

Appendix F1  
**Air Quality Construction  
Methods Memorandum**





# MEMO

Date **March 6, 2018**

To **Jose Campos,  
Office of Community Investment and Infrastructure  
Joy Navarette  
Planning Department, City and County of San Francisco**

From **Michael Keinath  
Sarah Manzano**

Subject **Air Quality Analysis and Health Risk Assessment for the  
Refinements to the Candlestick Point-Hunter 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, adjusted locations for two high-rise towers, redesign of parks and open spaces, refinements to the street network, additional water taxi infrastructure and two pedestrian bridges, and revisions to the utility network. 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 02/26/2018 (included as Attachment B).

Ramboll has conducted a construction HHRA of the revised phasing plan (designated herein as the “2018 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 Hunters Point Shipyard section of the Project, the construction HHRA is focused only on this portion of the Project. The 2018 Project Modification Variant reduces the land use of CP and thus would reduce construction impacts. Therefore, construction at CP was not evaluated quantitatively.

Section III.H.4 of the EIR identified the construction thresholds of significance for toxic air contaminants as:

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- 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 through 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 02/26/2018) which included phase duration, construction equipment list and usage, number of construction workers, and number of construction truck trips for:

- Hunter's Point Shipyard
- Candlestick Point
- Development of Shoreline of Hunter's Point Shipyard and Candlestick Point
- Field management for the construction of Hunter's 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.<sup>1</sup> Construction began in 2013, 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. Since the 2018 Phasing Plan occurs after this phase-in period, 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.<sup>2</sup> 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 16216) 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 presented in Attachment C and is the same grid used for the 2010 EIR. However, some locations that were analyzed as worker exposure in the EIR were analyzed as residential exposure as these locations will be developed into residential areas. Conversely, some locations analyzed as residents in the EIR were instead analyzed as workers because there are no plans to develop these locations into residential areas. Residential exposure assumptions are more conservative because residents are assumed to be exposed to all the construction emissions. 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 and terrain data as were used in the 2010 EIR. 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-site were not

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<sup>1</sup> [http://www.arb.ca.gov/msei/categories.htm#offroad\\_motor\\_vehicles](http://www.arb.ca.gov/msei/categories.htm#offroad_motor_vehicles)

<sup>2</sup> [http://www.arb.ca.gov/msei/categories.htm#onroad\\_motor\\_vehicles](http://www.arb.ca.gov/msei/categories.htm#onroad_motor_vehicles)

modeled considering the running emissions are likely to be lower due to cleaner engines as a result of the construction beginning in 2017, 7 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<sub>10</sub> 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 15 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 3 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 D compares the results of the 2018 Project Modification Variant compared to the results for Hunters Point Shipyard in the 2010 EIR. As shown in the table, impacts from the 2018 Project Modification Variant are lower than that of the 2010 EIR. Because the construction impacts from Hunter's Point Shipyard have decreased and construction at Candlestick Point is similar to or lower than what was analyzed previously, the combined impact of Hunter's Point Shipyard and Candlestick Point 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 because:

1. The construction will begin eight years later than what was assumed in the EIR. All equipment is required to be 100% Tier 2 plus DPF.
2. The shift of a substantial portion of emissions from the perimeter of the site near sensitive locations to the center near the large hill. For example, the location of the residential MEI moved from a point along Innes Avenue near the perimeter of the site to a point along the hillside closer to the center of the site.

Therefore, no new mitigation measures would be required.

**ATTACHMENT A:  
PROJECT OVERVIEW**



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**RAMBOLL** ENVIRON

DRAFTED BY: \_\_\_\_\_ DATE: 11/29/2017

Project Overview  
Candlestick Point-Hunters Point Shipyard  
Phase II Development Plan  
San Francisco, California

ATTACHMENT  
**A**  
PROJECT: 1690001656



# Legend

- HP01WWTP
- HPS01A
- Parks
- Surcharge
- Geothermal
- HP04 Bridge



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



## Project Overview Candlestick Point-Hunters Point Shipyard Phase II Development Plan San Francisco, California

ATTACHMENT  
**A**  
PROJECT: 1690001656

DRAFTED BY: DATE: 11/29/2017

**ATTACHMENT B:  
CONSTRUCTION WORKERS AND EQUIPMENT PHASING PLAN**

**DRAFT: CPHPSII Project: Construction Workers and Equipment for  
 Hunters Point Shipyard Construction Phase (Revision Date: 2/26/2018  
 based on Construction Schedule received 02/21/18 )  
 Prepared by TRC for EIR Analysis**

