7.8481	0.00137	0.00126	7.2E-05	6.4E-05	254623	29775.9	62.6999	1.1E+07
Santa Clara	2022	Construction and Mining - Excavators	Aggregate	25	Diesel	3E-06	3.7E-06	4.4E-06	1E-05	7E-06	0.00054	9.8E-07	9E-07	4.9E-09	4.4E-09	17.6358	32.1571	0.12311	803.929
Santa Clara	2022	Construction and Mining - Excavators	Aggregate	50	Diesel	0.00119	0.00144	0.00171	0.0129	0.01117	1.77527	0.00048	0.00044	1.6E-05	1.4E-05	57596.6	73268.8	100.126	2623877
Santa Clara	2022	Construction and Mining - Excavators	Aggregate	75	Diesel	1.3E-06	1.5E-06	1.8E-06	5E-06	1.2E-05	0.00042	9E-07	8.3E-07	3.8E-09	3.4E-09	13.5731	12.9847	0.04104	688.191
Santa Clara	2022	Construction and Mining - Excavators	Aggregate	100	Diesel	0.0009	0.00109	0.0013	0.01527	0.01135	2.3041	0.0006	0.00055	2.1E-05	1.9E-05	74754.1	46724	72.1403	3802413
Santa Clara	2022	Construction and Mining - Excavators	Aggregate	175	Diesel	0.00147	0.00178	0.00211	0.02833	0.01558	4.86318	0.00076	0.0007	4.5E-05	4E-05	157781	54686.9	92.4528	7985946
Santa Clara	2022	Construction and Mining - Excavators	Aggregate	300	Diesel	0.00148	0.00179	0.00213	0.0131	0.01683	6.20881	0.00054	0.00049	5.7E-05	5.1E-05	201438	46607.3	79.9781	1E+07
Santa Clara	2022	Construction and Mining - Excavators	Aggregate	600	Diesel	0.0022	0.00267	0.00317	0.02207	0.02145	11.0422	0.00072	0.00066	0.0001	9E-05	358251	53636.7	83.425	1.8E+07
Santa Clara	2022	Construction and Mining - Graders	Aggregate	25	Diesel	9.6E-07	1.2E-06	1.4E-06	4.5E-06	3.5E-06	0.00034	4.3E-07	3.9E-07	3.1E-09	2.8E-09	11.0732	18.8425	0.08247	471.061
Santa Clara	2022	Construction and Mining - Graders	Aggregate	50	Diesel	3.6E-05	4.4E-05	5.2E-05	0.00015	0.00011	0.0114	1.2E-05	1.1E-05	1E-07	9.3E-08	369.912	421.459	1.19586	15737.4
Santa Clara	2022	Construction and Mining - Graders	Aggregate	75	Diesel	1.2E-05	1.4E-05	1.7E-05	4.7E-05	0.00011	0.00492	9.2E-06	8.4E-06	4.5E-08	4E-08	159.568	105	0.32989	7366.33
Santa Clara	2022	Construction and Mining - Graders	Aggregate	100	Diesel	0.00036	0.00044	0.00052	0.00222	0.00345	0.26122	0.00027	0.00025	2.4E-06	2.1E-06	8475.02	4537.92	12.1236	406734
Santa Clara	2022	Construction and Mining - Graders	Aggregate	175	Diesel	0.00201	0.00243	0.00289	0.0194	0.02277	2.97026	0.00126	0.00116	2.7E-05	2.4E-05	96367	30583.9	64.824	4542451
Santa Clara	2022	Construction and Mining - Graders	Aggregate	300	Diesel	0.00299	0.00362	0.00431	0.01544	0.04268	6.26424	0.00141	0.0013	5.8E-05	5.1E-05	203236	44400.3	58.4735	9612140
Santa Clara	2022	Construction and Mining - Graders	Aggregate	600	Diesel	0.00014	0.00017	0.00021	0.00058	0.00227	0.26924	7E-05	6.4E-05	2.5E-06	2.2E-06	8735.08	1169.27	1.52575	411692
Santa Clara	2022	Construction and Mining - Pavers	Aggregate	25	Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Santa Clara	2022	Construction and Mining - Pavers	Aggregate	50	Diesel	7.5E-05	9E-05	0.00011	0.00042	0.00037	0.0487	2.7E-05	2.5E-05	4.5E-07	4E-07	1579.9	1705.13	4.80549	66126.6
Santa Clara	2022	Construction and Mining - Pavers	Aggregate	75	Diesel	0.00012	0.00015	0.00018	0.00059	0.00111	0.07439	0.00011	9.8E-05	6.8E-07	6.1E-07	2413.36	1570.59	4.64531	113368
Santa Clara	2022	Construction and Mining - Pavers	Aggregate	100	Diesel	0.00015	0.00018	0.00022	0.00255	0.00213	0.39542	0.00011	0.0001	3.7E-06	3.2E-06	12828.8	7386.8	18.5812	599548
Santa Clara	2022	Construction and Mining - Pavers	Aggregate	175	Diesel	0.00022	0.00027	0.00032	0.00365	0.00269	0.6429	0.00013	0.00012	5.9E-06	5.2E-06	20858.2	6136.52	15.8982	968925
Santa Clara	2022	Construction and Mining - Pavers	Aggregate	300	Diesel	0.00012	0.00014	0.00017	0.00096	0.00189	0.50206	5.8E-05	5.3E-05	4.6E-06	4.1E-06	16288.9	3441	7.64874	758092
Santa Clara	2022	Construction and Mining - Pavers	Aggregate	600	Diesel	1.6E-05	1.9E-05	2.3E-05	0.00017	0.00022	0.09131	6.4E-06	5.9E-06	8.4E-07	7.5E-07	2962.35	365.966	0.84096	137887
Santa Clara	2022	Construction and Mining - Rollers	Aggregate	25	Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Santa Clara	2022	Construction and Mining - Rollers	Aggregate	50	Diesel	0.00103	0.00125	0.00149	0.00747	0.00701	0.99853	0.00042	0.00039	9.2E-06	8.1E-06	32396.1	42050.9	121.434	1501582
Santa Clara	2022	Construction and Mining - Rollers	Aggregate	75	Diesel	3.4E-05	4.1E-05	4.9E-05	0.00013	0.0003	0.01108	2.2E-05	2E-05	1E-07	9E-08	359.44	265.391	1.15338	18420.2
Santa Clara	2022	Construction and Mining - Rollers	Aggregate	100	Diesel	0.00072	0.00088	0.00104	0.0101	0.00919	1.55143	0.00053	0.00048	1.4E-05	1.3E-05	50334.6	29715.7	89.5515	2594003
Santa Clara	2022	Construction and Mining - Rollers	Aggregate	175	Diesel	0.00042	0.0005	0.0006	0.00891	0.00524	1.61487	0.00024	0.00022	1.5E-05	1.3E-05	52392.7	18793.3	52.3963	2702154
Santa Clara	2022	Construction and Mining - Rollers	Aggregate	300	Diesel	9.2E-05	0.00011	0.00013	0.00078	0.0013	0.26745	4.9E-05	4.5E-05	2.5E-06	2.2E-06	8677.24	2067.51	6.7143	447119
Santa Clara	2022	Construction and Mining - Rollers	Aggregate	600	Diesel	3.7E-05	4.5E-05	5.3E-05	0.00041	0.00051	0.15676	1.7E-05	1.6E-05	1.4E-06	1.3E-06	5085.84	746.39	2.43033	260686
Santa Clara	2022	Construction and Mining - Rough Terrain Forklifts	Aggregate	25	Diesel	2.9E-07	3.5E-07	4.1E-07	3.6E-06	4.4E-06	0.00052	2.5E-07	2.3E-07	4.8E-09	4.3E-09	16.9566	29.3235	0.09507	733.087
Santa Clara	2022	Construction and Mining - Rough Terrain Forklifts	Aggregate	50	Diesel	5.6E-05	6.8E-05	8.1E-05	0.00037	0.00035	0.05034	2E-05	1.9E-05	4.6E-07	4.1E-07	1633.25	1479.86	5.41917	70688.9
Santa Clara	2022	Construction and Mining - Rough Terrain Forklifts	Aggregate	75	Diesel	3.8E-06	4.6E-06	5.5E-06	1.6E-05	3.8E-05	0.00139	2.6E-06	2.4E-06	1.3E-08	1.1E-08	45.0245	32.636	0.14261	2165.08
Santa Clara	2022	Construction and Mining - Rough Terrain Forklifts	Aggregate	100	Diesel	0.00081	0.00098	0.00116	0.0242	0.01452	3.97708	0.00039	0.00036	3.7E-05	3.2E-05	129032	64411.1	227.985	6202049
Santa Clara	2022	Construction and Mining - Rough Terrain Forklifts	Aggregate	175	Diesel	0.00035	0.00042	0.0005	0.00498	0.00371	0.87474	0.00025	0.00023	8.1E-06	7.1E-06	28380.1	10889	39.7406	1365085
Santa Clara	2022	Construction and Mining - Rough Terrain Forklifts	Aggregate	300	Diesel	1.2E-05	1.4E-05	1.7E-05	0.00012	0.00019	0.0642	4.4E-06	4E-06	5.9E-07	5.2E-07	2082.94	476.398	1.90146	100168
Santa Clara	2022	Construction and Mining - Rough Terrain Forklifts	Aggregate	600	Diesel	2.6E-06	3.1E-06	3.7E-06	4.3E-05	2.7E-05	0.02387	4.1E-07	3.7E-07	2.2E-07	1.9E-07	774.406	97.3106	0.38029	37484.4
Santa Clara	2022	Construction and Mining - Rubber Tired Dozers	Aggregate	25	Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Santa Clara	2022	Construction and Mining - Rubber Tired Dozers	Aggregate	50	Diesel	7.9E-05	9.5E-05	0.00011	0.00047	0.00034	0.04436	2.8E-05	2.6E-05	4.1E-07	3.6E-07	1439.11	1526.47	1.6068	63316.2
Santa Clara	2022	Construction and Mining - Rubber Tired Dozers	Aggregate	75	Diesel	6.2E-05	7.5E-05	8.9E-05	0.00038	0.0006	0.04459	4.5E-05	4.2E-05	4.1E-07	3.6E-07	1446.78	1027.98	1.37166	70348.3
Santa Clara	2022	Construction and Mining - Rubber Tired Dozers	Aggregate	100	Diesel	0.00015	0.00018	0.00022	0.00112	0.00154	0.14148	0.00012	0.00011	1.3E-06	1.2E-06	4590.15	2637.5	3.05685	222930
Santa Clara	2022	Construction and Mining - Rubber Tired Dozers	Aggregate	175	Diesel	0.0002	0.00024	0.00029	0.00144	0.00221	0.19922	0.00014	0.00013	1.8E-06	1.6E-06	6463.55	2217.39	2.8217	316029
Santa Clara	2022	Construction and Mining - Rubber Tired Dozers	Aggregate	300	Diesel	0.00018	0.00022	0.00026	0.00123	0.0024	0.2154	0.00011	0.0001	2E-06	1.8E-06	6988.52	1539.95	2.19466	340683
Santa Clara	2022	Construction and Mining - Rubber Tired Dozers	Aggregate	600	Diesel	0.00164	0.00198	0.00236	0.01575	0.0205	2.24127	0.00092	0.00085	2.1E-05	1.8E-05	72715.6	9567.94	13.168	3531445
Santa Clara	2022	Construction and Mining - Scrapers	Aggregate	25	Diesel	6.6E-08	8E-08	9.5E-08	1.9E-06	1.7E-06	0.00036	6E-09	5.5E-09	3.3E-09	2.9E-09	11.5201	16.6094	0.04039	415.234
Santa Clara	2022	Construction and Mining - Scrapers	Aggregate	50	Diesel	1.4E-05	1.6E-05	2E-05	4.6E-05	3.3E-05	0.00283	4.6E-06	4.2E-06	2.6E-08	2.3E-08	91.691	86.784	0.24233	3361.14
Santa Clara	2022	Construction and Mining - Scrapers	Aggregate	75	Diesel	4E-05	4.8E-05	5.7E-05	0.00021	0.00037	0.02494	3.2E-05	2.9E-05	2.3E-07	2E-07	809.148	477.889	1.09049	32401.9
Santa Clara	2022	Construction and Mining - Scrapers	Aggregate	100	Diesel	9.6E-05	0.00012	0.00014	0.00085	0.00122	0.1124	9E-05	8.3E-05	1E-06	9.2E-07	3646.78	1612.17	2.66563	145391
Santa Clara	2022	Construction and Mining - Scrapers	Aggregate	175	Diesel	0.00093	0.00113	0.00135	0.00973	0.01111	1.51641	0.00059	0.00055	1.4E-05	1.2E-05	49198.2	11743.5	26.2928	1960227
Santa Clara	2022	Construction and Mining - Scrapers	Aggregate	300	Diesel	0.00095	0.00115	0.00137	0.00598	0.01234	1.78727	0.00054	0.00049	1.6E-05	1.5E-05	57986	10432.1	25.687	2329994
Santa Clara	2022	Construction and Mining - Scrapers	Aggregate	600	Diesel	0.00847	0.01025	0.01219	0.07593	0.111	22.1479	0.00423	0.0039	0.0002	0.00018	718563	68078.7	141.763	2.9E+07
Santa Clara	2022	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate	25	Diesel	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Santa Clara	2022	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate	50	Diesel	0.00147	0.00178	0.00212	0.01234	0.01045	1.49257	0.00056	0.00052	1.4E-05	1.2E-05	48424.8	60855.9	117.712	2303931
Santa Clara	2022	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate	75	Diesel	0.00055	0.00066	0.00079	0.00221	0.0052	0.2198	0.00042	0.00039	2E-06	1.8E-06	7131.22	5218.16	22.7631	374369
Santa Clara	2022	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate	100	Diesel	0.00917	0.0111	0.01321	0.15758	0.11444	23.8383	0.00601	0.00553	0.00022	0.00019	773407	486192	776.49	4E+07
Santa Clara	2022	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate	175	Diesel	0.00131	0.00159	0.00189	0.02448	0.01393	4.15956	0.00071	0.00065	3.8E-05	3.4E-05	134952	49635.5	89.412	7118357
Santa Clara	2022	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate	300	Diesel	0.00079	0.00095	0.00113	0.00614	0.00997	2.62225	0.00035	0.00032	2.4E-05	2.1E-05	85076.2	21400.4	37.9796	4471436
Santa Clara	2022	Construction and Mining - Tractors/Loaders/Backhoes	Aggregate	600	Diesel	0.00088	0.00107	0.00127	0.00798	0.0097	3.42296	0.00036	0.00033	3.2E-05	2.8E-05	111054	17318.6	31.9504	5871071

