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memorandum

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subject Updated Health Risk Assessment Memorandum for the Balboa Reservoir Project

Introduction

Environmental Science Associates (ESA) evaluated the health risks associated with construction and operation of the Balboa Reservoir Project on the 17.6-acre site in the West of Twin Peaks area of south central San Francisco known as the Balboa Reservoir (the “project”) for the draft Subsequent Environmental Impact Report (draft SEIR). This analysis was described in draft SEIR Appendix E, *Balboa Reservoir Project Air Quality Technical Memorandum*.

In February 2020, after the release of the draft SEIR, the City and County of San Francisco, in collaboration with the Bay Area Air Quality Management District (air district), updated the Community Risk Reduction Plan (CRRP) database of health impacts throughout the City. This database is now referred to as the draft 2020 Citywide Health Risk Assessment, or Citywide HRA. This action was initiated to update the APEZ map, as required by San Francisco Health Code article 38.¹

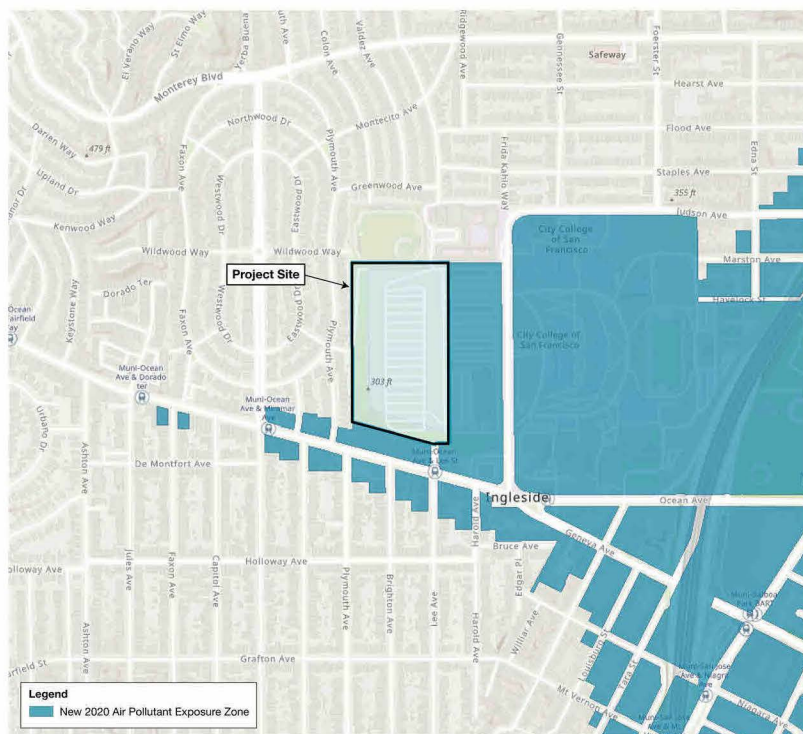
Using the new Citywide HRA database for the background health impacts in the City, the project remains outside of the Air Pollution Exposure Zone (APEZ); see **Figure 1, Balboa Reservoir Project Site and New 2020 Air Pollutant Exposure Zone**. However, sensitive receptors in the immediately surrounding areas to the south and west would meet the APEZ criteria. This includes four daycares that previously were outside of the APEZ, residential receptors to the south of the project site along Ocean Avenue, and the City College campus and Multi-Use Building to the east of the project site. In addition, the background health risk values, including excess lifetime cancer risk due to exposure to emissions of diesel particulate matter (DPM), and annual average concentrations of particulate matter less than or equal to 2.5 microns in diameter (PM_{2.5}), have been updated in the new Citywide HRA database. The majority of these background health risk values have increased compared to the 2012 CRRP database included in the draft SEIR and draft SEIR Appendix E. This is the primary reason for

¹ For more information, see: <https://www.sfdph.org/dph/EH/Air/Article38.asp>

why the APEZ has expanded. For more information on the Citywide HRA, please refer to the City's technical documentation for the analysis.²

ESA prepared an updated HRA for the project to account for the cumulative background health risk values from the updated Citywide HRA database. The health risk values from the updated Citywide HRA were provided by the City and County of San Francisco Planning Department. The analysis of the project is unchanged from the draft SEIR. The unmitigated and mitigated emissions associated with the project were used to estimate excess lifetime cancer risk and annual average PM_{2.5} concentrations using the same methodologies described under Impact AQ-4 (draft SEIR p. 3.D-67) and in draft SEIR Appendix E, *Air Quality Technical Memorandum*.