Major Phase Indicator	
Subphase Color Coding	1 HPS
	2 HPS
	3 HPS

Year	Project Year	Horizontal (Site Prep) or Vertical Duration (Building Const.)	Construction Phase Type	Project Sub Phase	Duration (Months)	Construction Equipment			Daily Construction Workers		Daily Construction Truck Trips			
						Full Time	1/2 Time	1/4 Time	Max Number of Workers	Avg. Number of Workers	Max Number of Truck Trips	Avg. Number of Truck Trips	Number of On Site Equipment	
2017	0	Building Construction	Foundation Piles/Structure/ Rough-In	HP-01	4	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Scraper, (2) Off Road Dump Trucks, (1) Dozer		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	20	16	16	8	10	
			Interior and Exterior Finishes	HP-01	5	(1)Excavator, (1)Loader,(1)Water Truck, (1)Crane, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	(1) Pile Driver	10	8	8	4	5	
2018	1	Building Construction	Foundation Piles/Structure/ Rough-In	HP-01	4	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Scraper, (2) Off Road Dump Trucks, (1) Dozer		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	20	16	16	8	10	
			Interior and Exterior Finishes	HP-01	6	(1)Excavator, (1)Loader,(1)Water Truck, (1)Crane, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	(1) Pile Driver	10	8	8	4	5	
2019	2	Site Preparation	Abatement	HP-01	2	(4) Man Lifts, (2)Loader, (2) Rough Terrain Fork lift, (1)Water Truck			26	20	16	8	13	
				HP-02	3	(4) Man Lifts, (2)Loader, (2) Rough Terrain Fork lift, (1) Water Truck			26	20	16	8	13	
				HP-01 WWTP	1	(2) Man Lifts, (1)Loader, (1) Rough Terrain Fork lift	(1) Water Truck		13	10	8	4	7	
			Demolition	HP-01	2	(4) Man Lifts, (4)Excavators,(2) Off Road Dump Truck, (2)Loaders, (2)Dozer, (4)Water Trucks, (2) Crane			50	40	48	32	25	
				HP-02	2	(4) Man Lifts, (4)Excavators,(2) Off Road Dump Truck, (2)Loaders, (2)Dozer, (4)Water Trucks, (2) Crane			50	40	48	32	25	
			Grading & Infrastructure	HP-01 (Surcharge)	1	(1)Bottom-drive wick inserter, (1)Dozer, (1)Loader			16	12	10	5	8	
	HPS-01A (Geothermal)	10	(2) Drill Rigs, (1)Bobcat		(1)Excavator	10	8	8	4	5				
2020	3	Site Preparation	Abatement	HP-01	4	(4) Man Lifts, (2)Loader, (2) Rough Terrain Fork lift, (1)Water Truck			26	20	16	8	13	
				Demolition	HP-01	10	(4) Man Lifts, (4)Excavators,(2) Off Road Dump Truck, (2)Loaders, (2)Dozer, (4)Water Trucks, (2) Crane			50	40	48	32	25
					HP-02	3	(4) Man Lifts, (4)Excavators,(2) Off Road Dump Truck, (2)Loaders, (2)Dozer, (4)Water Trucks, (2) Crane			50	40	48	32	25
			Grading & Infrastructure	HP-01	10	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Trucks, (1) Dozer	(4) Scraper	(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	44	35	32	16	22	
				HP-02	6	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Trucks, (1) Dozer	(2) Scraper	(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	34	26	13	7	17	
				HP-02 (Surcharge)	1	(1)Bottom-drive wick inserter, (1)Dozer, (1)Loader			16	12	10	5	8	
				HP-01 WWTP	10	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Trucks, (1) Dozer	(1) Scraper	(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	35	28	16	8	18	
				HP-03(Surcharge)	1	(1)Bottom-drive wick inserter, (1)Dozer, (1)Loader			16	12	10	5	8	
		HP-04 (Geothermal)	8	(2) Drill Rigs, (1)Bobcat		(1)Excavator	10	8	8	4	5			
		HP-01 (Geothermal)	4	(2) Drill Rigs, (1)Bobcat		(1)Excavator	10	8	8	4	5			
Building Construction	Foundation Piles/Structure/ Rough-In	HP-01	12	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Scraper, (2) Off Road Dump Trucks, (1) Dozer		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	20	16	16	8	10			
	Interior and Exterior Finishes	HP-01	10	(1)Excavator, (1)Loader,(1)Water Truck, (1)Crane, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	(1) Pile Driver	10	8	8	4	5			
				HP-03	2	(4) Man Lifts, (2)Loader, (2) Rough Terrain Fork lift, (1)Water Truck			26	20	16	8	13	

**DRAFT: CPHPSII Project: Construction Workers and Equipment for  
 Hunters Point Shipyard Construction Phase (Revision Date: 2/26/2018  
 based on Construction Schedule received 02/21/18 )  
 Prepared by TRC for EIR Analysis**

Major Phase Indicator	
Subphase Color Coding	1 HPS
	2 HPS
	3 HPS

Year	Project Year	Horizontal (Site Prep) or Vertical Duration (Building Const.)	Construction Phase Type	Project Sub Phase	Duration (Months)	Construction Equipment			Daily Construction Workers		Daily Construction Truck Trips		
						Full Time	1/2 Time	1/4 Time	Max Number of Workers	Avg. Number of Workers	Max Number of Truck Trips	Avg. Number of Truck Trips	Number of On Site Equipment
2021	4	Site Preparation	Abatement	HP-04	3	(4) Man Lifts, (2) Loader, (2) Rough Terrain Fork lift, (1) Water Truck			26	20	16	8	13
				HP-03 (Roadway-YSB Connection)	2	(2) Man Lifts, (1) Loader, (1) Rough Terrain Fork lift	(1) Water Truck		13	10	8	4	7
				HP-01 Parks (Shipyard Hillside OS & Green Room)	1	(2) Man Lifts, (1) Loader, (1) Rough Terrain Fork lift	(1) Water Truck		13	10	8	4	7
			Demolition	HP-03	4	(4) Man Lifts, (4) Excavators, (2) Off Road Dump Truck, (2) Loaders, (2) Dozer, (4) Water Trucks, (2) Crane			50	40	48	32	25
				HP-04	6	(4) Man Lifts, (4) Excavators, (2) Off Road Dump Truck, (2) Loaders, (2) Dozer, (4) Water Trucks, (2) Crane			50	40	48	32	25
				HP-03 (Roadway-YSB Connection)	3	(2) Man Lifts, (2) Excavators, (1) Off Road Dump Truck, (1) Loader, (1) Dozer, (2) Water Trucks, (1) Crane			25	20	24	16	13
			Grading & Infrastructure	HP-01	10	(1) Excavators, (1) Loaders, (1) Bobcat, (1) Compactors, (1) Water Truck, (1) Off Road Dump Trucks, (1) Dozer		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	35	28	8	6	18
				HP-03	4	(1) Excavators, (1) Loaders, (1) Bobcat, (1) Compactors, (1) Water Truck, (2) Off Road Dump Trucks, (1) Dozer	(1) Scraper	(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	40	32	24	12	20
				HP-04(Surcharge)	1	(1) Bottom-drive wick inserter, (1) Dozer, (1) Loader			16	12	10	5	8
				HP-04 (Geothermal)	4	(2) Drill Rigs, (1) Bobcat		(1) Excavator	10	8	8	4	5
		Building Construction	Foundation Piles/Structure/ Rough-In	HP-01	10	(1) Excavators, (1) Loaders, (1) Bobcat, (1) Compactors, (1) Water Truck, (1) Scraper, (2) Off Road Dump Trucks, (1) Dozer		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	20	16	16	8	10
				HP-02	8	(1) Excavators, (1) Loaders, (1) Water Trucks, (1) Cranes, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	(1) Pile Driver	20	16	16	8	10
			Interior and Exterior Finishes	HP-01	10	(1) Excavator, (1) Loader, (1) Water Truck, (1) Crane, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	(1) Pile Driver	10	8	8	4	5
				HP-02	5	(1) Loader, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift			10	8	8	4	5
		Abatement	HP-03	4	(4) Man Lifts, (2) Loader, (2) Rough Terrain Fork lift, (1) Water Truck			26	20	16	8	13	
			HP-04	2	(4) Man Lifts, (2) Loader, (2) Rough Terrain Fork lift, (1) Water Truck			26	20	16	8	13	
			HP-01 Parks (Shipyard Hillside OS & Green Room)	3	(2) Man Lifts, (1) Loader, (1) Rough Terrain Fork lift	(1) Water Truck		13	10	8	4	7	
		Demolition	HP-03	4	(4) Man Lifts, (4) Excavators, (2) Off Road Dump Truck, (2) Loaders, (2) Dozer, (4) Water Trucks, (2) Crane			50	40	48	32	25	
			HP-04	2	(4) Man Lifts, (4) Excavators, (2) Off Road Dump Truck, (2) Loaders, (2) Dozer, (4) Water Trucks, (2) Crane			50	40	48	32	25	
			HP-01 Parks (Shipyard Hillside OS & Green Room)	3	(2) Man Lifts, (1) Excavators, (1) Off Road Dump Truck, (1) Dozer, (1) Loaders, (1) Water Trucks	(1) Crane		20	16	8	4	10	