Sheet 18: OFFROAD2021 Output File for Santa Clara (SF) Sub-Area, Year 2022

Source: EMFAC2021 (v1.0.0) Emissions Inventory
Region Type: Sub-Area
Region: Santa Clara (SF)
Calendar Year: 2022
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

Region	Calendar Ye	Vehicle Cate	Model Year	Speed	Fuel	Population	Total VMT	CVMT	EVMT	Trips	Energy Cc	NOx_RUNEX	NOx_IDLEX	NOx_STREX	NOx_TOTEX	PM2.5_RUN	PM2.5_IDLE	PM2.5_STRE	PM2.5_TOTE
Santa Clara	2022	HHDT	Aggregate	Aggregate	Gasoline	3.8273666	105.19135	105.19135	0	76.578	0	0.0010721	0	0.0001043	0.0011764	6.702E-07	0	1.432E-07	8.134E-07
Santa Clara	2022	HHDT	Aggregate	Aggregate	Diesel	8126.6301	984491.31	984491.31	0	118999	0	2.6528293	0.6073383	0.3338163	3.593984	0.0295957	0.0003092	0	0.0299049
Santa Clara	2022	HHDT	Aggregate	Aggregate	Natural Gas	660.77564	47681.358	47681.358	0	5809.4	0	0.0713086	0.0099214	0	0.08123	9.981E-05	1.629E-05	0	0.0001161
Santa Clara	2022	LDA	Aggregate	Aggregate	Gasoline	604047.78	22374250	22374250	0	2805661	0	1.3266694	0	0.8904556	2.2171251	0.031074	0	0.0063766	0.0374506
Santa Clara	2022	LDA	Aggregate	Aggregate	Diesel	1988.8469	60930.092	60930.092	0	8564.5	0	0.0177008	0	0	0.0177008	0.0013416	0	0	0.0013416
Santa Clara	2022	LDA	Aggregate	Aggregate	Electricity	49768.561	2058455.9	0	2058456	247156	794734	0	0	0	0	0	0	0	0
Santa Clara	2022	LDA	Aggregate	Aggregate	Plug-in Hybr	14080.335	626833.53	326494.83	300339	69204.8	90711.2	0.0023616	0	0.0357549	0.0381165	0.0004963	0	0.0001738	0.0006701
Santa Clara	2022	LDT1	Aggregate	Aggregate	Gasoline	54974.085	1779154.4	1779154.4	0	245182	0	0.313861	0	0.115931	0.429792	0.0038659	0	0.0008124	0.0046783
Santa Clara	2022	LDT1	Aggregate	Aggregate	Diesel	28.886015	444.57775	444.57775	0	84.9575	0	0.0008155	0	0	0.0008155	0.0001182	0	0	0.0001182
Santa Clara	2022	LDT1	Aggregate	Aggregate	Electricity	182.99279	6367.0471	0	6367.05	860.935	2458.21	0	0	0	0	0	0	0	0
Santa Clara	2022	LDT1	Aggregate	Aggregate	Plug-in Hybr	24.315774	1158.9526	555.22679	603.726	119.512	182.343	4.016E-06	0	6.175E-05	6.576E-05	5.363E-07	0	1.928E-07	7.291E-07
Santa Clara	2022	LDT2	Aggregate	Aggregate	Gasoline	274728.48	9911729.9	9911729.9	0	1286654	0	0.9529012	0	0.5490569	1.5019581	0.0142872	0	0.0029151	0.0172023
Santa Clara	2022	LDT2	Aggregate	Aggregate	Diesel	933.78803	35569.229	35569.229	0	4479.45	0	0.0019401	0	0	0.0019401	0.0002202	0	0	0.0002202
Santa Clara	2022	LDT2	Aggregate	Aggregate	Electricity	669.35851	23693.948	0	23693.9	3436.2	9147.82	0	0	0	0	0	0	0	0
Santa Clara	2022	LDT2	Aggregate	Aggregate	Plug-in Hybr	1256.2802	57825.985	28723.513	29102.5	6174.62	8789.81	0.0002078	0	0.0031901	0.0033979	3.599E-05	0	1.293E-05	4.891E-05
Santa Clara	2022	LHDT1	Aggregate	Aggregate	Gasoline	19023.539	692949.18	692949.18	0	283422	0	0.1717873	0.000809	0.2119336	0.3845298	0.0012727	0	0.0001109	0.0013836
Santa Clara	2022	LHDT1	Aggregate	Aggregate	Diesel	9466.8975	364941.29	364941.29	0	119082	0	0.8211642	0.0224257	0	0.84359	0.0169809	0.0002834	0	0.0172643
Santa Clara	2022	LHDT2	Aggregate	Aggregate	Gasoline	2479.1193	89333.801	89333.801	0	36935.2	0	0.020804	0.0001058	0.0272396	0.0481494	0.0001499	0	1.173E-05	0.0001616
Santa Clara	2022	LHDT2	Aggregate	Aggregate	Diesel	4276.1747	167672.01	167672.01	0	53788.9	0	0.2951305	0.0099664	0	0.3050969	0.0068032	0.0001276	0	0.0069309
Santa Clara	2022	MCY	Aggregate	Aggregate	Gasoline	27595.089	162923.97	162923.97	0	55190.2	0	0.1133439	0	0.009846	0.1231899	0.000326	0	0.0002127	0.0005387
Santa Clara	2022	MDV	Aggregate	Aggregate	Gasoline	150747.25	5216511.8	5216511.8	0	697659	0	0.7864526	0	0.3979919	1.1844445	0.007801	0	0.0017343	0.0095353
Santa Clara	2022	MDV	Aggregate	Aggregate	Diesel	2337.3284	86668.847	86668.847	0	11158.5	0	0.0055554	0	0	0.0055554	0.000521	0	0	0.000521
Santa Clara	2022	MDV	Aggregate	Aggregate	Electricity	623.69751	22215.798	0	22215.8	3205.62	8577.13	0	0	0	0	0	0	0	0
Santa Clara	2022	MDV	Aggregate	Aggregate	Plug-in Hybr	789.56121	33722.809	17285.181	16437.6	3880.69	4964.65	0.000125	0	0.002005	0.00213	2.687E-05	0	1.006E-05	3.694E-05
Santa Clara	2022	MH	Aggregate	Aggregate	Gasoline	2642.0841	23105.283	23105.283	0	264.314	0	0.0140449	0	0.0001178	0.0141626	4.882E-05	0	1.344E-07	4.895E-05
Santa Clara	2022	MH	Aggregate	Aggregate	Diesel	940.8008	9155.2096	9155.2096	0	94.0801	0	0.0447914	0	0	0.0447914	0.0010562	0	0	0.0010562
Santa Clara	2022	MHDT	Aggregate	Aggregate	Gasoline	1426.5351	69284.182	69284.182	0	28542.1	0	0.0524052	0.0001385	0.0145449	0.0670886	0.0001094	0	1.866E-05	0.0001281
Santa Clara	2022	MHDT	Aggregate	Aggregate	Diesel	10189.551	428042.28	428042.28	0	121267	0	0.8170638	0.1717031	0.1982834	1.1870503	0.009577	0.0004812	0	0.0100582
Santa Clara	2022	MHDT	Aggregate	Aggregate	Natural Gas	84.480523	3914.2047	3914.2047	0	796.889	0	0.0006991	0.000603	0	0.0013021	4.44E-06	1.51E-06	0	5.95E-06
Santa Clara	2022	OBUS	Aggregate	Aggregate	Gasoline	470.92336	21653.295	21653.295	0	9422.23	0	0.0142339	3.372E-05	0.0042277	0.0184953	2.06E-05	0	2.726E-06	2.333E-05
Santa Clara	2022	OBUS	Aggregate	Aggregate	Diesel	852.16788	61336.681	61336.681	0	8739.29	0	0.0967031	0.0076905	0.0140947	0.1184882	0.001468	8.795E-06	0	0.0014768
Santa Clara	2022	OBUS	Aggregate	Aggregate	Natural Gas	6.1241899	392.3599	392.3599	0	54.5053	0	0.0001131	1.058E-05	0	0.0001237	3.122E-07	2.151E-08	0	3.337E-07
Santa Clara	2022	SBUS	Aggregate	Aggregate	Gasoline	160.41389	7959.4302	7959.4302	0	641.656	0	0.0045862	0.0001637	0.0004874	0.0052373	7.484E-06	0	3.893E-07	7.873E-06
Santa Clara	2022	SBUS	Aggregate	Aggregate	Diesel	662.51623	15413.711	15413.711	0	9593.24	0	0.0719641	0.0167041	0.0047653	0.0934335	0.0003757	1.671E-05	0	0.0003924
Santa Clara	2022	SBUS	Aggregate	Aggregate	Natural Gas	22.596767	578.35316	578.35316	0	327.201	0	0.0003882	0.0001319	0	0.0005201	2.154E-06	2.681E-07	0	2.422E-06
Santa Clara	2022	UBUS	Aggregate	Aggregate	Gasoline	45.811044	4784.0366	4784.0366	0	183.244	0	0.0001446	0	0.0001109	0.0002555	4.742E-06	0	1.794E-08	4.76E-06
Santa Clara	2022	UBUS	Aggregate	Aggregate	Diesel	435.64749	48716.135	48716.135	0	1742.59	0	0.0207421	0	0	0.0207421	0.0003771	0	0	0.0003771
Santa Clara	2022	UBUS	Aggregate	Aggregate	Electricity	5.0467569	199.00273	0	199.003	20.187	346.91	0	0	0	0	0	0	0	0
Santa Clara	2022	UBUS	Aggregate	Aggregate	Natural Gas	41.848751	4783.781	4783.781	0	167.395	0	0.0003099	0	0	0.0003099	1.488E-06	0	0	1.488E-06