FIGURE 1
BALBOA RESERVOIR PROJECT SITE AND NEW 2020 AIR POLLUTANT EXPOSURE ZONE



² San Francisco Department of Public Health, San Francisco Planning Department, and Ramboll, *Draft San Francisco Citywide Health Risk Assessment: Technical Support Documentation*, February 2020, https://www.sfdph.org/dph/files/EHSdocs/AirQuality/Air_Pollutant_Exposure_Zone_Technical_Documentation_2020.pdf, accessed March 2020.

HRA Methods

As discussed above, ESA updated the HRA to incorporate the new Citywide HRA database and APEZ map. [The Citywide HRA database presents the existing health risk impacts on the project site and in the project vicinity.](#) Because construction and operational activities for the project have not changed, ESA did not update construction or operational emissions. In addition, ESA did not update the [project's health risk impact calculations for onsite](#) and offsite sensitive receptors. Only the background cumulative health risk values and the Maximum Exposed Individual Sensitive Receptor (MEISR) locations were updated to reflect the new Citywide HRA database.

This updated HRA was prepared using technical information and HRA protocol from the air district, California Air Pollution Control Officer's Association, California Air Resources Board, Office of Environmental Health Hazard Assessment, and the U.S. Environmental Protection Agency. The HRA evaluates the estimated incremental increase in lifetime cancer risks from exposure to emissions of toxic air contaminants (TACs), which include DPM and total organic gases from gasoline vehicle exhaust, and annual average PM_{2.5} concentrations associated with combustion (i.e., exhaust) that would be emitted by project-related construction sources and project-related operational sources. Concentrations were estimated using the U.S. Environmental Protection Agency's American Meteorological Society/Environmental Protection Agency regulatory air dispersion model (AERMOD version 9.6.5).

ESA calculated health risks for the following exposure scenarios. TAC exposure and resulting health risks were quantified for both the Developer's Proposed Option (1,100 dwelling units) and the Additional Housing Option (1,550 dwelling units).

Scenario 1. *Construction:* offsite receptors (residents, daycare, and school) evaluated starting when construction commences for Phase 0 and exposed to all construction emissions for Phase 1 and Phase 2.

Scenario 2. *Construction:* onsite receptors (residents and daycare³) present at the project site once Phase 1 is complete evaluated starting when construction for Phase 1 concludes and exposed to all Phase 2 construction emissions.

Scenario 3. *Construction plus Operation:* offsite receptors (residents, daycare, and school) evaluated starting when construction commences and exposed to all construction emissions and 27 years of operational emissions.

Scenario 4. *Construction plus Operation:* onsite receptors (residents and daycare) present at the project site once Phase 1 is complete evaluated starting when construction for Phase 1 concludes and exposed to all Phase 2 construction emissions and 30 years of operational emissions.

³ It was assumed that daycare receptors would be present at the site when Phase 1 construction is complete and exposed to all Phase 2 construction emissions. Although the project phasing plan indicates that the daycare is part of Phase 2 and would not be occupied until Phase 2 construction is complete (and therefore daycare receptors would not be exposed to any construction emissions), the health risk assessment assumes that daycare receptors would be present when Phase 1 is complete. This results in a highly conservative assessment of daycare risk.

Scenario 5. Operation: offsite (residents, daycare, and school) and onsite receptors (residents and daycare) evaluated starting when full buildout operation commences and exposed to 30 years of operational emissions.

For each exposure scenario, health risks were evaluated for the following receptor locations based on the APEZ:

1. the maximum lifetime excess cancer risks and annual average $PM_{2.5}$ exhaust concentrations contribution from the proposed project for those off-site receptors not located in the APEZ during existing conditions, but which would be placed in the APEZ during existing plus proposed project conditions; and
2. the maximum lifetime excess cancer risks and annual average $PM_{2.5}$ exhaust concentrations contribution from the proposed project for those off-site receptors located in the APEZ during existing conditions, and which would continue to be located in the APEZ during existing plus proposed project conditions.

For more information on exposure scenarios, emission calculation methods, health risk analysis methods, and sensitive receptor types, please see “Health Risk Assessment Methods,” draft SEIR p. 3.D-38, and draft SEIR Appendix E, *Air Quality Technical Memorandum*, pp. 12-24.