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Major Phase Indicator	
Subphase Color Coding	1 HPS
	2 HPS
	3 HPS

Year	Project Year	Horizontal (Site Prep) or Vertical Duration (Building Const.)	Construction Phase Type	Project Sub Phase	Duration (Months)	Construction Equipment			Daily Construction Workers		Daily Construction Truck Trips		
						Full Time	1/2 Time	1/4 Time	Max Number of Workers	Avg. Number of Workers	Max Number of Truck Trips	Avg. Number of Truck Trips	Number of On Site Equipment
2022	5	Site Preparation	Grading & Infrastructure	HP-01	10	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Trucks, (1) Dozer		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	35	28	8	6	18
				HP-03	8	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (2) Off Road Dump Trucks, (1) Dozer		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	38	26	8	4	19
				HP-04	10	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Trucks, (1) Dozer	(2) Scraper	(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	40	30	32	16	20
				HP-04 (Geothermal)	4	(2) Drill Rigs, (1)Bobcat		(1)Excavator	10	8	8	4	5
				HP-03 (Roadway-YSB Connection)	8	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Trucks, (1) Dozer	(1) Scraper	(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	35	28	16	8	18
				HP-01 Parks (Shipyard Hillside OS & Green Room)	4	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Trucks, (1) Dozer	(2) Scraper	(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	44	35	16	8	22
		Building Construction	Foundation Piles/Structure/ Rough-In	HP-01	8	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Scraper, (2) Off Road Dump Trucks, (1) Dozer		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	20	16	16	8	10
				HP-02	6	(1)Excavators, (1)Loaders, (1)Water Trucks, (1)Cranes, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	(1) Pile Driver	20	16	16	8	10
				HP-01 Parks (Shipyard Hillside OS & Green Room)	2	(1)Excavators, (1)Loaders, (1)Water Trucks, (1)Cranes, (1) Man Lift		(1) Cement Truck, (1) Pump Truck, (1) Pile Driver	10	8	8	4	5
			Interior and Exterior Finishes	HP-01	12	(1)Excavator, (1)Loader, (1)Water Truck, (1)Crane, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	(1) Pile Driver	10	8	8	4	5
				HP-02	8	(1)Loader, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift			10	8	8	4	5
				HP-01 Parks (Shipyard Hillside OS & Green Room)	2	(1)Loader, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift			10	8	8	4	5
			Abatement	HP-05	5	(4) Man Lifts, (2)Loader, (2) Rough Terrain Fork lift, (1)Water Truck			26	20	16	8	13
				HP-06	3	(4) Man Lifts, (2)Loader, (2) Rough Terrain Fork lift, (1)Water Truck			26	20	16	8	13
				HP-02 Parks (Northside Park + Horne Blvd Streetscape 1)	1	(2) Man Lifts, (1)Loader, (1) Rough Terrain Fork lift	(1) Water Truck		13	10	8	4	7
HP-03	2	(4) Man Lifts, (4)Excavators, (2) Off Road Dump Truck, (2)Loaders, (2)Dozer, (4)Water Trucks, (2) Crane				50	40	48	32	25			
HP-05	5	(4) Man Lifts, (4)Excavators, (2) Off Road Dump Truck, (2)Loaders, (2)Dozer, (4)Water Trucks, (2) Crane				50	40	48	32	25			
HP-06	4	(4) Man Lifts, (4)Excavators, (2) Off Road Dump Truck, (2)Loaders, (2)Dozer, (4)Water Trucks, (2) Crane				50	40	48	32	25			
Demolition	HP-02 Parks (Northside Park + Horne Blvd Streetscape 1)	3	(2) Man Lifts, (1)Excavators, (1) Off Road Dump Truck, (1)Dozer, (1)Loaders, (1)Water Trucks	(1) Crane		20	16	8	4	10			

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Major Phase Indicator	
Subphase Color Coding	1 HPS
	2 HPS
	3 HPS

