Appendix E1

Air Quality Construction Methods Memorandum
MEMO

To  
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From  
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Subject  
Addendum 6 Construction Technical Memorandum: Air Quality Analysis and Health Risk Assessment for the Refinements to the Candlestick Point-Hunters Point Shipyard Phase II Development Plan

INTRODUCTION

In 2009, Ramboll, known at the time as ENVIRON International Corporation, performed four ambient air quality (AAQ) human health risk assessments (HHRA) as part of the Environmental Impact Report (EIR) for the proposed Candlestick Point – Hunters Point Shipyard Phase II Development Plan (herein referred to as “Project”; also known as San Francisco Planning Department Case Number 2007.0946E). The EIR for the Project was certified in July 2010 and since that time the Project proponent, FivePoint, formerly Lennar Urban, and the City and County of San Francisco, have been working to implement the Project plan.

However, during that time, the Project has been modified to include revisions to proposed land uses and changes to the phasing plan. Additionally, 368,500 square feet of office space are being moved from Hunters Point Shipyard to Candlestick Point. As such, the phasing of the Project and the uses for particular parcels has changed from what was originally evaluated in 2009. A map showing this revised phasing is presented as Attachment A. To reflect this new phasing, TRC prepared a Construction Workers and Equipment Phasing Plan for the Project dated 6/14/2019 (included as Appendix E3 of Addendum 6).

Ramboll has conducted a construction HHRA of the revised phasing plan (designated herein as the “2019 Phasing Plan”) to determine if the modified project would result in any new significant impacts not identified in the EIR or substantially increase the severity of an impact. Because the major changes to construction occur on the Candlestick Point section of the Project, the construction HHRA is focused only on this portion of the Project. The 2019 Project Modification Variant reduces the land use of Hunters Point Shipyard and delays the start of construction, and thus would reduce construction impacts. Therefore, construction at Hunters Point Shipyard was not evaluated quantitatively.
Section III.H.4 of the EIR identified the construction thresholds of significance for toxic air contaminants as:

- Probability of contracting cancer for the Maximally Exposed Individual (MEI) exceeds $1 \times 10^{-5}$ (10 in one million)
- Ground level concentrations of non-carcinogenic air contaminants/pollutants resulting in a HI greater than 1 for the MEI

As discussed in Impact AQ-2 of the EIR, all impacts were determined to be less than Significant with Mitigation, namely Mitigation Measures AQ 2.1 and 2.2, listed below:

- **MM AQ 2.1 Implement Emission Control Device Installation on Construction.** To reduce DPM [diesel particulate matter] emissions during Project construction, the Project Applicant shall require construction equipment used for the Project to utilize emission control technology such that 50% of the fleet will meet US EPA Tier 2 standards outfitted with California ARB [Air Resources Board] Level 3 VDECS (Verified Diesel Emission Control Strategies) for particulate matter control (or equivalent) during the first two years of construction activities, increasing to 75% of the fleet in the third year and 100% of the fleet starting in the fourth year and for the duration of the Project.

- **MM AQ 2.2 Implement Accelerated Emission Control Device Installation on Construction Equipment Used for Alice Griffith Parcels.** In addition to mitigation measure MM AQ 2.1, in order to minimize the potential impacts to residents living in Alice Griffith from the construction activities in that area, the Project Applicant will require that all construction equipment used in the Alice Griffith parcels (CP01 though CP06) would utilize equipment which meets the US EPA Tier 2 standards outfitted with California ARB Level 3 VDECS (Verified Diesel Emission Control Strategies) for particulate matter control (or equivalent) throughout the entire duration of construction activities on those parcels.

Below we describe the methods used in this screening level HHRA to determine whether the proposed modifications to the Project Phasing Schedule would result in any new significant impact on air quality beyond those identified in the FEIR or substantially increase the severity of a significant impact.

