

SECTION III.H AIR QUALITY

III.H.1 Introduction

This section of the EIR evaluates the potential impacts on air quality resulting from implementation of the Project. This includes the potential for the Project to conflict with or obstruct implementation of the applicable air quality plan, to violate an air quality standard or contribute substantially to an existing or projected air quality violation, to result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is in nonattainment, expose sensitive receptors to substantial pollutant concentrations, or create objectionable odors that would affect a substantial number of people. This section identifies both Project-level and cumulative environmental impacts, as well as feasible mitigation measures that could reduce or avoid the identified impacts.

The analyses includes an (1) evaluation of criteria air pollutant mass emissions including emissions by construction workers and equipment (refer to Appendix H1 [Construction Workers and Equipment]) using methodology provided in Bay Area Air Quality Management District (BAAQMD) CEQA Guidelines; (2) operational emissions from project-related and mobile sources; and (3) ambient carbon monoxide concentration from mobile sources (refer to Appendix H2 [Air Quality Model Input/Output]).^{168,169} In addition, this section provides a summary of the human health risk assessments (HRAs) conducted for (1) diesel particulate matter (DPM) emissions; (2) potentially contaminated dust emissions; (3) fine particulate matter (PM_{2.5}) emissions; and (4) potential emissions of toxic air contaminants (TAC) from stationary sources at proposed Research and Development (R&D) uses at the Project. Those four topics are based on a report prepared by ENVIRON International Corporation (ENVIRON) entitled *Ambient Air Quality Human Health Risk Assessment: Candlestick Point–Hunters Point Shipyard Phase II Development Plan* (refer to Appendix H3 [Ambient Air Quality and Human Health Risk Assessment]).

Section III.S (Greenhouse Gas Emissions) evaluates Project greenhouse gas (GHG) emissions and their potential contribution to climate change.

III.H.2 Setting

■ Environmental Background

The Project is located in the City and County of San Francisco, which is within the San Francisco Bay Area Air Basin (SFBAAB). The SFBAAB also comprises all of Alameda, Contra Costa, Marin, Napa, San Mateo, and Santa Clara Counties, the southern half of Sonoma County, and the southwestern portion of Solano County.

¹⁶⁸ Bay Area Air Quality Management District (BAAQMD). 1999. BAAQMD CEQA Guidelines: Assessing the Air Quality Impacts of Projects and Plans. December.

¹⁶⁹ BAAQMD. 2009. California Environmental Quality Act, Draft Air Quality Guidelines. September & October Drafts.

Ambient air quality is influenced by climatological conditions, topography, and the quantity and type of pollutants released in an area. The major determinants of transport and dilution of a given pollutant are wind, atmospheric stability, terrain; sunshine can impact the concentrations of photochemical pollutants.

Climate, Topology, and Meteorology

The regional climate in the SFBAAB is considered semi-arid and is characterized by mild, dry summers and mild, moderately wet winters (about 90 percent of the annual total rainfall is received in the November-April period), moderate daytime onshore breezes, and moderate humidity. The climate is dominated by a strong, semi-permanent, subtropical high-pressure cell over the northeastern Pacific Ocean. Climate is also affected by the moderating effects of the adjacent oceanic heat reservoir. In summer, when the high-pressure cell is strongest and farthest north, fog forms in the morning, and temperatures are mild. In winter, when the high-pressure cell is weakest and farthest south, occasional rainstorms occur.

The Project is located in the San Francisco Peninsula (Peninsula) climatological subregion that extends northwest from San Jose to the Golden Gate. The Santa Cruz Mountains run up the center of the Peninsula, creating an area of warmer temperatures and fewer foggy days to the east where the ridgeline blocks the marine layer. In San Francisco, the mean maximum summer temperatures are in the mid-60s degrees Fahrenheit, while mean minimum temperatures during the winter months are in the high-30s to low-40s degrees Fahrenheit. Annual average wind speeds range from 4 to 9 knots throughout the Peninsula with prevailing winds from the west, although local wind patterns are often influenced greatly by local topographic features.

In summer, the northwest winds to the west of the Pacific coastline are drawn into the interior through the Golden Gate and over the lower portions of the San Francisco Peninsula. This channeling of the flow through the Golden Gate produces a jet that sweeps eastward but widens downstream producing southwest winds at Berkeley and northwest winds at San Jose. Wind speeds may be locally strong in regions where air is channeled through a narrow opening such as the Golden Gate or San Bruno Gap. For example, the average wind speed at San Francisco International Airport from 3:00 P.M. to 4:00 P.M. in July is about 17 knots, compared with only about 9 knots at San Jose and less than 6 knots at the Farallon Islands.

The sea breeze between the coast and the Central Valley commences near the surface along the coast in late morning or early afternoon; it may be first observed only through the Golden Gate. Later in the day the layer deepens and intensifies while spreading inland. As the breeze intensifies and deepens it flows over the lower hills farther south along the Peninsula. This process frequently can be observed as a bank of stratus "rolling over" the coastal hills on the west side of the Bay. The depth of the sea breeze depends in large part upon the height and strength of the inversion. The generally low elevation of this stable layer of air prevents marine air from flowing over the coastal hills. It is unusual for the summer sea breeze to flow over terrain exceeding 2000 feet in elevation.

In winter, the Bay Area experiences periods of storminess and moderate-to-strong winds and periods of stagnation with very light winds. Winter stagnation episodes are characterized by outflow from the Central Valley, nighttime drainage flows in coastal valleys, weak onshore flows in the afternoon and otherwise light and variable winds.