Year	Project Year	Horizontal (Site Prep) or Vertical Duration (Building Const.)	Construction Phase Type	Project Sub Phase	Duration (Months)	Construction Equipment			Daily Construction Workers		Daily Construction Truck Trips		
						Full Time	1/2 Time	1/4 Time	Max Number of Workers	Avg. Number of Workers	Max Number of Truck Trips	Avg. Number of Truck Trips	Number of On Site Equipment
2023	6	Site Preparation	Grading & Infrastructure	HP-01	6	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Trucks, (1) Dozer		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	35	28	8	6	18
				HP-03	10	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (2) Off Road Dump Trucks, (1) Dozer		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	38	26	8	4	19
				HP-04	10	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Trucks, (1) Dozer		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	36	28	8	6	18
				HP-05	4	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Trucks, (1) Dozer	(3) Scraper	(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	42	33	32	16	21
				HP-05(Surcharge)	1	(1)Bottom-drive wick inserter, (1)Dozer, (1)Loader			16	12	10	5	8
				HP-06(Surcharge)	2	(1)Bottom-drive wick inserter, (1)Dozer, (1)Loader			16	12	10	5	8
				HP-02 Parks (Northside Park + Horne Blvd Streetscape 1)	7	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Trucks, (1) Dozer	(1) Scraper	(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	35	28	16	8	18
				Deep Soil Mixing	6	(2) Drill Rigs, (1) Bobcat, (1) Loader, (2) Support Trucks, (1) Water Truck, (1) Dump Truck			16	12	8	4	8
		HP-06 (Geothermal)	8	(2) Drill Rigs, (1)Bobcat		(1)Excavator	10	8	8	4	5		
		Building Construction	Foundation Piles/Structure/ Rough-In	HP-03	6	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	(1) Pile Driver	40	32	16	8	20
				HP-04	10	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift		(1) Cement Truck, (1) Pump Truck, (1) Pile Driver	20	16	16	8	10
			Interior and Exterior Finishes	HP-01	12	(1)Excavator, (1)Loader,(1)Water Truck, (1)Crane, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	(1) Pile Driver	10	8	8	4	5
				HP-03	3	(1)Loader, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift			20	16	8	4	10
				HP-04	6	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	(1) Pile Driver	10	8	8	4	5
		Roadway	Improvements	HP-03 (YS Bridge)	8	(1)Excavators, (2)Loaders, (2) Off Road Dump Truck, (1) Dozer, (4) barges, (4) Cranes, (1) Drill Rig, (1)Water Truck	(2)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Truck, (1) Pile Driver	(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (2) Pump Trucks	78	62	24	16	39
HP-02 (Innes Ave)	10			(2)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Truck		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers	30	24	12	8	15		
Site Preparation	Abatement	HP-05	4	(4) Man Lifts, (2)Loader, (2) Rough Terrain Fork lift, (1)Water Truck			26	20	16	8	13		
		HP-03 Parks (Waterfront Promenade North, Horn Blvd Streetscape 2)	1	(1) Man Lifts, (1)Loader, (1) Rough Terrain Fork lift	(1) Water Truck		10	8	8	4	5		
	Demolition	HP-05	5	(4) Man Lifts, (4)Excavators,(2) Off Road Dump Truck, (2)Loaders, (2)Dozer, (4)Water Trucks, (2) Crane			50	40	48	32	25		
		HP-03 Parks (Waterfront Promenade North, Horn Blvd Streetscape 2)	3	(1) Man Lifts, (1)Excavator, (1) Off Road Dump Truck, (1)Loaders, (1)Dozer, (1)Water Trucks		(1) Crane	18	14	8	4	9		
	Grading & Infrastructure	HP-05	6	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Trucks, (1) Dozer		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	36	28	16	8	18		
HP-06	6	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Trucks, (1) Dozer	(4) Scraper	(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	44	35	32	16	22				

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Major Phase Indicator	
1 HPS	
2 HPS	
3 HPS	

Year	Project Year	Horizontal (Site Prep) or Vertical Duration (Building Const.)	Construction Phase Type	Project Sub Phase	Duration (Months)	Construction Equipment			Daily Construction Workers		Daily Construction Truck Trips			
						Full Time	1/2 Time	1/4 Time	Max Number of Workers	Avg. Number of Workers	Max Number of Truck Trips	Avg. Number of Truck Trips	Number of On Site Equipment	
2024	7	Building Construction		HP-03 Parks (Waterfront Promenade North, Horn Blvd Streetscape 2)	6		(1)Excavators, (1)Loaders, (1)Bobcat, (1) Off Road Dump Truck, (1)Water Truck	(1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1)Compactors,	25	20	8	4	13	
				HP-06 (Geothermal)	8	(2) Drill Rigs, (1)Bobcat	(1)Excavator	10	8	8	4	5		
			Foundation Piles/Structure/ Rough-In	HP-03	12	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift	(1) Cement Truck, (1) Pump Truck, (1) Pile Driver	20	16	16	8	10		
				HP-04	10	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift	(1) Cement Truck, (1) Pump Truck, (1) Pile Driver	20	16	16	8	10		
				HP-05	6	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift	(1) Cement Truck, (1) Pump Truck, (1) Pile Driver	20	16	16	8	10		
				HP-02 Parks (Northside Park + Horne Blvd Streetscape 1)	2	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift	(1) Cement Truck, (1) Pump Truck, (1) Pile Driver	10	8	8	4	5		
				HP-03 Parks (Waterfront Promenade North, Horn Blvd Streetscape 2)	1	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	18	14	16	8	9		
				HP-03	10	(1)Loader, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift		20	16	8	4	10		
			Interior and Exterior Finishes	HP-04	10	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	10	8	8	4	5		
				HP-05	8	(1)Loader, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift		10	8	8	4	5		
				HP-02 Parks (Northside Park + Horne Blvd Streetscape 1)	6	(1)Loader, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift		10	8	8	4	5		
				HP-03 Parks (Waterfront Promenade North, Horn Blvd Streetscape 2)	10		(1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift, (1)Bobcat	(1) Water Truck, (1)Loader	15	12	8	4	8	
			Roadway	Improvements	HP-03 (YS Bridge)	8	(1)Excavators, (2)Loaders, (2) Off Road Dump Truck, (1) Dozer, (4) barges, (4) Cranes, (1) Drill Rig, (1)Water Truck	(2)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Truck, (1) Pile Driver	(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (2) Pump Trucks	78	62	24	16	39
					HP-02 (Innes Ave.)	6	(2)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Truck		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers	30	24	12	8	15
	Site Preparation	Grading & Infrastructure	Demolition	HP-05	3	(2) Man Lifts, (2)Excavators,(1) Off Road Dump Truck, (1)Loaders, (1)Dozer, (2)Water Trucks, (1) Crane			25	20	24	16	13	
			HP-05	4	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Trucks, (1) Dozer		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	36	28	16	8	18		
			HP-06	6	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (2) Off Road Dump Trucks, (1) Dozer		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	38	30	8	6	19		
			HP-06 (Geothermal)	8	(2) Drill Rigs, (1)Bobcat	(1)Excavator	10	8	8	4	5			
			HP-03 (Roadway-YSB Connection)	6	(1)Loader, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift			10	8	8	4	5		
			HP-03 Parks (Waterfront Promenade North, Horn Blvd Streetscape 2)	5		(1)Excavators, (1)Loaders, (1)Bobcat, (1) Off Road Dump Truck, (1)Water Truck	(1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1)Compactors,	25	20	8	4	13		
			HP-03	9	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift		(1) Cement Truck, (1) Pump Truck, (1) Pile Driver	20	16	16	8	10		