Results of the Updated HRA

Excess Cancer Risk from Construction and Operation Emissions for Receptors Not in APEZ under Existing Conditions

The cancer risk analysis in the health risk assessment for the project is based on DPM concentrations from construction on- and off-road equipment, as well as the operational DPM concentrations from the emergency generators and project-generated vehicle emissions. The assessment evaluated excess cancer risk and $PM_{2.5}$ concentrations as a result of exposure to both construction and operational emissions.

The maximum estimated excess lifetime cancer risk for each exposure scenario (see “Health Risk Assessment Methods,” draft SEIR p. 3.D-38) for all sensitive receptor locations for receptors not in the APEZ under existing conditions is presented in **Table 1, Lifetime Cancer Risk for Receptors Not Located in the APEZ but Would Be Located in the APEZ with the Proposed Project – Developer’s Proposed Option**, and **Table 2, Lifetime Cancer Risk for Receptors Not Located in the APEZ but Would Be Located in the APEZ with the Proposed Project – Additional Housing Option**. These tables can be compared to the results in draft SEIR Table 3.D-13a (p. 3.D-67) and 3.D-13b (p. 3.D-68) in Impact AQ-4 of the draft SEIR, respectively.

TABLE 1
LIFETIME CANCER RISK FOR RECEPTORS NOT LOCATED IN THE APEZ BUT WOULD BE LOCATED IN THE APEZ WITH
THE PROPOSED PROJECT – DEVELOPER'S PROPOSED OPTION

Scenario / Receptor Type	Lifetime Excess Cancer Risk (In One Million) ^{a,b}				
	Bkgd.	Unmitigated		Mitigated ^c	
		Project	Total	Project	Total
Significance Threshold	—	10.0 ^d	100.0	10.0 ^d	100.0
Construction					
Resident (offsite) ^f	78.1	36.1	114.2	4.7	82.8
Resident (onsite) ^f	64.8	108.6	173.3	9.5	74.2
Daycare (offsite) ^f	62.0	87.5	149.6	11.6	73.6
Daycare (onsite) ^f	59.3	238.4	297.6	20.9	80.1
School (offsite) ^e	28.0	12.9	40.8	1.5	29.5
Construction + Operations					
Resident (offsite) ^f	52.9	61.8	114.8	7.9	60.8
Resident (onsite) ^f	64.8	110.3	175.0	11.4	75.9
Daycare (offsite) ^f	62.0	87.7	149.7	11.8	73.8
Daycare (onsite) ^f	59.3	239.5	298.8	22.0	81.3
School (offsite) ^e	28.0	13.1	41.1	1.7	29.7
Operations^e					
Resident (offsite) ^f	28.9	2.6	31.5	2.2	31.2
Resident (onsite) ^e	45.3	14.8	60.1	14.7	60.0
Daycare (offsite) ^e	62.0	0.7	62.7	0.7	62.7
Daycare (onsite) ^e	50.8	7.0	57.8	6.9	57.7
School (offsite) ^e	29.0	0.6	29.6	0.5	29.5

SOURCE: ESA, 2020; San Francisco Planning Department, *Citywide Health Risk Assessment*, 2020.

NOTES:

APEZ = Air Pollutant Exposure Zone; Bkgd. = background value

a **Bold values** = threshold exceedance

b All receptors within 500 feet of I-280 also included in the APEZ, regardless of their cancer risk value, which may be below the APEZ criteria of 100 per million. This is consistent with CARB's *Air Quality and Land Use Handbook: A Community Health Perspective*, which suggests air pollutant levels decrease substantially at approximately 500 feet from a freeway.

c Mitigation measures include: (1) M-AQ-2a: all off-road construction equipment was modeled with Tier 4 Final engine emission standards; and (2) M-AQ-4a: all emergency generators were modeled with Tier 4 engine emission standards.

d The project-level threshold only applies when the background risk plus the project risk exceeds 100; otherwise, the threshold does not apply.

e Note that for these receptors, the unmitigated cancer risk from the proposed project combined with the background cancer risk would be less than 100; therefore, the MEISR would not be placed in a new APEZ, and the significance threshold for the project contribution of 10.0 per 1 million would not apply.

f Note that for these receptors, the mitigated cancer risk from the proposed project combined with the background cancer risk would be less than 100; therefore, the MEISR would not be placed in a new APEZ, and the significance threshold for the project contribution of 10.0 per 1 million would not apply.