PM2.5_PMT	PM2.5_PMB	PM2.5_TOT	PM10_RUNE	PM10_IDLEX	PM10_STRE	PM10_TOTE	PM10_PMT	PM10_PMB	PM10_TOTA	CO2_RUNEX	CO2_IDLEX	CO2_STREX	CO2_TOTEX	CH4_RUNEX	CH4_IDLEX	CH4_STREX	CH4_TOTEX	N2O_RUNEX
5.798E-07	4.235E-06	5.628E-06	7.289E-07	0	1.557E-07	8.846E-07	2.319E-06	1.21E-05	1.53E-05	0.2791207	0	0.0041911	0.2833117	4.86E-05	0	1.369E-08	4.862E-05	2.689E-05
0.0095165	0.0303718	0.0697932	0.0309339	0.0003232	0	0.0312571	0.0380661	0.0867765	0.1560997	1820.4969	113.56928	0	1934.0662	0.0015826	0.0021216	0	0.0037042	0.28682
0.000473	0.0025016	0.0030908	0.0001085	1.771E-05	0	0.0001263	0.0018921	0.0071475	0.0091659	75.123548	7.5145282	0	82.638076	0.1413081	0.0263175	0	0.1676256	0.0153144
0.0493268	0.065505	0.1522823	0.0337954	0	0.0069349	0.0407303	0.1973071	0.1871571	0.4251945	7081.7798	0	226.79203	7308.5718	0.0721315	0	0.2513186	0.3234502	0.1330301
0.0001343	0.0001807	0.0016566	0.0014023	0	0	0.0014023	0.0005373	0.0005162	0.0024558	15.868953	0	0	15.868953	0.0001014	0	0	0.0001014	0.0025002
0.0045381	0.0034736	0.0080117	0	0	0	0	0.0181525	0.0099245	0.0280769	0	0	0	0	0	0	0	0	0
0.0013819	0.0009451	0.0029972	0.0005398	0	0.000189	0.0007288	0.0055277	0.0027004	0.0089569	100.34391	0	5.7884048	106.13232	0.0002604	0	0.0120553	0.0123157	0.0002854
0.0039224	0.0063469	0.0149476	0.0042042	0	0.0008834	0.0050877	0.0156895	0.018134	0.0389111	663.12318	0	24.410673	687.53385	0.0152942	0	0.0324767	0.0477709	0.0219232
9.801E-07	1.828E-06	0.000121	0.0001235	0	0	0.0001235	3.921E-06	5.224E-06	0.0001327	0.2037004	0	0	0.2037004	6.853E-06	0	0	6.853E-06	3.209E-05
1.404E-05	1.081E-05	2.485E-05	0	0	0	0	5.615E-05	3.09E-05	8.705E-05	0	0	0	0	0	0	0	0	0
2.555E-06	1.758E-06	5.042E-06	5.833E-07	0	2.097E-07	7.93E-07	1.022E-05	5.022E-06	1.604E-05	0.1706417	0	0.0108123	0.181454	4.418E-07	0	2.078E-05	2.122E-05	4.829E-07
0.0218516	0.0341334	0.0731874	0.0155385	0	0.0031704	0.0187089	0.0874065	0.097524	0.2036394	3910.1925	0	130.62336	4040.8159	0.0373459	0	0.1316204	0.1689663	0.0755945
7.842E-05	0.0001211	0.0004198	0.0002302	0	0	0.0002302	0.0003137	0.000346	0.0008899	12.54006	0	0	12.54006	2.595E-05	0	0	2.595E-05	0.0019757
5.224E-05	3.98E-05	9.204E-05	0	0	0	0	0.0002089	0.0001137	0.0003227	0	0	0	0	0	0	0	0	0
0.0001275	8.744E-05	0.0002638	3.914E-05	0	1.406E-05	5.32E-05	0.0005099	0.0002498	0.000813	8.8277956	0	0.602106	9.4299016	2.286E-05	0	0.0010738	0.0010967	2.499E-05
0.0015277	0.020853	0.0237642	0.0013842	0	0.0001206	0.0015047	0.0061108	0.05958	0.0671955	695.59136	2.5467808	8.0734562	706.21159	0.0081597	0.0024847	0.0112423	0.0218867	0.0095566
0.0012068	0.0109822	0.0294533	0.0177487	0.0002963	0	0.0180449	0.0048273	0.0313778	0.05425	257.51943	1.4067784	0	258.92621	0.0037673	5.32E-05	0	0.0038205	0.0405723
0.0001969	0.0031364	0.0034949	0.000163	0	1.275E-05	0.0001757	0.0007878	0.0089611	0.0099246	100.1489	0.3827625	1.054539	101.58621	0.0008183	0.0003275	0.0014359	0.0025818	0.0011874
0.0005545	0.0058867	0.0133721	0.0071108	0.0001334	0	0.0072442	0.0022179	0.0168192	0.0262814	142.95599	1.0130203	0	143.96901	0.0015378	2.403E-05	0	0.0015618	0.0225228
0.0001796	0.0007543	0.0014725	0.000348	0	0.0002256	0.0005736	0.0007184	0.0021551	0.0034471	34.438073	0	3.2885709	37.726644	0.0327048	0	0.0121857	0.0448905	0.0076024
0.0115004	0.0183602	0.039396	0.0084834	0	0.001886	0.0103694	0.0460018	0.0524576	0.1088288	2496.914	0	86.280554	2583.1945	0.0288535	0	0.0917946	0.1206481	0.0545154
0.0001911	0.0003012	0.0010133	0.0005446	0	0	0.0005446	0.0007643	0.0008607	0.0021696	39.856516	0	0	39.856516	5.283E-05	0	0	5.283E-05	0.0062794
4.898E-05	3.729E-05	8.627E-05	0	0	0	0	0.0001959	0.0001066	0.0003025	0	0	0	0	0	0	0	0	0
7.435E-05	5.091E-05	0.0001622	2.923E-05	0	1.094E-05	4.017E-05	0.0002974	0.0001455	0.000483	5.3123739	0	0.4627999	5.7751738	1.368E-05	0	0.000671	0.0006847	1.486E-05
7.641E-05	0.0004013	0.0005267	5.309E-05	0	1.461E-07	5.324E-05	0.0003056	0.0011466	0.0015054	49.646262	0	0.0093627	49.655625	0.0005519	0	1.121E-05	0.0005631	0.0007887
4.037E-05	0.0001582	0.0012547	0.0011039	0	0	0.0011039	0.0001615	0.000452	0.0017174	10.908222	0	0	10.908222	5.919E-05	0	0	5.919E-05	0.0017186
0.0002291	0.0012033	0.0015605	0.000119	0	2.03E-05	0.0001393	0.0009165	0.0034381	0.0044938	138.94929	0.8530219	1.5171131	141.31943	0.001709	0.0003931	0.0016073	0.0037093	0.002365
0.0014155	0.0075216	0.0189953	0.01001	0.000503	0	0.010513	0.005662	0.0214903	0.0376653	546.49468	26.104679	0	572.59936	0.0011448	0.0001506	0	0.0012954	0.0861005
1.294E-05	6.908E-05	8.798E-05	4.829E-06	1.643E-06	0	6.472E-06	5.178E-05	0.0001974	0.0002556	4.3247209	0.4852229	0	4.8099438	0.0031319	0.0016685	0	0.0048005	0.0008816
7.161E-05	0.0003742	0.0004692	2.241E-05	0	2.965E-06	2.537E-05	0.0002864	0.0010693	0.0013811	43.068868	0.199452	0.3338047	43.602125	0.0004097	0.000101	0.0003817	0.0008924	0.0006676
0.0002028	0.0012224	0.002902	0.0015344	9.193E-06	0	0.0015436	0.0008113	0.0034926	0.0058475	87.08415	1.5043979	0	88.588548	0.0001654	1.966E-05	0	0.000185	0.0137201
1.298E-06	6.984E-06	8.615E-06	3.395E-07	2.34E-08	0	3.629E-07	5.19E-06	1.995E-05	2.551E-05	0.4476617	0.0079893	0	0.4556511	0.0003248	3.109E-05	0	0.0003559	9.126E-05
1.755E-05	0.0001379	0.0001634	8.14E-06	0	4.234E-07	8.563E-06	7.019E-05	0.0003941	0.0004728	7.1948993	0.4626456	0.0418346	7.6993795	0.0001091	0.0004348	5.29E-05	0.0005967	0.0002455
5.097E-05	0.0002671	0.0007105	0.0003927	1.747E-05	0	0.0004101	0.0002039	0.0007632	0.0013772	19.588863	1.640509	0	21.229372	4.815E-05	5.975E-06	0	5.413E-05	0.0030862
1.913E-06	1.002E-05	1.436E-05	2.342E-06	2.916E-07	0	2.634E-06	7.65E-06	2.864E-05	3.892E-05	0.8172571	0.1008818	0	0.9181389	0.0022631	0.0003877	0	0.0026508	0.0001666
1.055E-05	0.000168	0.0001833	5.157E-06	0	1.951E-08	5.176E-06	4.219E-05	0.0004799	0.0005273	5.1397058	0	0.0076666	5.1473724	1.184E-05	0	1.069E-05	2.252E-05	2.213E-05
0.0004457	0.0020675	0.0028903	0.0003942	0	0	0.0003942	0.0017829	0.005907	0.0080841	59.110237	0	0	59.110237	0.0001726	0	0	0.0001726	0.0093128
1.974E-06	4.223E-06	6.197E-06	0	0	0	0	7.897E-06	1.206E-05	1.996E-05	0	0	0	0	0	0	0	0	0
4.314E-05	0.000203	0.0002476	1.556E-06	0	0	1.556E-06	0.0001726	0.0005801	0.0007542	6.8501115	0	0	6.8501115	0.0223869	0	0	0.0223869	0.0013964