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						Full Time	1/2 Time	1/4 Time	Max Number of Workers	Avg. Number of Workers	Max Number of Truck Trips	Avg. Number of Truck Trips	Number of On Site Equipment
2025	8	Building Construction	Foundation Piles/Structure/ Rough-In	HP-04	4	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift		(1) Cement Truck, (1) Pump Truck, (1) Pile Driver	20	16	16	8	10
				HP-05	8	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift		(1) Cement Truck, (1) Pump Truck, (1) Pile Driver	20	16	16	8	10
				HP-06	12	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Scraper, (2) Off Road Dump Trucks, (1) Dozer		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	20	16	16	8	10
			Interior and Exterior Finishes	HP-03	6	(1)Loader, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift			10	8	8	4	5
				HP-04	8	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	(1) Pile Driver	10	8	8	4	5
				HP-05	10	(1)Loader, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift			10	8	8	4	5
				HP-06	8	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	(1) Pile Driver	10	8	8	4	5
			HP-03 Parks (Waterfront Promenade North, Horn Blvd Streetscape 2)	12		(1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift, (1)Bobcat	(1) Water Truck, (1)Loader, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift	18	12	8	4	9	
		Roadway	Improvements	HP-03 (YS Bridge)	8	(1)Excavators, (2)Loaders, (2) Off Road Dump Truck, (1) Dozer, (4) barges, (4) Cranes, (1) Drill Rig, (1)Water Truck	(2)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Truck, (1) Pile Driver	(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (2) Pump Trucks	78	62	24	16	39
2026	9	Site Preparation	Abatement	HP-04 Parks (WF Prom SP, WF R&E, Regun Crane Pier, WR/DD4)	4	(2) Man Lifts, (1)Loader, (1) Rough Terrain Fork lift	(1) Water Truck		13	10	16	8	7
			Demo	HP-04 Parks (WF Prom SP, WF R&E, Regun Crane Pier, WR/DD4)	8	(2) Man Lifts, (1)Excavators,(1) Off Road Dump Truck, (1)Loaders, (1)Dozer, (1)Water Trucks		(1) Crane	20	16	24	16	10
			Grading	HP-04 Parks (WF Prom SP, WF R&E, Regun Crane Pier, WR/DD4)	9		(1)Excavators, (1)Loaders, (1)Bobcat, (1) Off Road Dump Truck, (1)Water Truck	(1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1)Compactors,	25	20	8	4	13
		Building Construction	Foundation Piles/Structure/ Rough-In	HP-05	10	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift		(1) Cement Truck, (1) Pump Truck, (1) Pile Driver	20	16	16	8	10
				HP-06	11	(1)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Scraper, (2) Off Road Dump Trucks, (1) Dozer		(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1) Barge	20	16	16	8	10
			Interior and Exterior Finishes	HP-03	10	(1)Loader, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift			10	8	8	4	5
				HP-05	10	(1)Loader, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift			10	8	8	4	5
			HP-06	10	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	(1) Pile Driver	10	8	8	4	5	
	HP-04 Parks (WF Prom SP, WF R&E, Regun Crane Pier, WR/DD4)	6	(1)Excavators, (1)Loaders, (1)Bobcat, (1) Off Road Dump Truck, (1)Water Truck	(1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1)Compactors,		25	20	8	4	13			
		Site Preparation	Demo	HP-04 Parks (WF Prom SP, WF R&E, Regun Crane Pier, WR/DD4)	2	(2) Man Lifts, (1)Excavators,(1) Off Road Dump Truck, (1)Loaders, (1)Dozer, (1)Water Trucks		(1) Crane	20	16	24	16	10