TABLE 1
LIFETIME CANCER RISK FOR RECEPTORS NOT LOCATED IN THE APEZ BUT WOULD BE LOCATED IN THE APEZ WITH
THE PROPOSED PROJECT – ADDITIONAL HOUSING OPTION

Scenario / Receptor Type	Bkgd.	Lifetime Excess Cancer Risk (In One Million) ^{a,b}			
		Unmitigated		Mitigated ^c	
		Project	Total	Project	Total
Significance Threshold	–	10.0 ^d	100.0	10.0 ^d	100.0
Construction					
Resident (offsite) ^f	49.8	76.3	126.0	8.2	57.9
Resident (onsite) ^f	64.8	122.2	186.9	10.7	75.4
Daycare (offsite) ^f	62.0	101.7	163.7	12.6	74.6
Daycare (onsite) ^f	59.3	267.7	326.9	23.4	82.7
School (offsite) ^e	28.0	14.4	42.4	1.6	29.6
Construction + Operations					
Resident (offsite) ^f	49.8	77.5	127.3	9.4	59.1
Resident (onsite) ^f	63.9	125.6	189.5	13.4	77.3
Daycare (offsite) ^f	62.0	102.0	164.0	12.8	74.8
Daycare (onsite) ^f	59.3	269.6	328.8	25.3	84.5
School (offsite) ^e	28.0	14.8	42.8	1.9	29.9
Operations					
Resident (offsite) ^f	28.9	4.2	33.2	3.26	32.2
Resident (onsite) ^e	45.3	25.1	70.4	24.9	70.2
Daycare (offsite) ^e	62.0	1.2	63.2	1.1	63.1
Daycare (onsite) ^e	50.8	11.8	62.6	11.7	62.5
School (offsite) ^e	29.0	1.0	29.9	0.7	29.7

Commented [RJ(1)]: Bold this and the above?

Commented [RJ(2)]: Bold this number?

SOURCE: ESA, 2020; San Francisco Planning Department, *Citywide Health Risk Assessment*, 2020.

NOTES:

APEZ = Air Pollutant Exposure Zone; Bkgd. = background value

a **Bold values** = threshold exceedance

b All receptors within 500 feet of I-280 also included in the APEZ, regardless of their cancer risk value, which may be below the APEZ criteria of 100 per million. This is consistent with CARB's *Air Quality and Land Use Handbook: A Community Health Perspective*, which suggests air pollutant levels decrease substantially at approximately 500 feet from a freeway.

c Mitigation measures include: (1) M-AQ-2a: all off-road construction equipment was modeled with Tier 4 Final engine emission standards; and (2) M-AQ-4a: all emergency generators were modeled with Tier 4 engine emission standards.

d The project-level threshold only applies when the background risk plus the project risk exceeds 100; otherwise, the threshold does not apply.

e Note that for these receptors, the unmitigated cancer risk from the proposed project combined with the background cancer risk would be less than 100; therefore, the MEISR would not be placed in a new APEZ, and the significance threshold for the project contribution of 10.0 per 1 million would not apply.

f Note that for these receptors, the mitigated cancer risk from the proposed project combined with the background cancer risk would be less than 100; therefore, the MEISR would not be placed in a new APEZ, and the significance threshold for the project contribution of 10.0 per 1 million would not apply.

Excess Cancer Risk from Construction and Operation Emissions for Receptors in APEZ under Existing Conditions

The maximum estimated excess lifetime cancer risk for each exposure scenario (see “Health Risk Assessment Methods,” draft SEIR p. 3.D-38) for all sensitive receptors in the APEZ under existing conditions is presented in **Table 3, Lifetime Cancer Risk for Receptors Located in the APEZ – Developer’s Proposed Option**, and **Table 4, Lifetime Cancer Risk for Receptors Located in the APEZ – Additional Housing Option**. These tables can be compared to the results in draft SEIR Table 3.D-14a (p. 3.D-73) and 3.D-14b (p. 3.D-74) in Impact AQ-4 of the draft SEIR, respectively.