Onshore winds from the west dominate at the Project such that emissions from the Project would be blown eastward over the San Francisco Bay.

Existing Air Quality Conditions

In addition to climate, topology, and meteorology, a wide range of emissions sources—such as dense population centers, heavy vehicular traffic, and industry—influences the air quality within the SFBAAB. Air pollutant emissions within the Bay Area are generated by stationary (or point), area wide and mobile sources. Stationary sources exist at identified locations and are usually associated with specific large manufacturing and industrial facilities; examples include fossil-fuel power plants or large boilers that provide industrial process heat. Area wide sources consist of many smaller point sources that are widely distributed spatially; examples include residential and commercial water heaters, painting/coating operations, power lawn mower use, agricultural operations, landfills, and the use of consumer products such as barbeque lighter fluid, hair spray, etc. Mobile sources include on-road motor vehicles and other transportation sources like aircraft, ships, trains, and self-propelled construction equipment. Air pollutants can also be generated by natural sources such as fine dust particles suspended in the air by high winds.

Criteria Pollutants

The federal and state governments have established ambient air quality standards (National Ambient Air Quality Standards [NAAQS] and California Ambient Air Quality Standards [CAAQS]) for outdoor concentrations of a number of pollutants to protect the health and welfare of the people most sensitive to their effects. Such pollutants are called “criteria” pollutants, the most common of which are listed below in Table III.H-1 (State and Federal Criteria Air Pollutant Standards, Effects, and Sources), which includes NAAQS and CAAQS and the known health effect for these pollutants. Table III.H-1 also discloses the health effects of each criteria pollutant, and the federal and state attainment status for each.

- **Ozone** (O_3) is a gas that is not directly emitted into the air but formed when reactive organic gases (ROG) and nitrogen oxides (NO_x)—both byproducts of internal combustion engine exhaust (ROG can also originate from the evaporation of chemical solvents or fuels)—undergo slow photochemical reactions in the presence of sunlight. Ozone concentrations are generally highest during the summer months when direct sunlight, light wind, and warm temperature conditions are conducive to its formation. Because of the reaction time involved in forming ozone, peak ozone concentrations are often found far downwind of precursor emissions. Therefore, ozone is seen as a regional pollutant where emissions and generation occur over large areas.

Emissions of the ozone precursors ROG and NO_x from both mobile (vehicle) and stationary sources have decreased in the SFBAAB since 1975 and are projected to continue declining through 2020. Reasons include the implementation of strict motor vehicle emissions controls, new controls on oil refinery fugitive emissions, and new rules for control of ROG from industrial coatings and solvent operations.¹⁷⁰ Concomitantly, the peak 1-hour and 8-hour concentrations have declined by nearly 18% during the last 20 years.¹⁷¹

- **Carbon Monoxide** (CO) is a colorless, odorless gas produced by the incomplete combustion of fuels, primarily from transportation sources though also from wood-burning stoves, incinerators

¹⁷⁰ California Air Resources Board. 2009. The 2009 California Almanac of Emissions and Air Quality. Sacramento, CA.

¹⁷¹ Ibid.

and other industrial sources. CO concentrations tend to be the highest during the winter morning, with little to no wind, when surface-based inversions trap the pollutant at ground levels. Because CO is emitted directly from internal combustion engines—unlike ozone—and motor vehicles operating at slow speeds are the primary source of CO in the Bay Area, the highest ambient CO concentrations are generally found near congested transportation corridors and intersections. In contrast to ozone issues, which tend to be regional in nature, CO issues tend to be localized.

- **Nitrogen Dioxide** (NO₂) is a brownish, highly reactive gas that is present in all urban environments. The major human-made NO₂ sources are combustion devices, such as boilers or turbines, and internal combustion engines, such as automobile or generator engines. Combustion devices emit primarily nitrogen oxide (NO), which reacts through oxidation in the atmosphere to form NO₂. NO and NO₂ are collectively referred to as NO_x. As NO₂ is formed and depleted by reactions associated with photochemical smog, the NO₂ concentrations in a particular geographical area may not be representative of the local NO_x emissions sources.
- **Sulfur dioxide** (SO₂) is a colorless, extremely irritating gas or liquid. It enters the atmosphere as a pollutant mainly as a result of burning high sulfur-content fuel oils and coal, and from chemical processes occurring at chemical plants and refineries.
- **Respirable Particulate Matter** (PM₁₀) and **Fine Particulate Matter** (PM_{2.5}) consist of extremely small, suspended particles or droplets 10 microns and 2.5 microns or smaller in diameter, respectively. Some sources of particulate matter, like pollen, forest fires, and windblown dust, are naturally occurring. However, in populated areas, most particulate matter is caused by road dust, combustion products, abrasion of tires and brakes, and construction activities. Particulate matter can also be formed in the atmosphere by condensation of SO₂ and ROG.
- **Lead** (Pb) occurs in the atmosphere as particulate matter. Historically, the combustion of leaded gasoline was the primary source of airborne lead in the Bay Area, though the use of leaded gasoline is no longer permitted for on-road motor vehicle. Other sources of lead include the manufacturing and recycling of batteries, paint, ink, ceramics, ammunition, and secondary lead smelters.
- **Sulfates** (SO₄) are the fully oxidized ionic form of sulfur. Emissions of sulfur compounds occur primarily from the combustion of petroleum-derived fuels (e.g., gasoline and diesel fuel) that contain sulfur. This sulfur is oxidized to sulfur dioxide (SO₂) during the combustion process and subsequently converted to sulfate compounds in the atmosphere. The conversion of SO₂ to sulfates takes place comparatively rapidly and completely in urban areas of California due to regional meteorological features.
- **Hydrogen Sulfide** (H₂S) is a colorless gas with the odor of rotten eggs. It is formed during bacterial decomposition of sulfur-containing organic substances. Also, it can be present in sewer gas and some natural gas, and can be emitted as the result of geothermal energy exploitation.
- **Vinyl Chloride** (chloroethene) is a colorless gas with a mild, sweet odor. Most vinyl chloride is used to make polyvinyl chloride (PVC) plastic and vinyl products. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites, due to microbial breakdown of chlorinated solvents. While the California ambient air quality standard for vinyl chloride is still in existence, since 1990 (when the California Air Resources Board [ARB] identified it as a TAC) the compound is typically evaluated using risk assessment methods.
- **Visibility-Reducing Particles** consist of suspended particulate matter, which is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size, and chemical composition, and