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						Full Time	1/2 Time	1/4 Time	Max Number of Workers	Avg. Number of Workers	Max Number of Truck Trips	Avg. Number of Truck Trips	Number of On Site Equipment
2027	10	Site Preparation	Grading	HP-04 Parks (WF Prom SP, WF R&E, Regun Crane Pier, WR/DD4)	6		(1)Excavators, (1)Loaders, (1)Bobcat, (1) Off Road Dump Truck, (1)Water Truck	(1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1)Compactors,	25	20	8	4	13
			Foundation Piles/Structure/ Rough-In	HP-04 Bridges	5	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	20	16	16	8	10	
		Building Construction	Interior and Exterior Finishes	HP-06	6	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	10	8	8	4	5	
			Interior and Exterior Finishes	HP-04 Bridges	5	(1)Excavators, (1)Loaders,(1)Water Trucks, (1)Cranes, (1) Man Lift	(1) Cement Truck, (1) Pump Truck	10	8	8	4	5	
			Interior and Exterior Finishes	HP-04 Parks (WF Prom SP, WF R&E, Regun Crane Pier, WR/DD4)	10	(1)Excavators, (1)Loaders, (1)Bobcat, (1) Off Road Dump Truck, (1)Water Truck	(1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1)Compactors,	25	20	8	4	13	
2028	11	Roadway	Improvements	HP-04 Palou Ave.	6	(2)Excavators, (1)Loaders, (1)Bobcat, (1)Compactors, (1)Water Truck, (1) Off Road Dump Truck	(1) Grader, (1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers	30	24	12	8	15	
2029	12	Site Preparation	Abatement	HP-04 Parks (Community SFC)	4	(2) Man Lifts, (1)Loader, (1) Rough Terrain Fork lift	(1) Water Truck	13	10	16	8	7	
			Demo	HP-04 Parks (Community SFC)	8	(2) Man Lifts, (1)Excavators,(1) Off Road Dump Truck, (1)Loaders, (1)Dozer, (1)Water Trucks	(1) Crane	20	16	24	16	10	
2030	13	Site Preparation	Abatement	HP-06 Parks ( Grassland EP, Multiuse OS)	7		(1) Water Truck		13	10	16	8	7
			Demo	HP-05 Parks (Heritage Park, WF Prom NP)	7	(1) Man Lifts, (1)Excavator, (1) Off Road Dump Truck, (1)Loaders, (1)Dozer, (1)Water Trucks		15	12	8	4	8	
				HP-06 Parks ( Grassland EP, Multiuse OS)	6	(2) Man Lifts, (1)Excavators,(1) Off Road Dump Truck, (1)Loaders, (1)Dozer, (1)Water Trucks	(1) Crane	20	16	24	16	10	
			Grading	HP-04 Parks (Community SFC)	7	(1)Excavators, (1)Loaders, (1)Bobcat, (1) Off Road Dump Truck	(1) Water Truck	(1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1)Compactors,	25	20	8	4	13
				HP-05 Parks (Heritage Park, WF Prom NP)	10	(1)Excavators, (1)Loaders, (1)Bobcat, (1) Off Road Dump Truck	(1)Water Truck	(1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1)Compactors,	25	20	24	16	13
Interior and Exterior Finishes	HP-04 Parks (Community SFC)	9	(1) Excavator, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift, (1)Bobcat	(1) Water Truck, (1)Loader		18	14	16	8	9			
2031	14	Site Preparation	Abatement	HP-06 Parks (Maint. Yard)	4	(2) Man Lifts, (1)Loader, (1) Rough Terrain Fork lift	(1) Water Truck	13	10	16	8	7	
			Demo	HP-05 Parks (Heritage Park, WF Prom NP)	2	(1)Excavators, (1)Loaders, (1)Bobcat, (1) Off Road Dump Truck	(1)Water Truck	(1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1)Compactors,	25	20	24	16	13
				HP-06 Parks ( Grassland EP, Multiuse OS)	4	(2) Man Lifts, (1)Excavators,(1) Off Road Dump Truck, (1)Loaders, (1)Dozer, (1)Water Trucks	(1) Crane	20	16	24	16	10	
				HP-06 Parks (Maint. Yard)	4	(2) Man Lifts, (1)Excavators,(1) Off Road Dump Truck, (1)Loaders, (1)Dozer, (1)Water Trucks	(1) Crane	20	16	24	16	10	
			HP-05 Parks (Heritage Park, WF Prom NP)	8	(1)Excavators, (1)Loaders, (1)Bobcat, (1) Off Road Dump Truck	(1)Water Truck	Soil stabilizer, (1)	25	20	24	16	13	
		Grading	HP-06 Parks (Maint. Yard)	2	(1)Excavators, (1)Loaders, (1)Bobcat, (1) Off Road Dump Truck	(1) Water Truck	(1) Asphalt Layer, (1) Soil stabilizer, (1) Roller, (1) Dozers, (1)Compactors,	25	20	8	4	13	
		Building Construction	Interior and Exterior Finishes	HP-06 Parks (Maint. Yard)	3	(1) Excavator, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift, (1)Bobcat	(1) Water Truck, (1)Loader	18	14	16	8	9	
		Site Preparation	Demo	HP-06 Parks ( Grassland EP, Multiuse OS)	5	(2) Man Lifts, (1)Excavators,(1) Off Road Dump Truck, (1)Loaders, (1)Dozer, (1)Water Trucks	(1) Crane	20	16	24	16	10	

**DRAFT: CPHPSII Project: Construction Workers and Equipment for  
 Hunters Point Shipyard Construction Phase (Revision Date: 2/26/2018  
 based on Construction Schedule received 02/21/18 )  
 Prepared by TRC for EIR Analysis**

Major Phase Indicator	
Subphase Color Coding	1 HPS
	2 HPS
	3 HPS

Year	Project Year	Horizontal (Site Prep) or Vertical Duration (Building Const.)	Construction Phase Type	Project Sub Phase	Duration (Months)	Construction Equipment			Daily Construction Workers		Daily Construction Truck Trips			
						Full Time	1/2 Time	1/4 Time	Max Number of Workers	Avg. Number of Workers	Max Number of Truck Trips	Avg. Number of Truck Trips	Number of On Site Equipment	
2032	15		Grading	HP-06 Parks ( Grassland EP, Multiuse OS)	9	(2)Excavators, (4)Loaders, (2)Bobcat, (4) Off Road Dump Truck, (2)Water Truck		(1) Barge	40	32	140	120	20	
			Building Construction	Interior and Exterior Finishes	HP-05 Parks (Heritage Park, WF Prom NP)	8	(1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift, (1)Bobcat	(1) Water Truck, (1)Loader		15	12	8	4	8
					HP-06 Parks ( Grassland EP, Multiuse OS)	3	(1) Excavator, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift, (1)Bobcat	(1) Water Truck, (1)Loader		18	14	16	8	9
2033	16	Building Construction	Interior and Exterior Finishes	HP-05 Parks (Heritage Park, WF Prom NP)	8	(1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift, (1)Bobcat	(1) Water Truck, (1)Loader		15	12	8	4	8	
				HP-06 Parks ( Grassland EP, Multiuse OS)	8	(1) Excavator, (1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift, (1)Bobcat	(1) Water Truck, (1)Loader		18	14	16	8	9	
2034	17	Building Construction	Interior and Exterior Finishes	HP-05 Parks (Heritage Park, WF Prom NP)	8	(1) Man Lift, (1) Sweeper, (1) Rough Terrain Fork Lift, (1)Bobcat	(1) Water Truck, (1)Loader		15	12	8	4	8	

CPHPSII Project - Construction Workers and Equipment for Field Management by Year (Revision Date: 2/26/2018)

Prepared by TRC for EIR analysis

Construction Phase	Yearly Average Duration (months)	Daily Construction Workers		Daily Construction Truck Trips <sup>1</sup>			Construction Equipment <sup>3</sup>	Construction Equipment <sup>3</sup>	Construction Equipment <sup>3</sup>
		Max. Number of workers	Avg. Number of workers	Max. Number of truck trips	Avg. Number of truck trips	Number of on site equipment	Full Time	1/2 Time	1/4 Time
Field Management 2014	12	15	12	8	4	10		(2)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2015	12	15	12	8	4	10		(2)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2016	12	15	12	8	4	10		(2)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2017	12	15	12	8	4	10		(2)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2018	12	25	20	8	4	10		(6)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2019	12	25	20	8	4	10		(6)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2020	12	25	20	8	4	10		(6)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2021	12	25	20	8	4	10		(6)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2022	12	25	20	8	4	10		(6)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2023	12	25	20	8	4	10		(6)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2024	12	25	20	8	4	10		(6)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2025	12	25	20	8	4	10		(6)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2026	12	15	12	8	4	10		(2)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2027	12	15	12	8	4	10		(2)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2028	12	15	12	8	4	10		(2)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2029	12	15	12	8	4	10		(2)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2030	12	15	12	8	4	10		(2)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2031	12	15	12	8	4	10		(2)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2032	12	15	12	8	4	10		(2)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2033	12	15	12	8	4	10		(2)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	
Field Management 2034	12	15	12	8	4	10		(2)Onsite Field Trucks, Backup Equipment (see note 2); (1)Loaders, (1)Haul Trucks, (1)Water Trucks, (1) Man Lift	