N2O_IDLEX	N2O_STREX	N2O_TOTEX	ROG_RUNEX	ROG_IDLEX	ROG_STREX	ROG_TOTEX	ROG_DIURN	ROG_HOTSC	ROG_RUNLC	ROG_TOTAL	TOG_RUNEX	TOG_IDLEX	TOG_STREX	TOG_TOTEX	TOG_DIURN	TOG_HOTSC	TOG_RUNLC	TOG_TOTAL
0	3.265E-06	3.015E-05	0.0003048	0	7.437E-08	0.0003048	4.626E-05	1.376E-05	0.000124	0.0004888	0.0004447	0	8.143E-08	0.0004448	4.626E-05	1.376E-05	0.000124	0.0006288
0.0178929	0	0.3047129	0.0340733	0.0456767	0	0.0797499	0	0	0	0.0797499	0.0387898	0.0519994	0	0.0907892	0	0	0	0.0907892
0.0015319	0	0.0168463	0.0032868	0.0004101	0	0.0036969	0	0	0	0.0036969	0.1456597	0.0268978	0	0.1725575	0	0	0	0.1725575
0	0.1085206	0.2415507	0.2874295	0	1.1805851	1.4680145	1.0189699	0.3039284	0.7724181	3.563331	0.4192902	0	1.2925878	1.711878	1.0189699	0.3039284	0.7724181	3.8071945
0	0	0.0025002	0.0021837	0	0	0.0021837	0	0	0	0.0021837	0.002486	0	0	0.002486	0	0	0	0.002486
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0.0043153	0.0046007	0.0010213	0	0.0607806	0.0618018	0.0070072	0.0025462	0.0022506	0.0736058	0.0014902	0	0.0665471	0.0680373	0.0070072	0.0025462	0.0022506	0.0798412
0	0.0110787	0.0330019	0.0689755	0	0.1704096	0.2393851	0.1776878	0.0492259	0.1438867	0.6101855	0.1005774	0	0.1865761	0.2871535	0.1776878	0.0492259	0.1438867	0.6579539
0	0	3.209E-05	0.0001475	0	0	0.0001475	0	0	0	0.0001475	0.000168	0	0	0.000168	0	0	0	0.000168
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	7.423E-06	7.906E-06	1.737E-06	0	0.000105	0.0001067	8.059E-06	2.783E-06	2.566E-06	0.0001201	2.534E-06	0	0.0001149	0.0001175	8.059E-06	2.783E-06	2.566E-06	0.0001309
0	0.0570185	0.132613	0.1507831	0	0.6235827	0.7743659	0.4368605	0.1249344	0.3278251	1.6639859	0.2199775	0	0.682744	0.9027215	0.4368605	0.1249344	0.3278251	1.7923416
0	0	0.0019757	0.0005587	0	0	0.0005587	0	0	0	0.0005587	0.0006361	0	0	0.0006361	0	0	0	0.0006361
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0.0003836	0.0004086	8.985E-05	0	0.005423	0.0055128	0.0004619	0.0001539	0.0001458	0.0062745	0.0001311	0	0.0059375	0.0060686	0.0004619	0.0001539	0.0001458	0.0068303
6.401E-05	0.0164311	0.0260518	0.0411647	0.0092666	0.0565102	0.1069415	0.0630245	0.0165885	0.0897952	0.2763497	0.0600674	0.0135219	0.0618715	0.1354608	0.0630245	0.0165885	0.0897952	0.304869
0.0002216	0	0.0407939	0.0811067	0.0011454	0	0.0822521	0	0	0	0.0822521	0.0923346	0.001304	0	0.0936386	0	0	0	0.0936386
8.451E-06	0.0021261	0.003322	0.0038767	0.001213	0.0071535	0.0122432	0.0075806	0.0020187	0.0107144	0.0325569	0.0056569	0.00177	0.0078322	0.0152591	0.0075806	0.0020187	0.0107144	0.0355728
0.0001596	0	0.0226824	0.0331077	0.0005174	0	0.0336251	0	0	0	0.0336251	0.0376909	0.000589	0	0.0382799	0	0	0	0.0382799
0	0.0005855	0.0081878	0.2180205	0	0.0909481	0.3089686	0.1210659	0.2166017	0.2271719	0.873808	0.260713	0	0.0988642	0.3595772	0.1210659	0.2166017	0.2271719	0.9244166
0	0.0349117	0.0894271	0.1252452	0	0.4726346	0.5978797	0.2928004	0.0816558	0.2258933	1.1982292	0.1824704	0	0.5174707	0.6999411	0.2928004	0.0816558	0.2258933	1.3002905
0	0	0.0062794	0.0011374	0	0	0.0011374	0	0	0	0.0011374	0.0012949	0	0	0.0012949	0	0	0	0.0012949
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0.0002382	0.000253	5.407E-05	0	0.0034083	0.0034624	0.0003324	0.0001095	0.0001071	0.0040113	7.889E-05	0	0.0037317	0.0038106	0.0003324	0.0001095	0.0001071	0.0043595
0	1.196E-05	0.0008007	0.0025732	0	4.912E-05	0.0026223	0.0145198	0.0040667	9.397E-05	0.0213029	0.0037548	0	5.378E-05	0.0038086	0.0145198	0.0040667	9.397E-05	0.0224891
0	0	0.0017186	0.0012744	0	0	0.0012744	0	0	0	0.0012744	0.0014508	0	0	0.0014508	0	0	0	0.0014508
1.07E-05	0.0010097	0.0033855	0.0086994	0.0015825	0.0092386	0.0195205	0.0052321	0.0012928	0.0105774	0.0366228	0.0126941	0.0023092	0.0101152	0.0251185	0.0052321	0.0012928	0.0105774	0.0422207
0.0041128	0	0.0902133	0.024648	0.0032422	0	0.0278902	0	0	0	0.0278902	0.0280598	0.003691	0	0.0317508	0	0	0	0.0317508
9.892E-05	0	0.0009805	4.475E-05	2.384E-05	0	6.859E-05	0	0	0	6.859E-05	0.0031964	0.0017029	0	0.0048992	0	0	0	0.0048992
2.71E-06	0.0003192	0.0009895	0.0020253	0.0003867	0.0020247	0.0044366	0.0013286	0.0003497	0.0014838	0.0075988	0.0029553	0.0005642	0.0022168	0.0057363	0.0013286	0.0003497	0.0014838	0.0088985
0.000237	0	0.0139572	0.00356	0.0004233	0	0.0039833	0	0	0	0.0039833	0.0040528	0.0004819	0	0.0045347	0	0	0	0.0045347
1.629E-06	0	9.289E-05	4.64E-06	4.442E-07	0	5.085E-06	0	0	0	5.085E-06	0.0003315	3.173E-05	0	0.0003632	0	0	0	0.0003632
1.525E-05	4.5E-05	0.0003058	0.0005305	0.0018792	0.0003017	0.0027114	0.0002672	7.672E-05	0.0001742	0.0032295	0.0007741	0.0027421	0.0003304	0.0038466	0.0002672	7.672E-05	0.0001742	0.0043646
0.0002585	0	0.0033447	0.0010367	0.0001286	0	0.0011654	0	0	0	0.0011654	0.0011802	0.0001464	0	0.0013267	0	0	0	0.0013267
2.057E-05	0	0.0001872	3.234E-05	5.539E-06	0	3.787E-05	0	0	0	3.787E-05	0.0023097	0.0003956	0	0.0027053	0	0	0	0.0027053
0	1.677E-05	3.891E-05	3.347E-05	0	3.914E-05	7.261E-05	3.975E-05	1.31E-05	2.541E-05	0.0001509	4.885E-05	0	4.285E-05	9.17E-05	3.975E-05	1.31E-05	2.541E-05	0.00017
0	0	0.0093128	0.0037165	0	0	0.0037165	0	0	0	0.0037165	0.0042309	0	0	0.0042309	0	0	0	0.0042309
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0.0013964	0.0003199	0	0	0.0003199	0	0	0	0.0003199	0.0228474	0	0	0.0228474	0	0	0	0.0228474

CO_RUNEX	CO_IDLEX	CO_STREX	CO_TOTEX	SOx_RUNEX	SOx_IDLEX	SOx_STREX	SOx_TOTEX	NH3_RUNEX	Fuel Consumption
0.0109894	0	6.011E-05	0.0110495	2.759E-06	0	4.143E-08	2.801E-06	4.604E-06	0.0298749
0.1359039	0.6312771	0	0.767181	0.017239	0.0010754	0	0.0183145	0.2210214	172.76937
0.7637066	0.0538126	0	0.8175192	0	0	0	0	0.0447654	9.5517012
20.892496	0	11.338641	32.231137	0.0700106	0	0.0022421	0.0722527	0.8096317	770.67977
0.023704	0	0	0.023704	0.0001504	0	0	0.0001504	0.0002082	1.4175673
0	0	0	0	0	0	0	0	0	0
0.1548329	0	0.4492321	0.604065	0.000992	0	5.722E-05	0.0010492	0.0137074	11.19152
3.3324563	0	1.6528703	4.9853266	0.0065556	0	0.0002413	0.006797	0.0696263	72.499586
0.0007886	0	0	0.0007886	1.93E-06	0	0	1.93E-06	1.519E-06	0.0181965
0	0	0	0	0	0	0	0	0	0
0.0002633	0	0.0007758	0.0010391	1.687E-06	0	1.069E-07	1.794E-06	2.571E-05	0.0191341
10.498461	0	5.8566022	16.355063	0.0386562	0	0.0012913	0.0399476	0.3788349	426.09898
0.0051991	0	0	0.0051991	0.0001188	0	0	0.0001188	0.0001215	1.1201986
0	0	0	0	0	0	0	0	0	0
0.0136215	0	0.0400815	0.053703	8.727E-05	0	5.952E-06	9.322E-05	0.0013258	0.9943713
0.9995877	0.0786478	0.9409396	2.0191751	0.0068766	2.518E-05	7.981E-05	0.0069816	0.0342589	74.46913
0.2310973	0.0094936	0	0.2405909	0.0024401	1.333E-05	0	0.0024535	0.0630257	23.129776
0.103692	0.0102628	0.1255766	0.2395313	0.0009901	3.784E-06	1.043E-05	0.0010043	0.0044268	10.712138
0.0879931	0.0042882	0	0.0922813	0.0013546	9.599E-06	0	0.0013642	0.0319196	12.860695
2.7287212	0	0.475804	3.2045253	0.0003405	0	3.251E-05	0.000373	0.0015634	3.9782274
6.752752	0	3.5900598	10.342812	0.0246845	0	0.000853	0.0255375	0.1990566	272.39463
0.0194359	0	0	0.0194359	0.0003777	0	0	0.0003777	0.0002962	3.5603668
0	0	0	0	0	0	0	0	0	0
0.0081971	0	0.0251909	0.033388	5.252E-05	0	4.575E-06	5.709E-05	0.0008003	0.6089849
0.0689154	0	0.001102	0.0700174	0.0004908	0	9.256E-08	0.0004909	0.0011355	5.2361236
0.004284	0	0	0.004284	0.0001034	0	0	0.0001034	0.0014518	0.9744271
0.1843897	0.023655	0.2050533	0.4130981	0.0013737	8.433E-06	1.5E-05	0.0013971	0.0034314	14.901957
0.079701	0.0817413	0	0.1614423	0.005175	0.0002472	0	0.0054222	0.0927304	51.150074
0.0129074	0.002842	0	0.0157494	0	0	0	0	0.0045736	0.5559561
0.0457805	0.0029932	0.042787	0.0915607	0.0004258	1.972E-06	3.3E-06	0.0004311	0.0010719	4.5977896
0.0119505	0.0067748	0	0.0187253	0.0008246	1.425E-05	0	0.0008389	0.0141616	7.9135799
0.0013622	3.88E-05	0	0.001401	0	0	0	0	0.0004585	0.0526663
0.01359	0.0145271	0.0075786	0.0356957	7.113E-05	4.574E-06	4.136E-07	7.612E-05	0.0003948	0.81189
0.0031535	0.0032779	0	0.0064315	0.0001855	1.553E-05	0	0.000201	0.0023828	1.8964114
0.0077662	0.0004835	0	0.0082497	0	0	0	0	0.0006758	0.1061229
0.0030068	0	0.0010986	0.0041054	5.081E-05	0	7.579E-08	5.089E-05	0.0002373	0.542784
0.0042621	0	0	0.0042621	0.0005601	0	0	0.0005601	0.0100836	5.2802941
0	0	0	0	0	0	0	0	0	0
0.2585785	0	0	0.2585785	0	0	0	0	0.005115	0.7917684

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Attachment 2
AERMOD Output Files

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Attachment 2: AERMOD Output Files is comprised of 3,100 pages. It is on file with the City of Santa Clara and available in electronic format upon request.