Table III.H-1 State and Federal Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Time	State Standard ^a		Federal Standard ^b		Pollutant Health and Atmospheric Effects	Major Pollutant Sources
		Concentration	Attainment Status	Concentration	Attainment Status		
Ozone	1-Hour	0.09 ppm	N	— ^c	— ^c	High concentrations can directly affect lungs, causing irritation. Long-term exposure may cause damage to lung tissue.	Formed when ROG and NO _x react in the presence of sunlight. Major sources include on-road motor vehicles, solvent evaporation, and commercial industrial mobile equipment.
	8-Hour	0.070 ppm	N	0.075 ppm	N		
Carbon Monoxide	1-Hour	20 ppm	A	35 ppm	A	Classified as a chemical asphyxiate, CO interferes with the transfer of fresh oxygen to the blood and deprives sensitive tissues of oxygen.	Internal combustion engines, primarily gasoline-powered motor vehicles.
	8-Hour	9.0 ppm	A	9 ppm	A		
Nitrogen Dioxide	1-Hour	0.18 ppm	A	—	A	Irritating to eyes and respiratory tract. Colors atmosphere reddish-brown.	Motor vehicles, petroleum-refining operations, industrial sources, aircraft, ships, and railroads.
	Annual	0.030 ppm	A	0.053 ppm	A		
Sulfur Dioxide	1 Hour	0.25 ppm	A	—	—	Irritates upper respiratory tract; injurious to lung tissue. Can yellow the leaves of plants, destructive to marble, iron, and steel. Limits visibility and reduces sunlight.	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
	24-Hour	0.04 ppm	A	0.14 ppm	A		
	Annual	—	—	0.030 ppm	A		
Particulate Matter (PM ₁₀)	24-Hour	50 µg/m ³	N	150 µg/m ³	U	May irritate eyes and respiratory tract, decreases in lung capacity, cancer, and increased mortality. Produces haze and limits visibility.	Dust and fume-producing industrial and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
	Annual	20 µg/m ³	N	— ^d	—		
Fine Particulate Matter (PM _{2.5})	24-Hour	—	—	35 µg/m ^{3.e}	A	Increases respiratory disease, lung damage, cancer, and premature death. Reduces visibility and results in surface soiling.	Fuel combustion in motor vehicles, equipment, and industrial sources; residential and agricultural burning. Also formed from photochemical reactions of other pollutants, including NO _x , SO ₂ , and organics.
	Annual	12 µg/m ³	N	15 µg/m ³	A		
Lead	Monthly	1.5 µg/m ³	A	—	—	Disturbs gastrointestinal system, and causes anemia, kidney disease, and neuromuscular and neurological dysfunction.	Present source: lead smelters, battery manufacturing and recycling facilities. Past source: combustion of leaded gasoline.
	Quarterly	—	—	1.5 µg/m ³	A		
	3-Month Rolling	—	—	0.15 µg/m ³	U		
Sulfates	24-Hour	25 µg/m ³	A	No Federal Standard	—	Decrease ventilatory function, aggravate asthmatic symptoms, and increase risk of cardiopulmonary disease. Degrade visibility, and, due to fact that they are usually acidic, can harm ecosystems and damage materials and property.	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
Hydrogen Sulfide	1-Hour	0.03 ppm (42 µg/m ³)	U	No Federal Standard	—	Primarily an odor nuisance at ambient concentrations.	Present in sewer gas and some natural gas, and can be emitted as the result of geothermal energy exploitation.

Table III.H-1 State and Federal Criteria Air Pollutant Standards, Effects, and Sources

Pollutant	Averaging Time	State Standard ^a		Federal Standard ^b		Pollutant Health and Atmospheric Effects	Major Pollutant Sources
		Concentration	Attainment Status	Concentration	Attainment Status		
Vinyl Chloride	24-Hour	0.01 ppm (26 µg/m ³)	U	No Federal Standard		Short-term exposure to high levels causes central nervous system effects, such as dizziness, drowsiness, and headaches. Long-term exposure through inhalation and oral exposure causes liver damage. Cancer is a major concern from exposure to vinyl chloride via inhalation.	Most vinyl chloride is used to make polyvinyl chloride (PVC) plastic and vinyl products. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites, due to microbial breakdown of chlorinated solvents.
Visibility Reducing Particles	8-Hour	Extinction coefficient of 0.23 per kilometer—visibility of 10 miles or more because of particles when the relative humidity is less than 70%.	U	No Federal Standard		Limits visibility.	Combustion processes in motor vehicles, industrial and commercial boilers and incinerators, power generating plants, solid fuel domestic heating, domestic incineration. Natural sources of airborne particles include fine soil particles and smoke particles from bushfires.