**APPROACH**

Other than modifications detailed below, for this updated HHRA, Ramboll followed the methods outlined in Section III.H Air Quality of the EIR. As discussed there, the methods used to analyze the human health effects from emissions of DPM associated with Project construction equipment were developed consistent with Bay Area Air Quality Management District (BAAQMD), California Environmental Protection Agency (Cal/EPA), and United States Environmental Protection Agency (USEPA) risk assessment guidance. The analysis incorporates conservative (i.e., health protective) methodologies for the following: (1) the estimation of emissions, (2) the calculation of airborne concentrations of DPM during construction activities at receptor locations, and (3) the estimation of excess lifetime cancer risks and non-cancer health effects or hazard indices (HIs).

**Revised Construction Phasing**

As discussed earlier, TRC prepared an updated construction phasing schedule (dated 06/14/2019) which included phase duration, construction equipment list and usage, number of construction workers, and number of construction truck trips for:

- Hunters Point Shipyard
- Candlestick Point
- Development of Shoreline of Hunters Point Shipyard and Candlestick Point
Field management for the construction of Hunters Point Shipyard and Candlestick Point

Emissions Calculation

Emissions from off-road construction equipment associated with Project development as identified by TRC were calculated using the same equipment horsepower, load factor, and emission factors as used in the EIR. Emission factors were developed based on ARB’s 2007 In-Use Off-road Equipment Inventory Model, consistent with the EIR. Construction began in 2014, rather than in 2010 as assumed in the original analysis. Therefore, implementation of MM AQ-2.1 has been adjusted to reflect the current construction schedule assuming that the Project would require construction equipment used for the Project to utilize emission control technology such that 50% of the fleet will meet US EPA Tier 2 standards outfitted with California ARB Level 3 VDECS (Verified Diesel Emission Control Strategies) for particulate matter control (or equivalent) during the first two years of construction activities (2014 and 2015), increasing to 75% of the fleet in the third year (2016), and 100% of the fleet starting in the fourth year (2017) and for the remaining duration of the Project. All equipment operating during this phase-in period are used in the construction of the Alice Griffith parcels, and construction of any parcels not covered in MM AQ 2.2 occur after the phase-in period. Therefore, it is assumed that 100% of the construction equipment meets US EPA Tier 2 standards outfitted with California ARB Level 3 VDECS. Greenhouse gas (GHG) emissions from off-road trucks were excluded from the total construction GHG emissions in the 2010 EIR. Therefore, GHG emissions from off-road trucks were not included in calculating the total construction GHG emissions in this analysis.

Emissions from on-road mobile sources, particularly the running, idling, and starting emissions from worker commute trips and haul truck trips making deliveries and removing materials, were calculated using the same emission factors as were used in the 2010 EIR. The emission factors were developed based on ARB’s EMFAC2007 model. The worker vehicles were assumed to be 50% light duty vehicles (LDA) and 50% light duty trucks (25% LDT1 and 25% LDT2). The haul trucks were assumed to be 100% medium heavy-duty trucks (MHDT). These are the same assumptions used in the 2010 EIR. The distance that the workers and haul trucks would travel along the hauling roads was assumed to be the same as the 2010 EIR. Since the distance that the workers and hauling trips originating from the Field Management phase was unknown, Ramboll assumed an average travel distance based on the length of the other haul roads. Idling and starting emissions from on-road activity were allotted to the construction parcels. Running emissions from on-road activity were attributed to the hauling roads.

Air Dispersion Modeling

The air dispersion models (using the USEPA AERMOD, version 18081) were run for the revised emissions as a method of comparing the impact of the revised phasing plan to the previously modeled receptor locations (as before, ground level receptors were assumed). The modeled receptor grid is the same grid used for Addendum 5 at existing sensitive receptor and worker locations. A 20 meter by 20 meter grid of volume sources was developed for the revised construction emissions, with emissions within each parcel evenly distributed throughout the volume sources. The models used the same meteorological data used in the 2010 EIR. Terrain data was updated using the most recent version of AERMAP (version 18081), the terrain preprocessor for AERMOD. Mobile source starting and idling emissions associated with each parcel development were modeled along with the construction off-road equipment emissions through the volume sources. On-road mobile running emissions which occur off-

1 ARB. 2019. Mobile Source Emissions Inventory – Off-road Diesel Analysis & Inventory. Available at: https://ww3.arb.ca.gov/msei/ordiesel.htm
site were not modeled considering the running emissions are likely to be lower due to cleaner engines as a result of the construction beginning in 2014, 4 years later than that assumed in the 2010 EIR.