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Attachment 3

AERMOD $PM_{2.5}$ Exhaust Emissions Dispersion Figures

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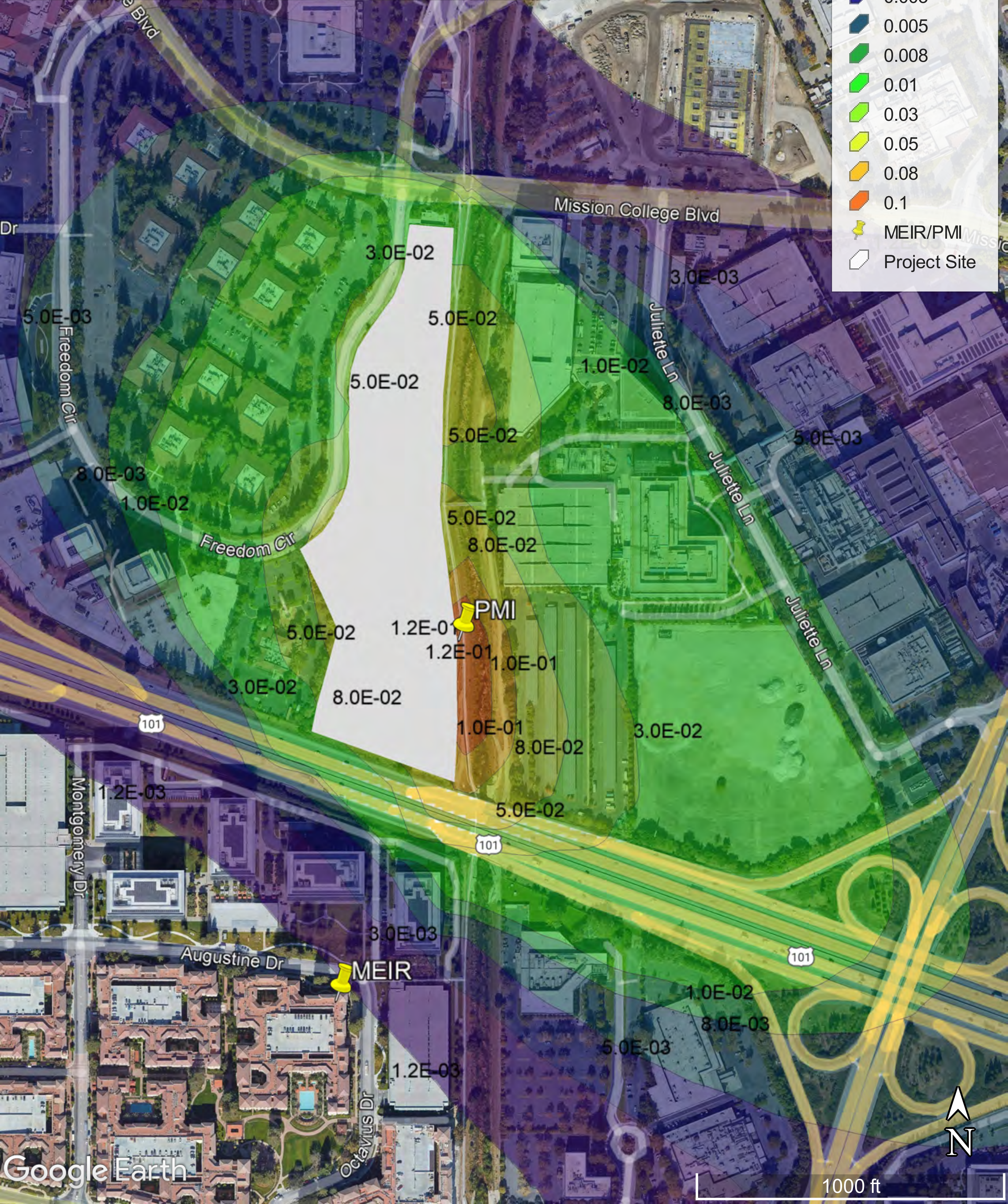
Greystar General Plan Amendment
Figure 1: Construction HRA Year 1 San Jose International Airport
Legend
0.00058
0.0009
0.001
0.003
0.005
0.009
0.01
0.03
0.05
MEIR/PMI
Project Site
Agnew Rd
Mission College Blvd
Freedom Cir
Freedom Cir
Freedom Cir
Juliette Ln
Juliette Ln
Montgomery Dr
Augustine Dr
101
101
101
101
9.0E-04
5.8E-04
1.0E-02
3.0E-03
9.0E-03
5.0E-03
3.0E-02
5.0E-02
5.0E-02
5.0E-02
5.0E-03
9.0E-03
3.0E-02
3.0E-03
5.0E-02
5.0E-02
PMI
1.0E-02
5.8E-02
5.0E-02
9.0E-04
1.0E-02
3.0E-02
5.8E-04
1.0E-03
9.0E-03
MEIR
5.0E-03
3.0E-03
9.0E-04
5.8E-04
N
Google Earth
1000 ft

Greystar General Plan Amendment

Figure 2: Construction HRA Year 2 San Jose International Airport



Greystar General Plan Amendment

Figure 3: Construction HRA Year 3 San Jose International Airport

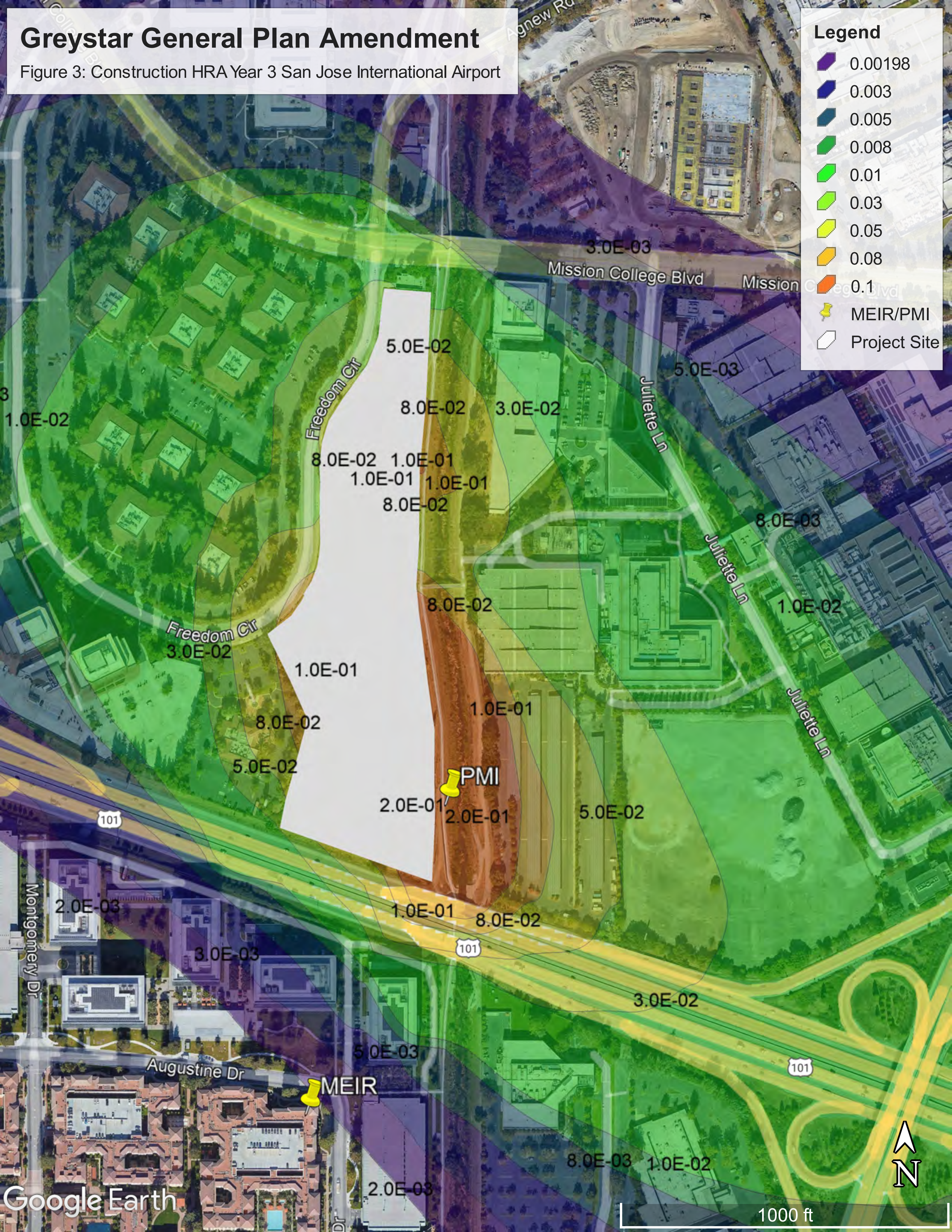


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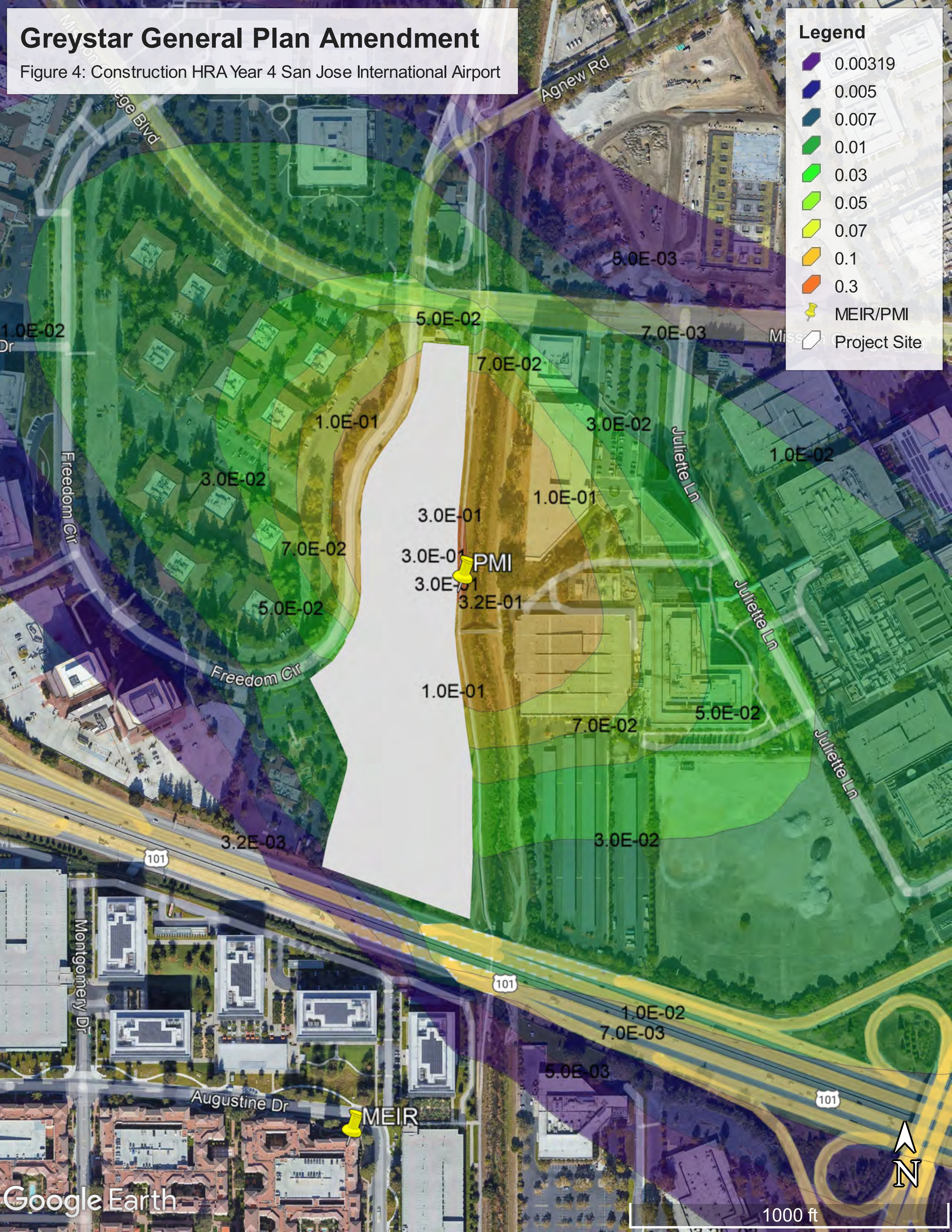
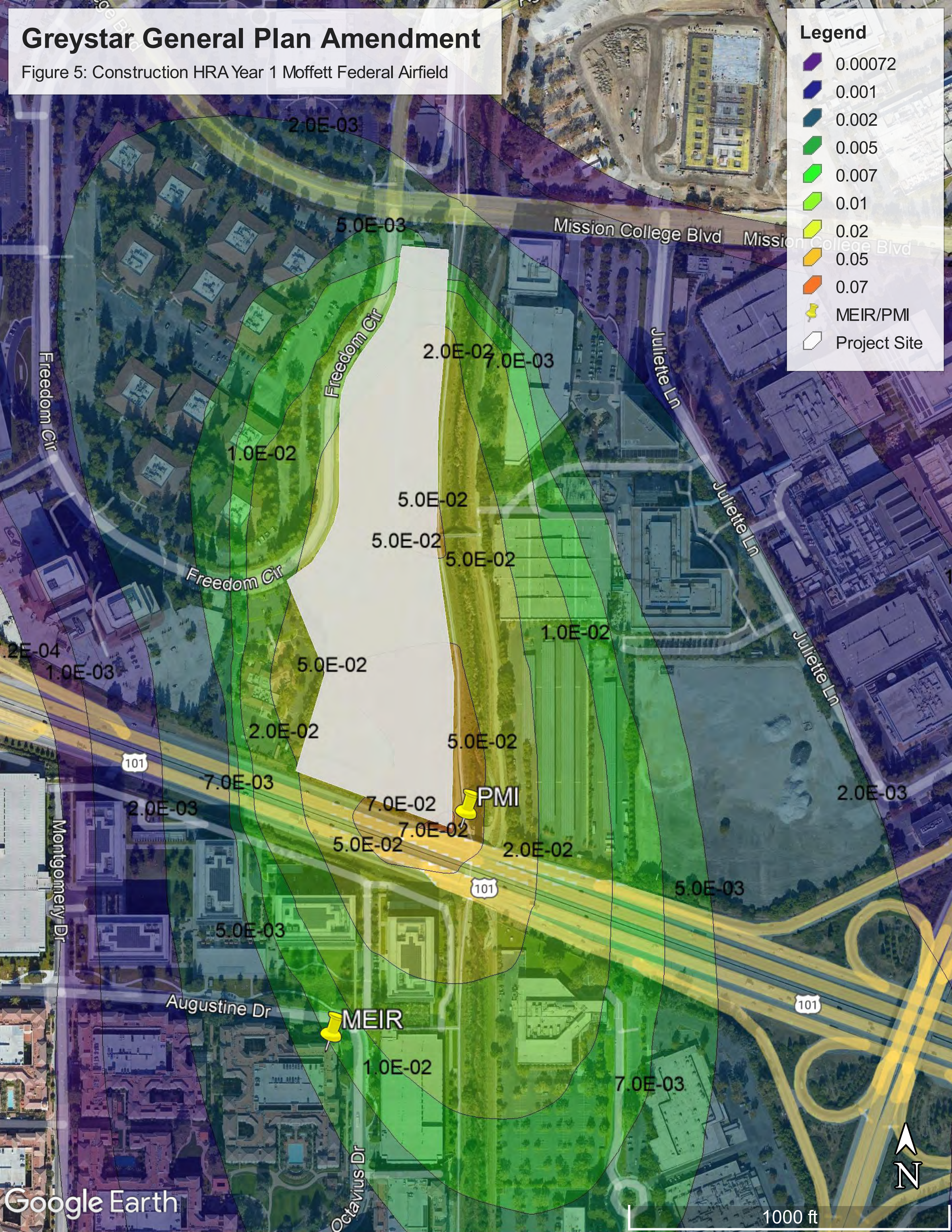
Figure 4: Construction HRA Year 4 San Jose International Airport