SOURCE: BAAQMD's Air Quality Standards and Attainment Status internet site http://hank.baaqmd.gov/pln/air_quality/ambient_air_quality.htm, ARB's California Ambient Air Quality Standards (CAAQS) internet site <http://www.arb.ca.gov/research/aaqs/caaqs/caaqs.htm>, and the United States Environmental Protection Agency's (US EPA's) National Ambient Air Quality Standards (NAAQS) internet site <http://www.epa.gov/air/criteria.html>, (accessed October 12, 2009)

A = Attainment; N = Nonattainment; U = Unclassified (insufficient data collected to determine classification; generally indicates low concern for the pollutant levels); ppm = parts per million; µg/m³ = micrograms per cubic meter

- California standards for O₃, CO (except Lake Tahoe), SO₂ (1-hour and 24-hour), NO, suspended particulate matter—PM₁₀, and visibility-reducing particles are values that are not to be exceeded. The standards for sulfates, Lake Tahoe CO, lead, hydrogen sulfide, and vinyl chloride are not to be equaled or exceeded. If the standard is for a 1-, 8-, or 24-hour average (i.e., all standards except for lead and the PM₁₀ annual standard), some measurements may be excluded. In particular, measurements are excluded that California ARB determines would occur less than once per year on the average. The Lake Tahoe CO standard is 6.0 ppm, a level one-half the national standard and two-thirds the state standard.
- Federal standards other than for ozone, particulates and those based on annual averages are not to be exceeded more than once a year. The 1-hour ozone standard is attained if, during the most recent 3-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than one. The 8-hour ozone standard is attained when the 3-year average of the 4th highest daily concentrations is 0.08 ppm or less. The 24-hour PM₁₀ standard is attained when the 3-year average of the 99th percentile of monitored concentrations is less than 150 µg/m³. The 24-hour PM_{2.5} standard is attained when the 3-year average of 98th percentiles is less than 65 µg/m³.
- The federal 1-hour ozone standard was revoked on June 15, 2005.
- Because of lack of evidence linking health problems to long-term coarse particle exposure, the USEPA revoked the annual PM₁₀ standard on September 21, 2006.
- USEPA lowered the 24-hour PM_{2.5} standard from 65 µg/m³ to 35 µg/m³ in 2006 and issued attainment status designations for the 35 µg/m³ standard on December 22, 2008. USEPA designated the SFBAAB as nonattainment for the 35 µg/m³ PM_{2.5} standard; however, that designation has not yet been published in the Federal Register and is, therefore, not yet effective.

can be made up of many different materials such as metals, soot, soil, dust, and salt. The Statewide standard is intended to limit the frequency and severity of visibility impairment due to regional haze. A separate standard for visibility-reducing particles that is applicable only in the Lake Tahoe Air Basin is based on reduction in scenic quality.

Regional Emissions Inventory

With the assistance of the BAAQMD, the California ARB compiles inventories of CO, ROG (reactive organic gases, which are ozone precursors), NO₂, PM₁₀, and PM_{2.5} emissions for the SFBAAB. Table III.H-2 (San Francisco Bay Area Air Basin and San Francisco County Criteria Pollutant Emissions Inventory and Projections, 2008 [Tons/Day—Annual Average]) presents a summary of the most recent year of emissions data for the SFBAAB and San Francisco County.

Table III.H-2 San Francisco Bay Area Air Basin and San Francisco County Criteria Pollutant Emissions Inventory and Projections, 2008 (Tons/Day—Annual Average)						
	CO	ROG	NO_x	SO_x	PM₁₀	PM_{2.5}
SFBAAB						
<u>2008 Estimated</u>						
Total Emissions	1,748	378	448	62	212	81
On-Road Motor Vehicle Emissions	1,542	183	381	15	20	16
San Francisco						
<u>2008 Estimated</u>						
Total Emissions	148	34	79	15	17	7.5
On-Road Motor Vehicle Emissions	142	18	74	15	4.6	4.1

SOURCE: California ARB, Almanac Emission Projection Data, <http://www.arb.ca.gov/app/emsmv/emssumcat.php> (accessed October 2009).

Natural source are excluded from this inventory.

Monitoring Station Data and Attainment Area Designations

The SFBAAB has instances of recorded violations of federal and state AAQS for ozone, CO, and PM₁₀ over the last 30 years. Since the early 1970s, substantial progress has been made toward controlling these pollutants. Emissions and ambient concentrations of CO decreased in the SFBAAB with the introduction of the catalytic converter in 1975, and with subsequent improvements in motor vehicle engine technology and the introduction of oxygenated fuel. No violations of the state AAQS or federal AAQS for CO have been recorded in the Bay Area since 1991. The Bay Area is in attainment for all state and federal standards except those for ozone, PM₁₀, and PM_{2.5}. For ozone, the SFBAAB does not meet either the state or federal standards. For PM₁₀ and PM_{2.5}, the SFBAAB does not meet the state standards but does meet the current federal standards.¹⁷²

¹⁷² United States Environmental Protection Agency (USEPA) lowered the 24-hour PM_{2.5} standard from 65 µg/m³ to 35 µg/m³ in 2006 and issued attainment status designations for the 35 µg/m³ standard on December 22, 2008. USEPA designated the SFBAAB as nonattainment for the 35 µg/m³ PM_{2.5} standard; however, that designation has not yet been published in the Federal Register and is, therefore, not yet effective.