TABLE 3
LIFETIME CANCER RISK FOR RECEPTORS LOCATED IN THE APEZ – DEVELOPER’S PROPOSED OPTION

Scenario / Receptor Type ^d	Lifetime Excess Cancer Risk (in one Million) ^{a,b}				
	Bkgd.	Unmitigated		Mitigated ^c	
		Project	Total	Project	Total
Significance Threshold	—	7.0	—	7.0	—
Construction					
Resident (offsite)	80.9	43.4	124.3	6.0	86.9
Daycare (offsite)	104.8	37.3	142.0	5.1	109.8
School (offsite)	145.5	1.1	146.7	0.1	145.7
Construction + Operations					
Resident (offsite)	80.9	44.1	125.0	6.7	87.6
Daycare (offsite)	104.8	37.4	142.1	5.2	109.9
School (offsite)	145.5	1.3	146.8	0.3	145.8
Operations					
Resident (offsite)	187.0	5.0	192.0	4.9	191.9
Daycare (offsite)	124.2	1.2	125.4	1.2	125.4
School (offsite)	145.5	0.2	145.8	0.2	145.7

SOURCE: ESA, 2020; San Francisco Planning Department, *Citywide Health Risk Assessment*, 2020.

NOTES:

APEZ = Air Pollutant Exposure Zone; Bkgd. = background value.

a **Bold values** = threshold exceedance

b All receptors within 500 feet of I-280 also included in the APEZ, regardless of their cancer risk value, which may be below the APEZ criteria of 100 per million. This is consistent with CARB's *Air Quality and Land Use Handbook: A Community Health Perspective*, which suggests air pollutant levels decrease substantially at approximately 500 feet from a freeway.

c Mitigation measures include: (1) M-AQ-2a: all off-road construction equipment was modeled with Tier 4 Final engine emission standards; and (2) M-AQ-4a: all emergency generators were modeled with Tier 4 engine emission standards.

d Only receptor types that are already in the APEZ are shown in the table; there are no onsite residents or onsite daycare receptors in the modeling domain that are already located in the APEZ.

TABLE 4
LIFETIME CANCER RISK FOR RECEPTORS LOCATED IN THE APEZ – ADDITIONAL HOUSING OPTION

Scenario / Receptor Type ^d	Lifetime Excess Cancer Risk (in one Million) ^{a,b}				
	Bkgd.	Unmitigated		Mitigated ^c	
		Project	Total	Project	Total
Significance Threshold	—	7.0	—	7.0	—
Construction					
Resident (offsite)	80.9	48.5	129.4	6.3	87.3
Daycare (offsite)	104.8	43.0	147.7	5.5	110.2
School (offsite)	145.5	1.3	146.8	0.1	145.7
Construction + Operations					
Resident (offsite) ^e	80.9/83.9	49.6	130.5	7.4	91.2
Daycare (offsite)	104.8	43.1	147.8	5.6	110.4
School (offsite)	145.5	1.5	147.0	0.3	145.9
Operations					
Resident (offsite)	187.0	7.0	194.0	6.9	193.9
Daycare (offsite)	124.2	1.8	126.0	1.7	125.9
School (offsite)	145.5	0.3	145.9	0.3	145.8

SOURCE: ESA, 2020; San Francisco Planning Department, *Citywide Health Risk Assessment*, 2020.

NOTES:

APEZ = Air Pollutant Exposure Zone; Bkgd. = background value.

a **Bold values** = threshold exceedance

b All receptors within 500 feet of I-280 also included in the APEZ, regardless of their cancer risk value, which may be below the APEZ criteria of 100 per million. This is consistent with CARB's *Air Quality and Land Use Handbook: A Community Health Perspective*, which suggests air pollutant levels decrease substantially at approximately 500 feet from a freeway.

c Mitigation measures include: (1) M-AQ-2a: all off-road construction equipment was modeled with Tier 4 Final engine emission standards; and (2) M-AQ-4a: all emergency generators were modeled with Tier 4 engine emission standards.

d Only receptor types that are already in the APEZ are shown in the table; there are no onsite residents or onsite daycare receptors in the modeling domain that are already located in the APEZ.

e Under mitigated conditions, the offsite residential MEISR is a different receptor location than under unmitigated conditions. This is because the reduction in construction emissions from mitigation results in operational emissions being a relatively larger share of total emissions, and thus the mitigated offsite residential MEISR occurs during the project operations phase.

Commented [RJ(3)]: Not bold because APEZ criteria not exceeded. Perhaps add a note to this effect in the table.