**Note:**

1. Number of truck trips making deliveries, and number of truck trips required for materials removal, see assumptions for trip details.
2. Back up equipment is kept onsite to minimize downtime if a piece of equipment breaks down and needs replacement. Typically this equipment will not be used on a day to day basis.
3. It should be assumed that all Man Lifts referenced in the "Construction Equipment" columns will be propane or electric powered.
4. Hunters Point and Candlestick Point will each utilize a new dedicated crushing plant located near the Bay. The crushing plants will be comprised of 1 loader, 1 hammer, 1 screener, 1 crusher and an adjacent batch plant. Each crushing plant will operate ½ time. (2) = Number of pieces of specified equipment.

**Assumptions**

Max. number of round trips to 8 total trips

Each truck will be able to carry 20 tons of material

Personal vehicle trips to and from the construction site were not included in the truck trip calculations and are estimated to be 1 trip for every 2 workers as incentives will be offered for use of mass transit and car/van pooling.

Import fill will be brought onto the site through two primary modes; Trucks (60%) and Barge (40%).

Quantities do not account for concurrent remediation work occurring at Hunters Point Shipyard.

CPHPSII Project - Construction Workers and Equipment for Shoreline Improvements by Construction Phase (Revision Date: 2/26/18)

Prepared by TRC for EIR analysis

	Yearly Average Duration (months)	Daily Construction Workers		Daily Construction Truck Trips <sup>1</sup>	Daily Construction Truck Trips <sup>1</sup>	Yearly Barge Trips	Number of on site equipment	Construction Equipment <sup>2,3</sup>	Construction Equipment <sup>2</sup>	Construction Equipment <sup>2</sup>
		Max. Number of workers	Avg. Number of workers	Max. Number of truck trips	Avg. Number of truck trips	Number of Round Trips		Full Time	1/2 Time	1/4 Time
<b>Hunters Point Shipyard</b>										
<b>2019 Shoreline</b>										
HP-02 (Outfalls A, B, and H)	6	21	18	0	0	6	5	(1) Floating Platforms, (1) Bobcat	(1) Cranes, (1)Barge, (1) Bobcat	
<b>2020 Shoreline</b>										
HP-01 (Outfalls D and E)	6	21	18	0	0	6	5	(1) Floating Platforms, (1) Bobcat	(1) Cranes, (1)Barge, (1) Bobcat	
<b>2021 Shoreline</b>										
<b>2022 Shoreline</b>										
<b>2023 Shoreline</b>										
<b>2024 Shoreline</b>										
Demolition and Improvements (Waterfront Prom N)	8	21	18	0	0	6	2	(1) Floating Platforms, (1) Bobcat		
<b>2025 Shoreline</b>										
Demolition and Improvements (Waterfront Prom N)	6	21	18	0	0	6	5	(1) Floating Platforms, (1) Bobcat	(1) Cranes, (1)Barge, (1) Bobcat	
<b>2026 Shoreline</b>										
Demolition and Improvements (WF Prom SP, WF R&E, Regun Crane Pier, WR/DD4)	7	21	18	0	0	15	9	(2) Floating Platforms, (2) Cranes, (2) Excavator, (2) Bobcat	(1)Barge	
<b>2027 Shoreline</b>										
Demolition and Improvements (WF Prom SP, WF R&E, Regun Crane Pier, WR/DD4)	6	21	18	0	0	15	9	(2) Floating Platforms, (2) Cranes, (2) Excavator, (2) Bobcat	(1)Barge	
<b>2030 Shoreline</b>										
Demolition and Improvements ( Heritage Park, Waterfront Prom NP)	6	21	18	0	0	20	7	(2) Floating Platforms, (2) Cranes, (1) Excavator, (2) Bobcat	(1)Barge	
<b>2031 Shoreline</b>										
Demolition and Improvements ( Heritage Park, Waterfront Prom NP)	6	21	18	0	0	20	7	(2) Floating Platforms, (2) Cranes, (1) Excavator, (2) Bobcat	(1)Barge	
<b>2032 Shoreline</b>										
Demolition and Improvements ( Grasslands Ecology Park, Multiuse Open Space)	7	21	18	0	0	10	7	(2) Floating Platforms, (2) Cranes, (1) Excavator, (2) Bobcat	(1)Barge	
<b>Candlestick Point</b>										
<b>2021 Shoreline</b>										
Improvements (Last Port + The Neck)	4	7	5	0	0	2	3	(1) Excavator		(1) Crane, (1) Barge
<b>2025 Shoreline</b>										
Improvements (The Point + The Heart of the Park)	4	7	5	0	0	2	3	(1) Excavator		(1) Crane, (1) Barge
<b>2027 Shoreline</b>										
Improvements (The Last Rubble and Wind Meadow)	4	7	5	0	0	2	3	(1) Excavator		(1) Crane, (1) Barge
<b>2030 Shoreline</b>										
Improvements (Bayview Gardens)	2	7	5	0	0	2	3	(1) Excavator		(1) Crane, (1) Barge
<b>2032 Shoreline</b>										
Improvements (Grasslands S1, Grasslands S2)	4	7	5	0	0	2	3	(1) Excavator		(1) Crane, (1) Barge