The BAAQMD operates many air quality monitoring stations throughout the Bay Area. The closest monitoring station to the Project is the San Francisco-Arkansas Street monitoring station, which is located approximately three miles to the north of the Project on Potrero Hill. Table III.H-3 (Summary of Local Ambient Air Quality in the Project Vicinity) shows recent data taken at this monitoring station (i.e., 2006 through 2008).¹⁷³ During this period at this station, the state and federal ozone standards were not exceeded. The state 24-hour PM₁₀ standard was exceeded five times while the federal 24-hour PM₁₀ standard was not exceeded. For this time period, the annual average was above the state standard of 20 µg/m³. The federal 24-hour standard for PM_{2.5} standard was exceeded eight times over this period at this station; however, over this period, the annual average was below both the state 12 µg/m³ and federal 15 µg/m³ standards.

Toxic Air Contaminants

TACs include a diverse group of air pollutants that can adversely affect human health. They are not fundamentally different from the criteria pollutants, but they have not had ambient air quality standards established for them for a variety of reasons (e.g., insufficient dose-response data, association with particular workplace exposures rather than general environmental exposure, etc.). The health effects of TACs can result from either acute or chronic exposure; many types of cancer are associated with chronic TAC exposures, but TAC exposures can also cause other adverse health effects. Consequently, the BAAQMD has established both a cancer and a non-cancer health risk threshold for TAC emissions.

Significant sources of TACs in the environment include industrial processes, such as petroleum refining, chemical manufacturing, electric utilities, metal mining/refining and chrome plating; commercial operations, such as gasoline stations, dry cleaners and buildings with boilers and/or emergency generators; and transportation activities, particularly diesel-powered vehicles, including trains, buses, and trucks. The California ARB has determined that the 10 compounds which pose the greatest known health risk in California, based primarily on ambient air quality data, are benzene, 1,3-butadiene, acetaldehyde, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, perchloroethylene, and DPM.¹⁷⁴

Diesel Particulate Matter

DPM is generated when an engine burns diesel fuel and consists of a mixture of gases and fine particles (also known as soot) that can penetrate deeply into the lungs, where they can contribute to a range of health problems. In 1998, the California ARB identified particulate matter from diesel-powered engines as a TAC based on its potential to cause cancer and other adverse health effects.¹⁷⁵ Diesel exhaust is a complex mixture that includes hundreds of individual constituents and as a mixture, is identified by the

¹⁷³ BAAQMD formerly maintained a Bayview monitoring station, but monitoring activities ceased in 2005.

¹⁷⁴ California ARB. 2009. The 2009 California Almanac of Emissions and Air Quality. Sacramento, CA.

¹⁷⁵ California ARB, Initial Statement of Reasons for Rulemaking. Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant. June.1998.

Table III.H-3 Summary of Local Ambient Air Quality in the Project Vicinity

Air Pollutants ^a	Year		
	2006	2007	2008
Ozone			
Maximum 1-hour concentration measured ^b	0.053 ppm	0.060 ppm	0.082 ppm
Days exceeding state 0.09 ppm 1-hour standard	0	0	0
Maximum 8-hour concentration measured ^c	0.046 ppm	0.049 ppm	0.066 ppm
Days exceeding state 0.07 or federal 0.075 ppm 8-hour standard	0	0	0
Respirable Particulate Matter (PM₁₀)			
Annual average concentration measured ^a	22.9 µg/m ³	21.9 µg/m ³	22.0 µg/m ³
Maximum 24-hour concentration measured ^d	61.4 µg/m ³	69.8 µg/m ³	41.3 µg/m ³
Days exceeding federal 150 µg/m ³ 24-hour standard	0	0	0
Days exceeding state 50 µg/m ³ 24-hour standard	3	2	0
Fine Particulate Matter (PM_{2.5})			
Annual average concentration measured ^a	9.7 µg/m ³	8.7 µg/m ³	9.8 µg/m ³
Maximum 24-hour concentration measured	54.3 µg/m ³	45.2 µg/m ³	29.4 µg/m ³
No. of days exceeding federal 35 µg/m ³ 24-hour standard ^e	3	5	N/A ^f
Carbon Monoxide (CO)			
Maximum 8-hour concentration measured	2.09 ppm	1.60 ppm	2.3 ppm
Number of days exceeding federal and state 9.0 ppm 8-hour standard	0	0	0
Nitrogen Dioxide (NO₂)			
Annual average concentration measured ^a	0.016 ppm	0.016 ppm	0.016 ppm
Maximum 1-hour concentration measured	0.11 ppm	0.069 ppm	0.062 ppm
Days exceeding state 0.18 ppm 1-hour standard	0	0	0

SOURCE: BAAQMD *Annual Bay Area Air Quality Summaries*, 2006 through 2008, (<http://www.baaqmd.gov/~link.aspx?id=7BE01D796A3644E2B0BC30BDD4665912&z=z>, Accessed October 2009)

- a. Data is taken from the BAAQMD San Francisco-Arkansas Street monitoring station.
- b. ppm = parts by volume per million of air.
- c. The California 8-hour ozone standard was implemented on May 17, 2005.
- d. µg/m³ = micrograms per cubic meter.
- e. On December 17, 2006, the USEPA implemented a more stringent federal 24-hour PM_{2.5} standard revising it from 65 µg/m³ to 35 µg/m³. PM_{2.5} exceedance days for 2006 to 2008 reflect the new 35 µg/m³ standard.
- f. Insufficient data available per California ARB.

State of California as a known carcinogen.¹⁷⁶ However, under California regulatory guidelines, DPM is used as a surrogate measure of exposure for the mixture of chemicals that make up diesel exhaust as a whole.¹⁷⁷

¹⁷⁶ California Environmental Protection Agency (Cal/EPA). Findings of the Scientific Review Panel on The Report on Diesel Exhaust, as adopted at the Panel's April 22, 1998, meeting. Office of Environmental Health Hazard Assessment. 1998.