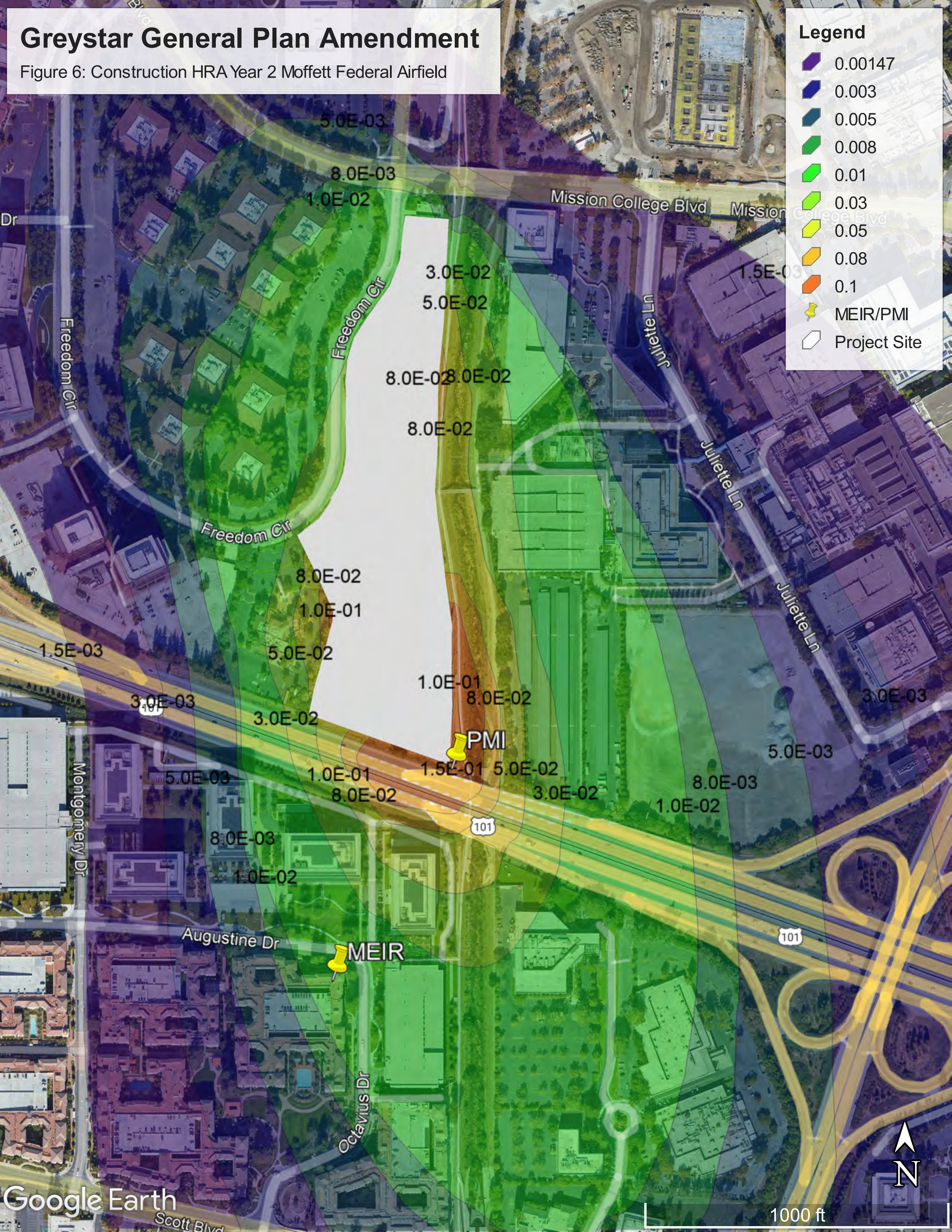
Greystar General Plan Amendment

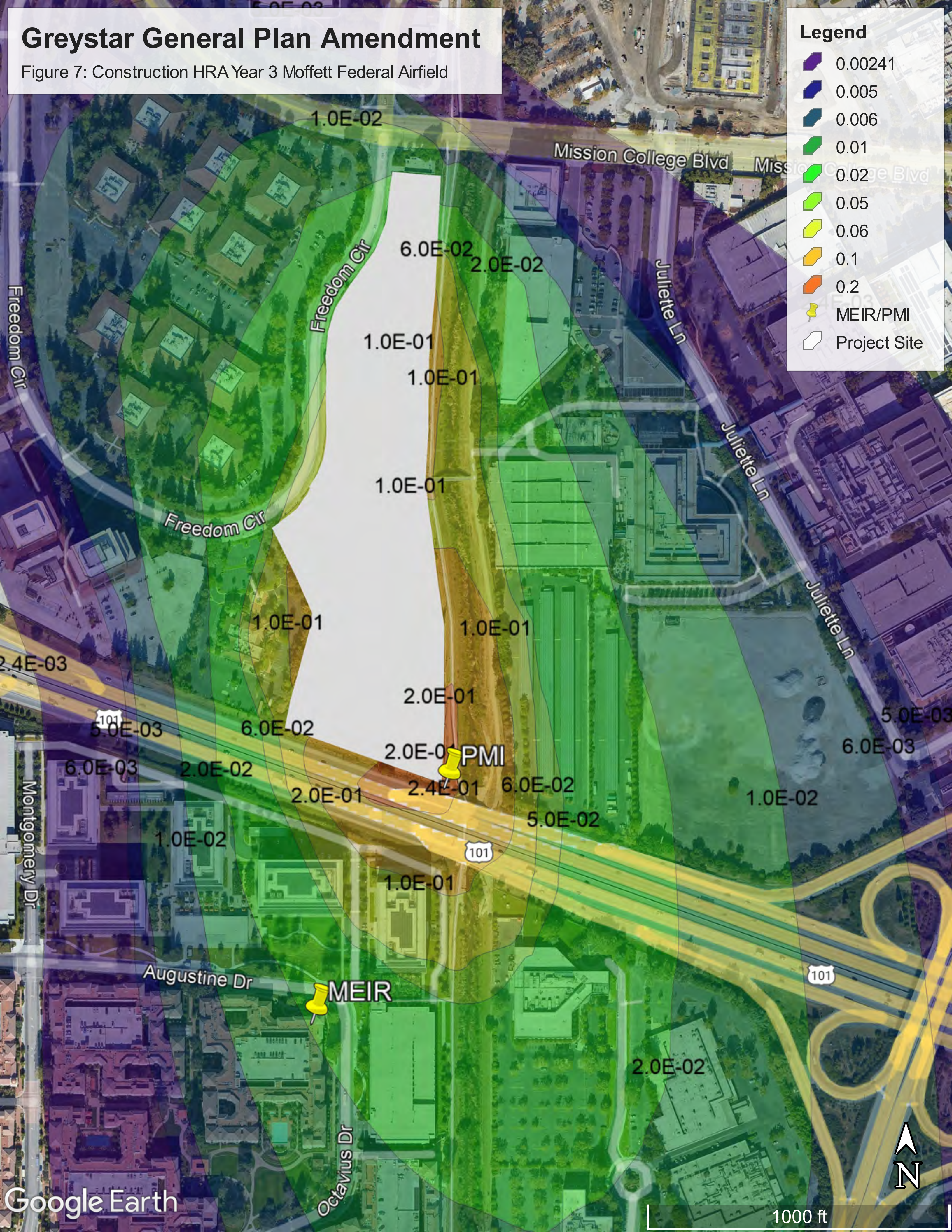
Figure 5: Construction HRA Year 1 Moffett Federal Airfield