PM_{2.5} Concentrations from Construction and Operation Emissions for Receptors Not in APEZ under Existing Conditions

The maximum estimated annual average PM_{2.5} concentrations from all project sources at offsite receptor locations not in the APEZ under existing conditions are presented in **Table 5, Annual Average PM_{2.5} Concentrations for Receptors Not Located in the APEZ but Would Be Located in the APEZ with the Proposed Project – Developer's Proposed Option**, and **Table 6, Annual Average PM_{2.5} Concentrations for Receptors Not Located in the APEZ but Would Be Located in the APEZ with the Proposed Project – Additional Housing Option**. These tables can be compared to the results in draft SEIR Appendix E, Table 32 (p. 57) and 34 (p. 61), respectively.

TABLE 5
ANNUAL AVERAGE PM_{2.5} CONCENTRATIONS FOR RECEPTORS NOT LOCATED IN THE APEZ BUT WOULD BE LOCATED IN THE APEZ WITH THE PROPOSED PROJECT – DEVELOPER'S PROPOSED OPTION

Scenario / Receptor Type	Bkgd.	Annual Average PM _{2.5} Concentrations (µg/m ³) ^{a,b}			
		Unmitigated		Mitigated ^c	
		Project	Total	Project	Total
Significance Threshold	—	0.3 ^d	10.0	0.3 ^d	10.0
Construction					
Resident (offsite) ^e	9.60	<0.01	9.61	<0.01	9.60
Resident (onsite) ^f	8.90	1.32	10.22	0.12	9.02
Daycare (offsite) ^e	8.92	0.38	9.29	0.03	8.95
Daycare (onsite) ^f	8.82	1.33	10.14	0.12	8.93
School (offsite) ^e	8.29	0.25	8.54	0.02	8.31
Construction + Operations					
Resident (offsite) ^e	9.60	<0.01	9.61	<0.01	9.60
Resident (onsite) ^f	8.90	1.32	10.23	0.12	9.02
Daycare (offsite) ^e	8.92	0.38	9.30	0.04	8.95
Daycare (onsite) ^f	8.82	1.33	10.15	0.12	8.94
School (offsite) ^e	8.29	0.25	8.55	0.02	8.32
Operations					
Resident (offsite) ^e	9.87	0.01	9.88	0.01	9.88
Resident (onsite) ^e	8.59	0.04	8.62	0.04	8.62
Daycare (offsite) ^e	8.92	<0.01	8.92	<0.01	8.92
Daycare (onsite) ^e	8.68	0.03	8.71	0.03	8.71
School (offsite) ^e	8.30	<0.01	8.31	<0.01	8.31

SOURCE: ESA, 2020; San Francisco Planning Department, *Citywide Health Risk Assessment*, 2020.

NOTES:

APEZ = Air Pollutant Exposure Zone; PM_{2.5} = particulate matter less than or equal to 2.5 microns in diameter; µg/m³ = micrograms per cubic meter; Bkgd. = background value

a **Bold values** = threshold exceedance

b All receptors within 500 feet of I-280 also included in the APEZ, regardless of their PM_{2.5} concentrations risk value, which may be below the APEZ criteria of 10 µg/m³. This is consistent with CARB's *Air Quality and Land Use Handbook: A Community Health Perspective*, which suggests air pollutant levels decrease substantially at approximately 500 feet from a freeway.

c Mitigation measures include: (1) M-AQ-2a: all off-road construction equipment was modeled with Tier 4 Final engine emission standards; and (2) M-AQ-4a: all emergency generators were modeled with Tier 4 engine emission standards.

d The project-level threshold only applies when the background risk plus the project risk exceeds 10 µg/m³; otherwise, the threshold does not apply.

e Note that for these receptors, the unmitigated cancer risk from the proposed project combined with the background cancer risk would be less than 10 µg/m³; therefore, the MEISR would not be placed in a new APEZ, and the significance threshold for the project contribution of 0.3 µg/m³ would not apply.

f Note that for these receptors, the mitigated cancer risk from the proposed project combined with the background cancer risk would be less than 10 µg/m³; therefore, the MEISR would not be placed in a new APEZ, and the significance threshold for the project contribution of 0.3 µg/m³ would not apply.

Commented [RJ(4)]: It seems like you should have a note like this on the cancer risk tables above too.