¹⁷⁷ Ibid.

Based on receptor modeling techniques, the California ARB estimated the background DPM health risk in the SFBAAB in 2000 to be approximately 500 cancer cases per million people, which reflects a drop of approximately 36 percent from estimates for 1990.¹⁷⁸

Naturally Occurring Asbestos

Asbestos is the common name for a group of naturally occurring fibrous silicate minerals that can separate into thin but strong and durable fibers. Naturally occurring asbestos (NOA), which the California ARB identified as a TAC in 1986, is found in many parts of California and commonly associated with serpentine rock (serpentinite).

As described in Section III.K (Hazards and Hazardous Materials) and Section III.L (Geology and Soils) Franciscan serpentinite and mélange (a mixed assemblage of rock types including serpentinite, shale, chert, sandstone, and greenstone) form most of the bedrock underlying the project area. Both rock types are known to contain small amounts of chrysotile asbestos. Serpentinite has been mapped in Parcels A, B, C, and G of HPS Phase II and may underlie portions of the proposed roadway. Mélange occurs throughout the Hunters Point shear zone, which underlies parts of all the HPS Phase II parcels, but has not been mapped separately. Chrysotile is a NOA mineral that can be a human health hazard if it becomes airborne. The other serpentine minerals found in serpentinite do not form fibrous crystals and are not asbestos minerals.

Exposure to airborne asbestos poses a potential health hazard. The issues related to NOA and naturally occurring metals-containing materials at the Project are addressed in Section III.K (Hazards and Hazardous Materials).

TACs Associated with Contaminated Dust

Historic operations by the US Department of the Navy (Navy) and its tenants at the HPS Phase II area resulted in a number of hazardous materials release sites and associated areas with contaminated soils. The types, levels, and extent of contamination of soils and other environmental media have been identified for the HPS Phase II area through a series of comprehensive environmental investigations conducted at the direction of the Navy. The Navy is currently remediating the contaminated soils under the oversight of federal and state regulatory agencies. Although there are no known hazardous materials release sites at Candlestick Point (CP), soil investigations were conducted at this area in the late 1990s at the direction of DeBartolo Entertainment, Inc. These investigations revealed limited areas with elevated concentrations of metals and/or organic chemicals.

As some of the required remedial actions at HPS may be conducted after the Navy transfers the property, there is a potential for Project-related construction activities to generate dust which have particulate bound chemicals which could impact human health in the surrounding community. As discussed later in this section, ENVIRON evaluated this potential exposure in a human health risk assessment.

¹⁷⁸ California ARB. 2009. The 2009 California Almanac of Emissions and Air Quality. Sacramento, CA.

Monitoring Station Data for TACs

The BAAQMD measures ambient levels of TACs at a number of monitoring stations in the region. Table III.H-4 (Ambient Concentrations of Carcinogenic TACs in the Bay Area Basin) summarizes district-wide monitored concentrations of carcinogenic TACs for the SFBAAB in 2003, the most recent year for which data are available. Sources include industry, business, agriculture, vehicles, household products, wood stoves, barbecues, and more. Whether air toxics have a harmful effect on an individual's health depends upon a number of factors, including the concentration of toxics in the air and the length of exposure.

Table III.H-4 Ambient Concentrations of Carcinogenic TACs in the Bay Area Air Basin				
Compound	Concentration		Unit Risk (per $\mu\text{g}/\text{m}^3$)	Cancer Risk* (Chances in one million)
	(ppb)	($\mu\text{g}/\text{m}^3$)		
1,3-Butadiene	0.09	0.21	1.7×10^{-4}	36.0
Benzene	0.40	1.30	2.9×10^{-5}	37.7
Carbon tetrachloride	0.11	0.70	4.2×10^{-5}	29.1
Formaldehyde	2.18	2.72	6.0×10^{-6}	16.3
Acetaldehyde	0.72	1.32	2.7×10^{-6}	3.6
Perchloroethylene	0.03	0.18	5.9×10^{-6}	1.1
Methylene chloride	0.36	1.27	1.0×10^{-6}	1.3
Methyl tert-butyl ether (MTBE)	0.53	1.95	2.6×10^{-7}	0.5
Chloroform	0.02	0.12	5.3×10^{-6}	0.6
Trichloroethylene	0.02	0.12	2.0×10^{-6}	0.2
Particulate TACs				
Chromium (hexavalent)	0.10	1.00×10^{-4}	1.5×10^{-1}	14.4
Dioxin	0.000025	2.50×10^{-8}	38	1.0
Nickel	3.30	3.30×10^{-3}	2.6×10^{-4}	0.8
Polycyclic aromatic hydrocarbons (PAHs)	0.47	4.70×10^{-4}	1.1×10^{-3}	0.5
Lead	7.80	7.8×10^{-3}	1.2×10^{-5}	0.1
Total for all TACs (excluding DPM)				143

SOURCE: BAAQMD, Toxic Air Contaminants 2003 Annual Report, August 2007.

ppb = parts per billion; $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter.

* Cancer risks are calculated for the inhalation pathway using the Unit Risk Factors adopted by OEHHA for the Air Toxics Hot Spots Program, and assuming 70-year continuous exposure.