Greystar General Plan Amendment

Figure 6: Construction HRA Year 2 Moffett Federal Airfield





Greystar General Plan Amendment

Figure 7: Construction HRA Year 3 Moffett Federal Airfield

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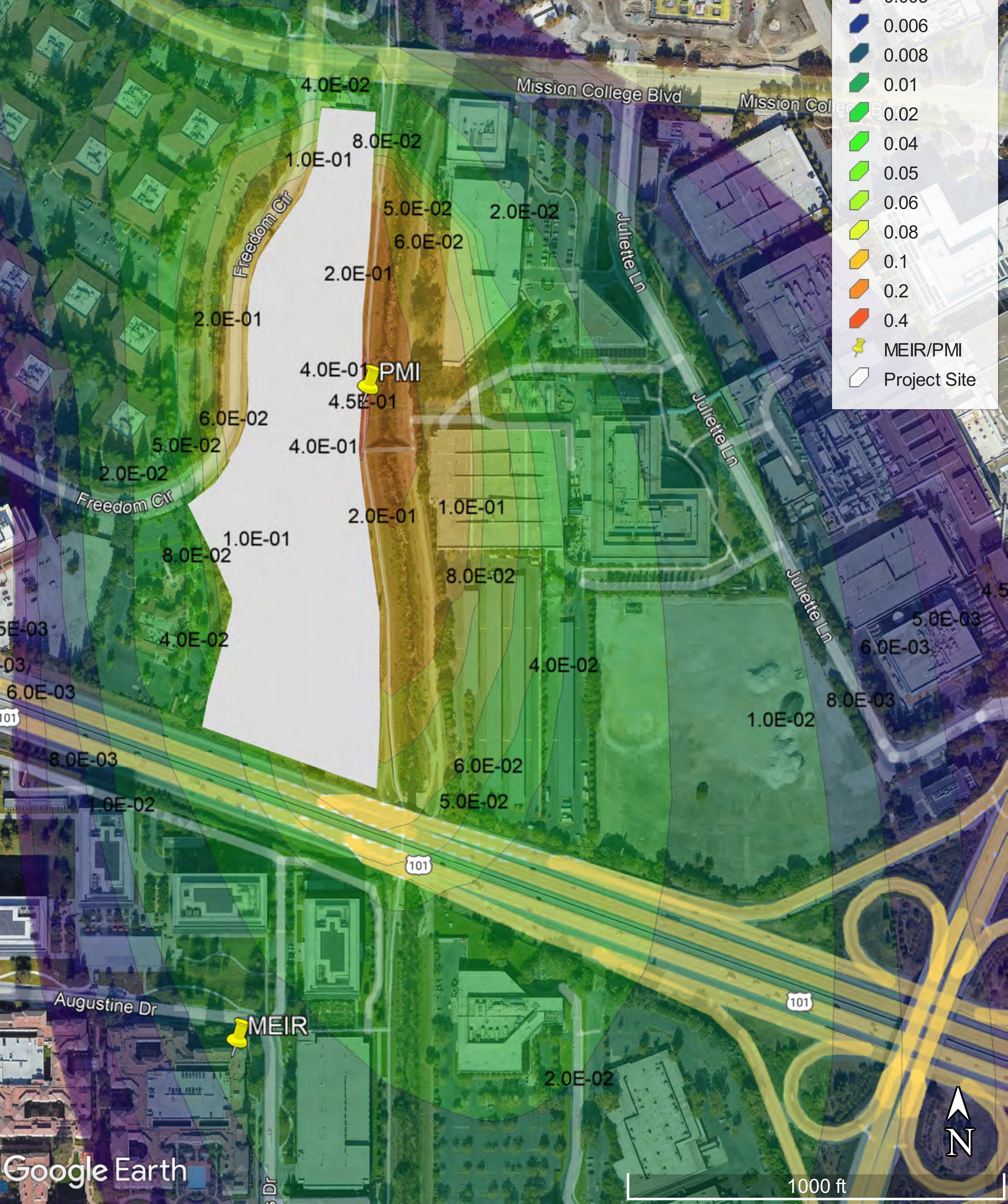
Figure 8: Construction HRA Year 4 Moffett Federal Airfield



Attachment 4

Health Risk Assessment Calculations

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Attachment 4: Construction Health Risk Assessment Calculations (DPM)
Greystar General Plan Amendment HRA
Residential Health Risk Calculations - Moffett Federal Airfield Met Data

METHODOLOGY

Dose (Air) = Cair x DBR x A x EF x CF

Where:
- Cair Chemical concentration in air (µg/m^3)
- DBR: Daily breathing rate (L/kg-day)
- A: Inhalation adsorption factor (unitless)
- EF: Exposure Frequency, days at home / days in year (unitless)
- CF: 10^{-6} Conversion Factor (m^3/L and mg/µg)

Cancer Risk (per million) = Dose (Air) x CPF x ASF x (ED/AT) x FAH x 1,000,000

Where:
- Dose: Dose of chemical in the air (µg/m3)
- CPF: Cancer Potency Factor $(mg/kg\text{-}day)^{-1}$
- ASF: Age Sensitivity Factor
- ED: Exposure Duration (years)
- AT: Averaging Time for lifetime cancer risks
- FAH: Fraction of daily time spent at home / school

Risk Parameter Values by Age Bin

Variable	Residential Age Bin				
	3rd Trimester	0-2 Years	2-16 Years	16-30 Years	16-70 Years
DBR	361	1090	572	261	233
A	1	1	1	1	1
EF	0.96	0.96	0.96	0.96	0.96
CF	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06
CPF	1.1	1.1	1.1	1.1	1.1
ASF	10	10	3	1	1
ED	0.25	2	14	14	54
AT	70	70	70	70	70
FAH	1	1	1	0.73	0.73

Scenario 1 (EIR; Tier III and IV): AERMOD Modeled DPM Concentrations (PMI/MEIR)

	PMI			MEIR		
	Conc.	X	Y	Conc.	X	Y
Year 1	0.0625	591291.00	4137942.00	0.0065	591165.00	4137730.00
Year 2	0.1371	591216.00	4137942.00	0.0130	591165.00	4137730.00
Year 3	0.22471	591216.00	4137942.00	0.0208	591165.00	4137730.00
Year 4	0.25458	591291.00	4138242.00	0.0115	591165.00	4137730.00

Scenario 1: Risk Assessment Year 1 MEIR

Scenario	AERMOD DPM Conc.	Chronic Hazard Quotient
Year 1	0.0065	0.00130
Year 2	0.0130	0.00259
Year 3	0.0208	0.00416
Year 4	0.0115	0.00230

Scenario 1: Year 1 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
3rd Trimester	0.00649	361	1	0.96	1.00E-06	=	2.25E-06
0-2 Years	0.00649	1090	1	0.96	1.00E-06	=	6.78E-06
2-16 Years	0.00649	572	1	0.96	1.00E-06	=	3.56E-06
16-30 Years	0.00649	261	1	0.96	1.00E-06	=	1.62E-06
30-70 Years	0.00649	233	1	0.96	1.00E-06	=	1.45E-06

Scenario 1: Year 1 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
3rd Trimester	2.25E-06	1.1	10	0.25	70	1	1,000,000	0.1
0-2 Years	6.78E-06	1.1	10	1.00	70	1	1,000,000	1.1
2-16 Years	3.56E-06	1.1	3	1.00	70	1	1,000,000	0.2
16-30 Years	1.62E-06	1.1	1	1.00	70	0.73	1,000,000	0.0
30-70 Years	1.45E-06	1.1	1	1.00	70	0.73	1,000,000	0.0

Scenario 1: Year 2 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
3rd Trimester	0.01297	361	1	0.96	1.00E-06	=	4.49E-06
0-2 Years	0.01297	1090	1	0.96	1.00E-06	=	1.36E-05
2-16 Years	0.01297	572	1	0.96	1.00E-06	=	7.11E-06
16-30 Years	0.01297	261	1	0.96	1.00E-06	=	3.25E-06
30-70 Years	0.01297	233	1	0.96	1.00E-06	=	2.90E-06

Scenario 1: Year 2 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
3rd Trimester	4.49E-06	1.1	10	0.25	70	1	1,000,000	0.2
0-2 Years	1.36E-05	1.1	10	1.00	70	1	1,000,000	2.1
2-16 Years	7.11E-06	1.1	3	1.00	70	1	1,000,000	0.3
16-30 Years	3.25E-06	1.1	1	1.00	70	0.73	1,000,000	0.0
30-70 Years	2.90E-06	1.1	1	1.00	70	0.73	1,000,000	0.0

Scenario 1: Year 3 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
3rd Trimester	0.0208	361	1	0.96	1.00E-06	=	7.20E-06
0-2 Years	0.0208	1090	1	0.96	1.00E-06	=	2.17E-05
2-16 Years	0.0208	572	1	0.96	1.00E-06	=	1.14E-05
16-30 Years	0.0208	261	1	0.96	1.00E-06	=	5.21E-06
30-70 Years	0.0208	233	1	0.96	1.00E-06	=	4.65E-06

Scenario 1: Year 3 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
3rd Trimester	7.20E-06	1.1	10	0.25	70	1	1,000,000	0.3
0-2 Years	2.17E-05	1.1	10	1.00	70	1	1,000,000	3.4
2-16 Years	1.14E-05	1.1	3	1.00	70	1	1,000,000	0.5
16-30 Years	5.21E-06	1.1	1	1.00	70	0.73	1,000,000	0.1
30-70 Years	4.65E-06	1.1	1	1.00	70	0.73	1,000,000	0.1

Scenario 1: Year 4 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
3rd Trimester	0.01151	361	1	0.96	1.00E-06	=	3.98E-06
0-2 Years	0.01151	1090	1	0.96	1.00E-06	=	1.20E-05
2-16 Years	0.01151	572	1	0.96	1.00E-06	=	6.31E-06
16-30 Years	0.01151	261	1	0.96	1.00E-06	=	2.88E-06
30-70 Years	0.01151	233	1	0.96	1.00E-06	=	2.57E-06

Scenario 1: Year 4 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
3rd Trimester	3.98E-06	1.1	10	0.25	70	1	1,000,000	0.2
0-2 Years	1.20E-05	1.1	10	1.00	70	1	1,000,000	1.9
2-16 Years	6.31E-06	1.1	3	1.00	70	1	1,000,000	0.3
16-30 Years	2.88E-06	1.1	1	1.00	70	0.73	1,000,000	0.0
30-70 Years	2.57E-06	1.1	1	1.00	70	0.73	1,000,000	0.0

Scenario 1: Total Excess Risk at MEIR (Exposure Year 1 through 4)

	Risks Presented by Age at Time of Construction Initiation				
	Infant	Child (1-2)	Child 2<x<16	Adult 16<x<30	Adult 30<x<70
Year 1	1.2	1.1	0.2	0.0	0.0
Year 2	2.1	0.3	0.3	0.0	0.0
Year 3	0.5	0.5	0.5	0.1	0.1
Year 4	0.3	0.3	0.3	0.03	0.0
Total	4.1	2.2	1.3	0.1	0.1

Note: Infant exposure includes 3rd trimester (0.25 years) and child (1 year exposure) in Year 1

Scneario 1: Total Excess Risk at MEIR (Exposure Year 2 through 4)

	Risks Presented by Age at Time of Construction Initiation				
	Infant	Child (1-2)	Child 2<x<16	Adult 16<x<30	Adult 30<x<70
Year 2	2.3	2.1	0.3	0.0	0.0
Year 3	3.4	0.5	0.5	0.1	0.1
Year 4	0.3	0.3	0.3	0.03	0.0
Total	6.0	3.0	1.2	0.1	0.1

Note: Infant exposure includes 3rd trimester (0.25 years) and child (1 year exposure) in Year 2

Scneario 1: Total Excess Risk at MEIR (Exposure Year 3 and 4)

	Risks Presented by Age at Time of Construction Initiation				
	Infant	Child (1-2)	Child 2<x<16	Adult 16<x<30	Adult 30<x<70
Year 3	3.7	3.4	0.5	0.1	0.1
Year 4	1.9	0.3	0.3	0.03	0.0
Total	5.6	3.7	0.8	0.1	0.1

Note: Infant exposure includes 3rd trimester (0.25 years) and child (1 year exposure) in Year 3

Scaling Factors for Scenario 2 Risks

	Scaling Factors
Year 1	2.83
Year 2	1.01
Year 3	0.74
Year 4	0.57

Scenario 2: Risk Assessment MEIR

Scenario	AERMOD DPM Conc.	Chronic Hazard Quotient
Year 1	0.0184	0.0037
Year 2	0.0131	0.0026
Year 3	0.0153	0.0031
Year 4	0.0065	0.0013

Scenario 2: Total Excess Risk at MEIR (Exposure Year 1 through 4)