TABLE 6
ANNUAL AVERAGE PM_{2.5} CONCENTRATIONS FOR RECEPTORS NOT LOCATED IN THE APEZ BUT WOULD BE LOCATED
IN THE APEZ WITH THE PROPOSED PROJECT – ADDITIONAL HOUSING OPTION

Scenario / Receptor Type	Bkgd.	Annual Average PM _{2.5} Concentrations (µg/m ³) ^{a,b}			
		Unmitigated		Mitigated ^c	
		Project	Total	Project	Total
Significance Threshold	—	0.3 ^d	10.0	0.3 ^d	10.0
Construction					
Resident (offsite) ^e	9.19	0.46	9.65	0.04	9.23
Resident (onsite) ^f	8.90	1.48	10.38	0.13	9.03
Daycare (offsite) ^e	8.92	0.42	9.34	0.04	8.95
Daycare (onsite) ^f	8.82	1.49	10.30	0.13	8.95
School (offsite) ^e	8.29	0.28	8.57	0.02	8.32
Construction + Operations					
Resident (offsite) ^e	9.19	0.46	9.65	0.04	9.23
Resident (onsite) ^f	8.90	1.49	10.39	0.13	9.04
Daycare (offsite) ^e	8.92	0.43	9.34	0.04	8.96
Daycare (onsite) ^f	8.82	1.50	10.31	0.14	8.95
School (offsite) ^e	8.29	0.28	8.58	0.03	8.32
Operations					
Resident (offsite) ^e	9.87	0.01	9.88	0.01	9.88
Resident (onsite) ^e	8.59	0.05	8.64	0.05	8.64
Daycare (offsite) ^e	8.92	<0.01	8.92	<0.01	8.92
Daycare (onsite) ^e	8.68	0.05	8.73	0.05	8.73
School (offsite) ^e	8.30	0.01	8.31	0.01	8.31

SOURCE: ESA, 2020; San Francisco Planning Department, *Citywide Health Risk Assessment*, 2020.

NOTES:

APEZ = Air Pollutant Exposure Zone; PM_{2.5} = particulate matter less than or equal to 2.5 microns in diameter; µg/m³ = micrograms per cubic meter; Bkgd. = background value

a **Bold values** = threshold exceedance

b All receptors within 500 feet of I-280 also included in the APEZ, regardless of their PM_{2.5} concentrations risk value, which may be below the APEZ criteria of 10 µg/m³. This is consistent with CARB's *Air Quality and Land Use Handbook: A Community Health Perspective*, which suggests air pollutant levels decrease substantially at approximately 500 feet from a freeway.

c Mitigation measures include: (1) M-AQ-2a: all off-road construction equipment was modeled with Tier 4 Final engine emission standards; and (2) M-AQ-4a: all emergency generators were modeled with Tier 4 engine emission standards.

d The project-level threshold only applies when the background risk plus the project risk exceeds 10 µg/m³; otherwise, the threshold does not apply.

e Note that for these receptors, the unmitigated cancer risk from the proposed project combined with the background cancer risk would be less than 10 µg/m³; therefore, the MEISR would not be placed in a new APEZ, and the significance threshold for the project contribution of 0.3 µg/m³ would not apply.

f Note that for these receptors, the mitigated cancer risk from the proposed project combined with the background cancer risk would be less than 10 µg/m³; therefore, the MEISR would not be placed in a new APEZ, and the significance threshold for the project contribution of 0.3 µg/m³ would not apply.

PM_{2.5} Concentrations from Construction and Operation Emissions for Receptors in APEZ under Existing Conditions

The maximum estimated annual average PM_{2.5} concentrations from all project sources at offsite receptor locations not in the APEZ under existing conditions are presented in **Table 7, Annual Average PM_{2.5} Concentrations for Receptors Located in the APEZ – Developer’s Proposed Option**, and **Table 8, Annual Average PM_{2.5} Concentrations for Receptors Located in the APEZ – Additional Housing Option**. These tables can be compared to the results in draft SEIR Appendix E, Table 36 (p. 66) and 38 (p. 70), respectively.