The BAAQMD reports that combining the California ARB estimates of the population-weighted average ambient air concentration of DPM in the SFBAAB for 2003 with the cancer potency factor adopted by California Environmental Protection Agency's (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA) results in an approximate cancer risk associated with exposure to DPM of about 500 to 700 in one million excess cancer risks.¹⁷⁹ Most of the DPM risks are from exposure to exhaust

¹⁷⁹ BAAQMD, Toxic Air Contaminants 2003 Annual Report, August 2007.

from diesel trucks where the emission sources are relatively close to receptors at businesses and residences near freeways.

Odors

Typically, odors are regarded as an annoyance rather than a health hazard. However, manifestations of a person's reaction to foul odors can range from psychological (e.g., irritation, anger, or anxiety) to physiological (e.g., circulatory and respiratory effects, nausea, vomiting, and headache).

With respect to odors, the human nose is the sole sensing device. The ability to detect odors varies considerably among the population and overall is quite subjective. Some individuals have the ability to smell very minute quantities of specific substances; others may not have the same sensitivity but may have sensitivities to specific odors. In addition, people may have different reactions to the same odor; an odor that is offensive to one person (e.g., from a fast-food restaurant) may be perfectly acceptable to another. An unfamiliar odor is more easily detected and more likely to cause complaints than a familiar one because of the phenomenon known as "odor fatigue," in which a person can become desensitized to almost any odor so that recognition occurs only with an alteration in the intensity.

Quality and intensity are two properties of any odor. The quality of an odor indicates the nature of the smell experience. For instance, if a person describes an odor as "flowery" or "sweet," the person is describing the quality of the odor. Intensity refers to the strength of the odor. For example, a person may use the word "strong" to describe the intensity of an odor. Odor intensity depends on the odorant concentration in the air. When an odorous sample is progressively diluted, the odorant concentration decreases, and the odor intensity weakens and eventually becomes so low that detection or recognition is difficult. At some point during dilution, the concentration of the odorant falls below a detection threshold. An odorant concentration below the detection threshold means that the concentration in the air is not detectable by the average human.

III.H.3 Regulatory Framework

Air quality within the Bay Area is maintained and improved through the efforts of various federal, state, regional, and local government agencies. These agencies work jointly, as well as individually, to improve air quality through legislation, regulations, planning, policy-making, education, and a variety of other programs.

■ Federal

At the federal level, the United States Environmental Protection Agency (USEPA) is responsible for implementing national air quality programs. The USEPA enforces the federal *Clean Air Act* (federal CAA) and associated NAAQS. As shown in Table III.H-1, the USEPA has established NAAQS for the following criteria air pollutants: ozone, CO, NO₂, SO₂, PM₁₀, PM_{2.5}, and lead. The standards are established to protect the public health and welfare. The CAA also required each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The federal CAA Amendments of 1990 (CAAA) added requirements for states with non-attainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is modified periodically to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins as reported by

their jurisdictional agencies. The USEPA must review all SIPs to determine whether they conform to the mandates of the federal CAA and its amendments and to determine whether implementing the SIPs will achieve air quality goals. If the USEPA determines a SIP to be inadequate, a Federal Implementation Plan that imposes additional control measures may be prepared for the non-attainment area. Failure to submit an approvable SIP or to implement the plan within the mandated time frame may result in sanctions being applied to transportation funding and stationary air pollution sources in the air basin.

The Project must comply with all required elements of the federal CAA and regulatory requirements of the USEPA.

■ State

The California ARB, a part of the Cal/EPA, is responsible for the coordination and administration of both federal and state air pollution control programs within California and for implementing the *California Clean Air Act* (CCAA). The CCAA, which was adopted in 1988, required the California ARB to establish CAAQS (Table III.H-1). The California ARB has established CAAQS for sulfates, hydrogen sulfide, vinyl chloride, visibility-reducing particulate matter, and the previously mentioned criteria air pollutants. In most cases the CAAQS are more stringent than the NAAQS. Differences in the standards are generally explained by the health effects studies considered during the standard-setting process and the interpretation of those studies.

The CCAA requires that all local air districts in the state endeavor to achieve and maintain the CAAQS by the earliest practical date. The act specifies that local air districts should focus particular attention on reducing emissions from transportation and areawide emission sources and gives districts the authority to regulate indirect sources of emissions.

Among the California ARB's other responsibilities are overseeing local air district compliance with California and federal laws, approving local air quality plans, submitting SIPs to the USEPA, monitoring air quality, determining and updating area designations and maps, and setting emissions standards for new mobile sources, consumer products, small utility engines, off-road vehicles, and fuels.

In 2000, the California ARB began a program of identifying and reducing risks associate with the particulate matter emissions from diesel-fueled vehicles in order to reduce diesel-related health risks. The California ARB plan consists of promulgating new regulatory standards for all new on-road, off-road and stationary diesel-fueled engines and vehicles, new retrofit requirements for existing on-road, off-road and stationary diesel-fueled engines and vehicles and new diesel fuel regulations to reduce the sulfur content of diesel fuel as required by advanced diesel emissions control systems. Under the plan, the overall risk reduction program is expected to result in a 75 percent reduction in diesel particulate emissions by 2010 (compared to 2000 levels) and an 85 percent reduction by 2020.

The *Air Quality and Land Use Handbook: A Community Health Perspective* (2005) provides California ARB recommendations for the siting of new sensitive land uses (i.e., residences, schools, daycare centers, playgrounds, and medical facilities) near recognized major sources of TACs (e.g., freeways, large warehouses/distribution centers, rail yards, etc.).

■ Regional

The BAAQMD is the primary agency responsible for comprehensive air pollution control in the SFBAAB. To that end, the BAAQMD works directly with the Association of Bay Area Governments (ABAG), the Metropolitan Transportation Commission (MTC), and local governments and cooperates actively with all federal and state government agencies. The BAAQMD develops rules and regulations, establishes permitting requirements for stationary sources, inspects emissions sources, and enforces such measures through educational programs or fines, when necessary.