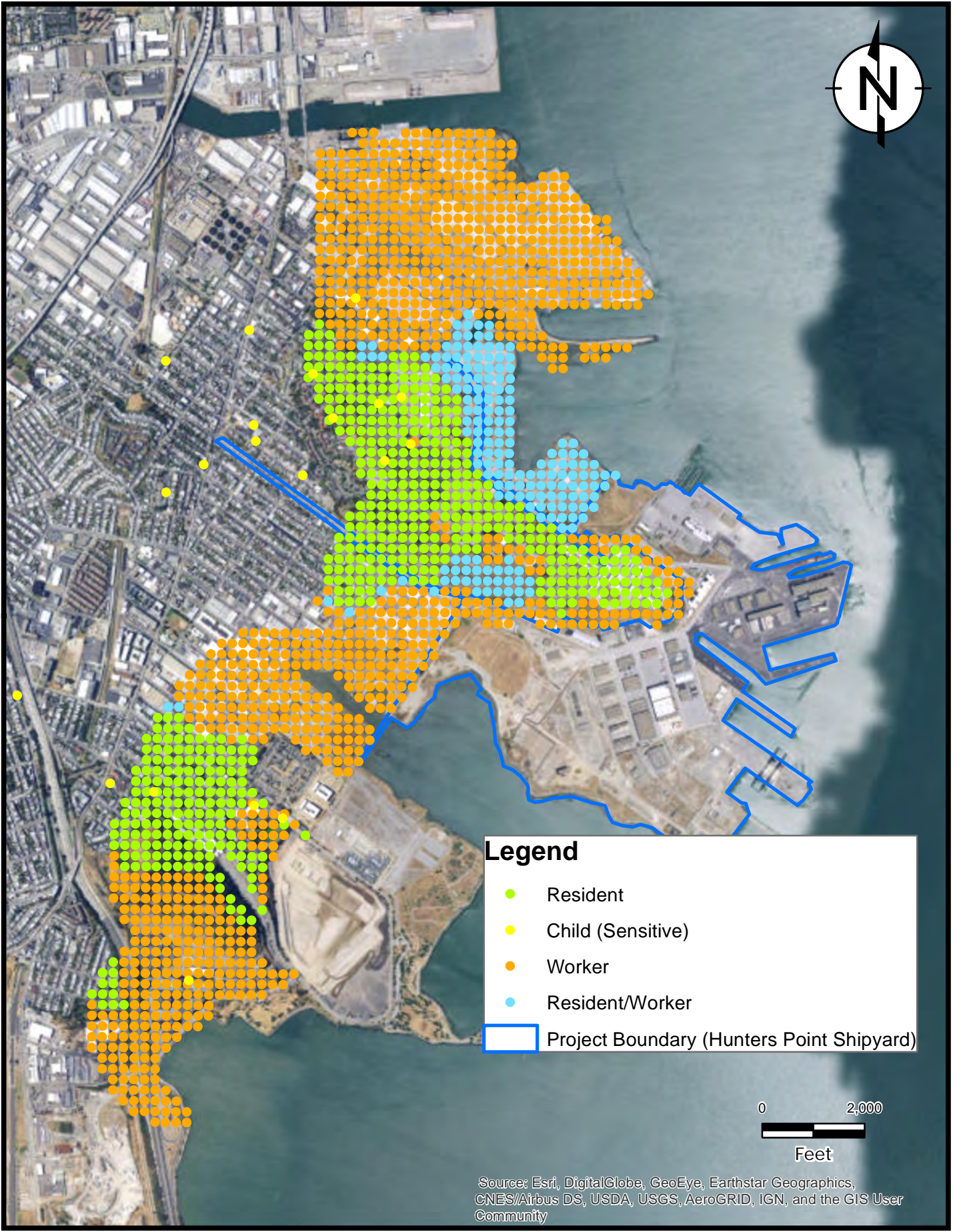
**Note:**

- Number of truck trips making deliveries, and number of truck trips required for materials removal, see assumptions for trip details.
  - The construction equipment in this table identifies what will be required in addition to the equipment already onsite performing infrastructure work.
  - It should be assumed that all Floating Platforms referenced in the "Construction Equipment" columns will be propane or electric powered.
- (2) = Number of pieces of specified equipment.

**Assumptions**

Each truck will be able to carry 15 cy of material  
 Each barge will be able to carry 2500 tons of material  
 Hunters Point Shipyard import fill will be brought on site by barge (100%)  
 Candlestick Point import fill will be brought on site by barge (50%), and sourced on site (50%).  
 Quantities do not account for work performed by Navy.

**ATTACHMENT C:  
RECEPTOR LOCATIONS**



**Legend**

- Resident
- Child (Sensitive)
- Worker
- Resident/Worker
- Project Boundary (Hunters Point Shipyard)



Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**ATTACHMENT D:  
SUMMARY OF CANCER RISKS AT THE MAXIMALLY EXPOSED INDIVIDUALS**

**Attachment D**  
**Summary of Cancer Risks<sup>1</sup> at the Maximally Exposed Individuals (MEI)<sup>2</sup>**  
**Candlestick Point - Hunters Point Shipyard Phase II Development Plan**  
**San Francisco, California**

Project Analysis						
	School Child	Offsite Worker	Resident			
			Adult		Child	
			High End	Average	High End	Average
2010 EIR	2.34E-07	3.82E-06	1.64E-06	1.47E-06	3.15E-06	2.45E-06
2017 Addendum	2.12E-07	3.48E-06	8.76E-07	7.86E-07	1.69E-06	1.31E-06

**Notes:**

<sup>1</sup> Cancer risks were estimated using the following equation:

$$\text{Risk}_{inh} = C_i \times CF \times I_{Finh} \times CPFi \times ASF$$

Where:

- Risk<sub>inh</sub> = Cancer Risk for the Inhalation Pathway (unitless)
- C<sub>i</sub> = Annual Average Air Concentration for Chemical "i" (µg/m<sup>3</sup>)
- CF = Conversion Factor (mg/µg)
- I<sub>Finh</sub> = Intake Factor for Inhalation (m<sup>3</sup>/kg-day)
- CPFi = Cancer Potency Factor for Chemical "i" (mg/kg-day)<sup>-1</sup>
- ASF = Age Sensitivity Factor (unitless)

<sup>2</sup> Latitude/Longitude coordinates of the MEI (same location for 2010 EIR and 2017 Addendum unless otherwise specified):

- School Child: 37.717974, -122.387394
- Offsite Worker: 37.721275, -122.382757
- Resident (2010 EIR): 37.731126, -122.370760
- Resident (2017 Addendum): 37.727501, -122.366819