TABLE 7
ANNUAL AVERAGE PM_{2.5} CONCENTRATIONS FOR RECEPTORS LOCATED IN THE APEZ – DEVELOPER’S PROPOSED OPTION

Scenario / Receptor Type ^d	Annual Average PM _{2.5} Concentrations (µg/m ³) ^{a,b}				
	Bkgd.	Unmitigated		Mitigated ^c	
		Project	Total	Project	Total
Significance Threshold	—	0.2	—	0.2	—
Construction					
Resident (offsite)	9.18	0.64	9.82	0.06	9.23
Daycare (offsite)	9.68	0.17	9.85	0.02	9.69
School (offsite)	10.26	0.02	10.28	<0.01	10.26
Construction + Operations					
Resident (offsite)	9.18	0.64	9.82	0.06	9.24
Daycare (offsite)	9.68	0.18	9.85	0.02	9.70
School (offsite)	10.26	0.02	10.28	<0.01	10.27
Operations					
Resident (offsite)	11.12	<0.01	11.13	<0.01	11.1
Daycare (offsite)	9.72	<0.01	9.72	<0.01	9.7
School (offsite)	10.26	<0.01	10.26	<0.01	10.3

SOURCE: ESA, 2020; San Francisco Planning Department, *Citywide Health Risk Assessment*, 2020.

NOTES:

APEZ = Air Pollutant Exposure Zone; PM_{2.5} = particulate matter less than or equal to 2.5 microns in diameter; µg/m³ = micrograms per cubic meter; Bkgd. = background value.

a **Bold values** = threshold exceedance

b All receptors within 500 feet of I-280 also included in the APEZ, regardless of their cancer risk value, which may be below the APEZ criteria of 10 µg/m³. This is consistent with CARB's *Air Quality and Land Use Handbook: A Community Health Perspective*, which suggests air pollutant levels decrease substantially at approximately 500 feet from a freeway.

c Mitigation measures include: (1) M-AQ-2a: all off-road construction equipment was modeled with Tier 4 Final engine emission standards; and (2) M-AQ-4a: all emergency generators were modeled with Tier 4 engine emission standards.

d Only receptor types that are already in the APEZ are shown in the table; there are no onsite residents or onsite daycare receptors in the modeling domain that are already located in the APEZ.

TABLE 8
ANNUAL AVERAGE PM_{2.5} CONCENTRATIONS FOR RECEPTORS LOCATED IN THE APEZ – ADDITIONAL HOUSING OPTION

Scenario / Receptor Type ^d	Annual Average PM _{2.5} Concentrations (µg/m ³) ^{a,b}				
	Bkgd.	Unmitigated		Mitigated ^c	
		Project	Total	Project	Total
Significance Threshold	—	0.2	—	0.2	—
Construction					
Resident (offsite)	9.18	0.72	9.89	0.06	9.24
Daycare (offsite)	9.68	0.19	9.87	0.02	9.70
School (offsite)	10.26	0.02	10.28	<0.01	10.26
Construction + Operations					
Resident (offsite)	9.18	0.72	9.90	0.07	9.25
Daycare (offsite) ^e	9.68/9.72	0.20	9.88	0.02	9.74
School (offsite)	10.26	0.02	10.29	<0.01	10.27
Operations					
Resident (offsite)	11.12	0.01	11.14	0.01	11.1
Daycare (offsite)	9.72	<0.01	9.73	<0.01	9.7
School (offsite)	10.26	<0.01	10.27	<0.01	10.3

SOURCE: ESA, 2020; San Francisco Planning Department, *Citywide Health Risk Assessment*, 2020.

NOTES:

APEZ = Air Pollutant Exposure Zone; PM_{2.5} = particulate matter less than or equal to 2.5 microns in diameter; µg/m³ = micrograms per cubic meter; Bkgd. = background value.

a **Bold values** = threshold exceedance.

b All receptors within 500 feet of I-280 also included in the APEZ, regardless of their cancer risk value, which may be below the APEZ criteria of 10 µg/m³. This is consistent with CARB's *Air Quality and Land Use Handbook: A Community Health Perspective*, which suggests air pollutant levels decrease substantially at approximately 500 feet from a freeway.

c Mitigation measures include: (1) M-AQ-2a: all off-road construction equipment was modeled with Tier 4 Final engine emission standards; and (2) M-AQ-4a: all emergency generators were modeled with Tier 4 engine emission standards.

d Only receptor types that are already in the APEZ are shown in the table; there are no onsite residents or onsite daycare receptors in the modeling domain that are already located in the APEZ.

e Under mitigated conditions, the offsite residential MEISR is a different receptor location than under unmitigated conditions. This is because the reduction in construction emissions from mitigation results in operational emissions being a relatively larger share of total emissions, and thus the mitigated offsite residential MEISR occurs during the project operations phase.