	Risks Presented by Age at Time of Construction Initiation				
	Infant	Child (1-2)	Child 2<x<16	Adult 16<x<30	Adult 30<x<70
Year 1	3.3	3.0	0.5	0.1	0.0
Year 2	2.2	0.3	0.3	0.0	0.0
Year 3	0.4	0.4	0.4	0.0	0.0
Year 4	0.2	0.2	0.2	0.0	0.0
Total	6.0	3.9	1.4	0.2	0.1

Note: Infant exposure includes 3rd trimester (0.25 years) and child (1 year exposure) in Year 1

Scenario 2: Total Excess Risk at MEIR (Exposure Year 2 through 4)

	Risks Presented by Age at Time of Construction Initiation				
	Infant	Child (1-2)	Child 2<x<16	Adult 16<x<30	Adult 30<x<70
Year 2	2.3	2.2	0.3	0.0	0.0
Year 3	2.5	0.4	0.4	0.0	0.0
Year 4	0.2	0.2	0.2	0.0	0.0
Total	5.0	2.7	0.9	0.1	0.1

Note: Infant exposure includes 3rd trimester (0.25 years) and child (1 year exposure) in Year 2

Scneario 2: Total Excess Risk at MEIR (Exposure Year 3 and 4)

	Risks Presented by Age at Time of Construction Initiation				
	Infant	Child (1-2)	Child 2<x<16	Adult 16<x<30	Adult 30<x<70
Year 3	2.7	2.5	0.4	0.0	0.0
Year 4	1.1	0.2	0.2	0.0	0.0
Total	3.8	2.7	0.6	0.1	0.1

Note: Infant exposure includes 3rd trimester (0.25 years) and child (1 year exposure) in Year 3

Attachment 4: Construction Health Risk Assessment Calculations (DPM)
Greystar General Plan Amendment HRA
Residential Health Risk Calculations - San Jose International Airport Met Data

METHODOLOGY

Dose (Air) = Cair x DBR x A x EF x CF

Where:
- Cair: Chemical concentration in air (µg/m^3)
- DBR: Daily breathing rate (L/kg-day)
- A: Inhalation adsorption factor (unitless)
- EF: Exposure Frequency, days at home / days in year (unitless)
- CF: 10^$^{-6}$ Conversion Factor (m^3/L and mg/µg)

Cancer Risk (per million) = Dose (Air) x CPF x ASF x (ED/AT) x FAH x 1,000,000

Where:
- Dose: Dose of chemical in the air (µg/m3)
- CPF: Cancer Potency Factor (mg/kg-day)$^{-1}$
- ASF: Age Sensitivity Factor
- ED: Exposure Duration (years)
- AT: Averaging Time for lifetime cancer risks
- FAH: Fraction of daily time spent at home / school

Risk Parameter Values by Age Bin

Variable	Residential Age Bin				
	3rd Trimester	**0-2 Years**	**2-16 Years**	**16-30 Years**	**16-70 Years**
DBR	361	1090	572	261	233
A	1	1	1	1	1
EF	0.96	0.96	0.96	0.96	0.96
CF	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06
CPF	1.1	1.1	1.1	1.1	1.1
ASF	10	10	3	1	1
ED	0.25	2	14	14	54
AT	70	70	70	70	70
FAH	1	1	1	0.73	0.73

Scenario 1 (EIR; Tier III and IV): AERMOD Modeled DPM Concentrations (PMI/MEIR)

	PMI			MEIR		
	Conc.	X	Y	Conc.	X	Y
Year 1	0.0583	591291.00	4138017.00	0.0005	591165.00	4137730.00
Year 2	0.1177	591291.00	4138092.00	0.0011	591165.00	4137730.00
Year 3	0.19844	591291.00	4138017.00	0.0017	591165.00	4137730.00
Year 4	0.25833	591291.00	4138317.00	0.0009	591165.00	4137730.00

Scenario 1: Risk Assessment Year 1 MEIR

Scenario	AERMOD DPM Conc.	Chronic Hazard Quotient
Year 1	0.0005	0.00011
Year 2	0.0011	0.00021
Year 3	0.0017	0.00034
Year 4	0.0009	0.00018

Scenario 1: Year 1 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
3rd Trimester	0.00053	361	1	0.96	1.00E-06	=	1.83E-07
0-2 Years	0.00053	1090	1	0.96	1.00E-06	=	5.54E-07
2-16 Years	0.00053	572	1	0.96	1.00E-06	=	2.91E-07
16-30 Years	0.00053	261	1	0.96	1.00E-06	=	1.33E-07
30-70 Years	0.00053	233	1	0.96	1.00E-06	=	1.18E-07

Scenario 1: Year 1 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
3rd Trimester	1.83E-07	1.1	10	0.25	70	1	1,000,000	0.0
0-2 Years	5.54E-07	1.1	10	1.00	70	1	1,000,000	0.1
2-16 Years	2.91E-07	1.1	3	1.00	70	1	1,000,000	0.0
16-30 Years	1.33E-07	1.1	1	1.00	70	0.73	1,000,000	0.0
30-70 Years	1.18E-07	1.1	1	1.00	70	0.73	1,000,000	0.0

Scenario 1: Year 2 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
3rd Trimester	0.00105	361	1	0.96	1.00E-06	=	3.63E-07
0-2 Years	0.00105	1090	1	0.96	1.00E-06	=	1.10E-06
2-16 Years	0.00105	572	1	0.96	1.00E-06	=	5.76E-07
16-30 Years	0.00105	261	1	0.96	1.00E-06	=	2.63E-07
30-70 Years	0.00105	233	1	0.96	1.00E-06	=	2.35E-07

Scenario 1: Year 2 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
3rd Trimester	3.63E-07	1.1	10	0.25	70	1	1,000,000	0.0
0-2 Years	1.10E-06	1.1	10	1.00	70	1	1,000,000	0.2
2-16 Years	5.76E-07	1.1	3	1.00	70	1	1,000,000	0.0
16-30 Years	2.63E-07	1.1	1	1.00	70	0.73	1,000,000	0.0
30-70 Years	2.35E-07	1.1	1	1.00	70	0.73	1,000,000	0.0

Scenario 1: Year 3 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
3rd Trimester	0.00168	361	1	0.96	1.00E-06	=	5.82E-07
0-2 Years	0.00168	1090	1	0.96	1.00E-06	=	1.76E-06
2-16 Years	0.00168	572	1	0.96	1.00E-06	=	9.21E-07
16-30 Years	0.00168	261	1	0.96	1.00E-06	=	4.20E-07
30-70 Years	0.00168	233	1	0.96	1.00E-06	=	3.75E-07

Scenario 1: Year 3 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
3rd Trimester	5.82E-07	1.1	10	0.25	70	1	1,000,000	0.0
0-2 Years	1.76E-06	1.1	10	1.00	70	1	1,000,000	0.3
2-16 Years	9.21E-07	1.1	3	1.00	70	1	1,000,000	0.0
16-30 Years	4.20E-07	1.1	1	1.00	70	0.73	1,000,000	0.0
30-70 Years	3.75E-07	1.1	1	1.00	70	0.73	1,000,000	0.0

Scenario 1: Year 4 Dose @ MEIR

Age Group	Cair x	BR	A	EF	CF		Dose
3rd Trimester	0.00092	361	1	0.96	1.00E-06	=	3.18E-07
0-2 Years	0.00092	1090	1	0.96	1.00E-06	=	9.62E-07
2-16 Years	0.00092	572	1	0.96	1.00E-06	=	5.05E-07
16-30 Years	0.00092	261	1	0.96	1.00E-06	=	2.30E-07
30-70 Years	0.00092	233	1	0.96	1.00E-06	=	2.06E-07

Scenario 1: Year 4 Excess Risk at MEIR

Age Group	Dose	CPF	ASF	ED	AT	FAH	Conversion	Risk
3rd Trimester	3.18E-07	1.1	10	0.25	70	1	1,000,000	0.0
0-2 Years	9.62E-07	1.1	10	1.00	70	1	1,000,000	0.2
2-16 Years	5.05E-07	1.1	3	1.00	70	1	1,000,000	0.0
16-30 Years	2.30E-07	1.1	1	1.00	70	0.73	1,000,000	0.0
30-70 Years	2.06E-07	1.1	1	1.00	70	0.73	1,000,000	0.0

Scenario 1: Total Excess Risk at MEIR (Exposure Year 1 through 4)

Risks Presented by Age at Time of Construction Initiation

	Infant	Child (1-2)	Child 2<x<16	Adult 16<x<3	Adult 30<x<70
Year 1	0.1	0.1	0.0	0.0	0.0
Year 2	0.2	0.0	0.0	0.0	0.0
Year 3	0.0	0.0	0.0	0.0	0.0
Year 4	0.0	0.0	0.0	0.00	0.0
Total	0.3	0.2	0.1	0.0	0.0

Note: Infant exposure includes 3rd trimester (0.25 years) and child (1 year exposure) in Year 1

Scneario 1: Total Excess Risk at MEIR (Exposure Year 2 through 4)

Risks Presented by Age at Time of Construction Initiation

	Infant	Child (1-2)	Child 2<x<16	Adult 16<x<3	Adult 30<x<70
Year 2	0.2	0.2	0.0	0.0	0.0
Year 3	0.3	0.0	0.0	0.0	0.0
Year 4	0.0	0.0	0.0	0.00	0.0
Total	0.5	0.2	0.1	0.0	0.0

Note: Infant exposure includes 3rd trimester (0.25 years) and child (1 year exposure) in Year 2

Scneario 1: Total Excess Risk at MEIR (Exposure Year 3 and 4)

Risks Presented by Age at Time of Construction Initiation

	Infant	Child (1-2)	Child 2<x<16	Adult 16<x<3	Adult 30<x<70
Year 3	0.3	0.3	0.0	0.0	0.0
Year 4	0.2	0.0	0.0	0.00	0.0
Total	0.4	0.3	0.1	0.0	0.0

Note: Infant exposure includes 3rd trimester (0.25 years) and child (1 year exposure) in Year 3

Scaling Factors for Scenario 2 Risks

	Scaling Factors
Year 1	2.83
Year 2	1.01
Year 3	0.74
Year 4	0.57

Scenario 2: Risk Assessment MEIR

Scenario	**AERMOD DPM Conc.**	**Chronic Hazard Quotient**
Year 1	0.0015	0.0003
Year 2	0.0011	0.0002
Year 3	0.0012	0.0002
Year 4	0.0005	0.0001

Scenario 2: Total Excess Risk at MEIR (Exposure Year 1 through 4)

	Risks Presented by Age at Time of Construction Initiation				
	Infant	Child (1-2)	Child 2<x<16	Adult 16<x<3	Adult 30<x<70
Year 1	0.3	0.2	0.0	0.0	0.0
Year 2	0.2	0.0	0.0	0.0	0.0
Year 3	0.0	0.0	0.0	0.0	0.0
Year 4	0.0	0.0	0.0	0.0	0.0
Total	0.5	0.3	0.1	0.0	0.0

Note: Infant exposure includes 3rd trimester (0.25 years) and child (1 year exposure) in Year 1

Scenario 2: Total Excess Risk at MEIR (Exposure Year 2 through 4)

	Risks Presented by Age at Time of Construction Initiation				
	Infant	Child (1-2)	Child 2<x<16	Adult 16<x<3	Adult 30<x<70
Year 2	0.2	0.2	0.0	0.0	0.0
Year 3	0.2	0.0	0.0	0.0	0.0
Year 4	0.0	0.0	0.0	0.0	0.0
Total	0.4	0.2	0.1	0.0	0.0

Note: Infant exposure includes 3rd trimester (0.25 years) and child (1 year exposure) in Year 2

Scneario 2: Total Excess Risk at MEIR (Exposure Year 3 and 4)

	Risks Presented by Age at Time of Construction Initiation				
	Infant	Child (1-2)	Child 2<x<16	Adult 16<x<3	Adult 30<x<70
Year 3	0.2	0.2	0.0	0.0	0.0
Year 4	0.1	0.0	0.0	0.0	0.0
Total	0.3	0.2	0.0	0.0	0.0

Note: Infant exposure includes 3rd trimester (0.25 years) and child (1 year exposure) in Year 3