**Health Risk Assessment**

The HHRA was conducted in the same way described in the EIR, including the assumption that all PM$_{10}$ from diesel fueled construction equipment was assumed to be DPM. For this screening level update, the cancer risk was calculated using the total construction DPM emissions. The adult was assumed to be exposed to all 20 years of construction activity. To be conservative, the child was also assumed to be exposed to all construction as a child. Since the release of the FEIR, the Office of Environmental Health Hazards Assessment (OEHHA) released new guidance on how to estimate health impacts from toxic air contaminants. However, in order to compare to the EIR, this new guidance was not taken into account. The risk assessment methods used for the EIR were also used for this addendum.

**RESULTS**

The modified Project with the new phasing schedule, beginning four years later than that assumed in the EIR and with the application of mitigation measures MM AQ-2.1 and 2.2, approved in the EIR, results in an excess cancer risk at the maximally exposed sensitive receptor location of less than 5 in a million and would not exceed the threshold of >10.0 in 1 million. The non-cancer impacts would be less than the Chronic Hazard Index (HI) threshold of >1 at the maximally exposed individual location. With mitigation, the results for the modified Project are below the significance thresholds for determining whether construction activities would expose sensitive receptors to substantial levels of DPM.

Attachment B compares the results of the 2019 Project Modification Variant compared to the results for Candlestick Point in the 2010 EIR. As shown in the table, impacts from the 2019 Project Modification Variant are lower compared to the 2010 EIR. Because construction at Hunters Point Shipyard is similar to or lower than what was analyzed previously, the combined impact of Candlestick Point and Hunters Point Shipyard construction is expected to be lower than reported in the 2010 EIR.

Implementation of the modified construction schedule would not result in any new significant effects related to emissions of DPM beyond those identified in the EIR or a substantial increase in the severity of a significant impact. Therefore, no new mitigation measures would be required.
ATTACHMENT A
CPHPS2 MAP WITH ROADWAYS
ATTACHMENT B

SUMMARY OF CANCER RISKS AT THE MAXIMALLY EXPOSED INDIVIDUALS (MEI)
## Attachment B

### Summary of Cancer Risks¹ at the Maximally Exposed Individuals (MEI)²

**Candlestick Point - Hunters Point Shipyard Phase II Development Plan**

San Francisco, California

<table>
<thead>
<tr>
<th>Project Area</th>
<th>Project Analysis</th>
<th>Cancer Risk</th>
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<tr>
<td></td>
<td>School Child</td>
<td>Offsite Worker</td>
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<tr>
<td></td>
<td>High End</td>
<td>Average</td>
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<td>Candlestick Point</td>
<td>2010 EIR</td>
<td>1.5E-06</td>
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<td>2019 Addendum</td>
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<td>Hunters Point Shipyard</td>
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</tbody>
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### Notes:

1. Cancer risks were estimated using the following equation:
   \[ \text{Risk}_{\text{inh}} = Ci x CF x IFinh x CPFi x ASF \]
   
   Where:
   - \( \text{Risk}_{\text{inh}} \) = Cancer Risk for the Inhalation Pathway (unitless)
   - \( Ci \) = Annual Average Air Concentration for Chemical "i" (µg/m³)
   - \( CF \) = Conversion Factor (mg/µg)
   - \( IFinh \) = Intake Factor for Inhalation (m³/kg-day)
   - \( CPFi \) = Cancer Potency Factor for Chemical "i" (mg/kg-day)-1
   - \( ASF \) = Age Sensitivity Factor (unitless)

2. UTM coordinates of the Candlestick Point MEI (same location for 2010 EIR and 2019 Addendum unless otherwise specified):
   - School Child: 553990.69, 4174701
   - Offsite Worker (2010 EIR): 554247, 4174920
   - Offsite Worker (2019 Addendum): 554097, 4175020
   - Offsite Resident (2010 EIR): 554097, 4174620
   - Offsite Resident (2019 Addendum): 553847, 4174970
   - Onsite Resident (2010 EIR): 554140, 4174900
   - Onsite Resident (2019 Addendum): 554160, 4174900