The BAAQMD is directly responsible for reducing emissions from stationary (area and point) sources and for assuring that state controls on mobile sources are effectively implemented. It has responded to these requirements by preparing a series of Ozone Attainment Plans and Clean Air Plans that comply with the federal CAA and the CCAA to accommodate growth, reduce the pollutant levels in the SFBAAB, meet NAAQS and CAAQS, and minimize the fiscal impact that pollution control measures have on the local economy. The Ozone Attainment Plans are prepared for the federal ozone standard, and the Clean Air Plans are prepared for the state ozone standards. The BAAQMD Board of Directors adopted the most recent Ozone Attainment Plan in October 2001 and in April 2004 the USEPA made the final finding that the SFBAAB had attained the 1-hour standard. Since then, the 1-hour ozone standard has been replaced by 8-hour ozone standard and the SFBAAB was designated a marginal non-attainment area. Although certain elements of the 8-hour implementation rule are undergoing legal challenge, it is not currently anticipated that marginal areas will be required to prepare attainment demonstrations for the 8-hour standard.

Nonetheless, the BAAQMD continues to work with the MTC and ABAG to update the Bay Area Ozone Strategy (BAOS). The updated BAOS will describe current conditions, review the SFBAAB's progress in reducing ozone levels to attain state 1-hour and 8-hour ozone standards, and describe how the SFBAAB's proposed control strategy will fulfill the CCAA planning requirements for the state 1-hour ozone standard and mitigation requirements for transport of ozone and ozone precursors to neighboring air basins.

The Board of Directors adopted the current regional Clean Air Plan in December 2000. The Clean Air Plan identifies the control measures that would be implemented through 2006 to reduce major sources of pollutants. Those planning efforts have substantially decreased the population's exposure to unhealthy levels of pollutants, even while substantial population growth has occurred within the SFBAAB. The Clean Air Plan predicts that regional ozone concentrations will decrease by 1.2 percent per year or 9.0 percent over the 12 years after it was adopted. The BAAQMD is in the process of preparing a new Clean Air Plan that will address ozone precursors, particulate matter, air toxics, and green house gases.

In 2003, the Legislature enacted Senate Bill 656 (SB 656) to reduce public exposure to PM₁₀ and PM_{2.5}. SB 656 required the California ARB, in consultation with local air districts, to develop and adopt, by January 1, 2005, a list of the most readily available, feasible, and cost-effective control measures that could be used by the California ARB and the air districts to reduce PM₁₀ and PM_{2.5}.

Although the BAAQMD is responsible for regional air quality planning efforts, it does not have the authority to directly regulate the air quality issues associated with plans and new development projects

within the SFBAAB. However, the BAAQMD has prepared the BAAQMD CEQA Guidelines (1999) to indirectly address these issues in accordance with the projections and programs of the Ozone Attainment Plan and Clean Air Plan. The BAAQMD CEQA Guidelines assists Lead Agencies, as well as consultants, Project proponents, and other interested parties, in evaluating potential air quality impacts of projects and plans proposed in the SFBAAB. Specifically, the BAAQMD CEQA Guidelines explain the procedures that the BAAQMD recommends be followed during environmental review processes required by CEQA. The BAAQMD CEQA Guidelines provide direction on how to evaluate potential air quality impacts, how to determine whether these impacts are significant, and how to mitigate these impacts. The BAAQMD intends that by providing this guidance, the air quality impacts of plans and development proposals will be analyzed accurately and consistently throughout the SFBAAB, and adverse impacts will be minimized.

As of the date of this Draft EIR, the BAAQMD is in the process of revising their CEQA guidelines and expects the draft to be approved by their Board of Directors by the end of 2009. On October 7, 2009, the BAAQMD released a draft table of Staff-Recommended CEQA Thresholds of Significance which indicates a number of modifications to existing guidelines, including changes to the maximum daily emissions thresholds for criteria pollutants emissions from operational sources as well as requirements for the quantification of criteria pollutant and TAC emissions from construction activities and comparison to mass emission or risk thresholds, respectively. As these draft guidelines have not been adopted by the BAAQMD's Board of Directors, the Project is not subject to the draft requirements; however, a brief analysis of these proposed guidelines in relation to the Project emissions is included at the end of the impact analysis.

■ Local

San Francisco General Plan

The goal of the Air Quality Element of the *San Francisco General Plan* is to reduce the level of air pollutants and to protect and improve public health, welfare, and quality of life of the citizens of San Francisco and the residents of the metropolitan region. To do so, the *General Plan* designates policies designed to:

- Adhere to state and federal AAQS and programs, reduce mobile sources of air pollution through implementation of the transportation element of the *General Plan*
- Decrease the air quality impacts of development by coordination of land use and transportation decisions
- Improve air quality by increasing public awareness regarding the negative health effects of pollutants generated by stationary and mobile sources
- Minimize particulate matter emissions from road and construction sites
- Link the positive effects of energy conservation and waste management to emission reductions

City of San Francisco Health Code

Construction Dust Control

San Francisco Health Code Article 22B, Construction Dust Control, requires, for construction projects within 1,000 feet of sensitive receptors (residence, school, childcare center, hospital or other health-care facility or group-living quarters), preparation of a site-specific dust control plan. That plan must include a number of equivalent measures to minimize visible dust. These measures contain all the dust control measures presented in the BAAQMD CEQA Guidelines; however the *San Francisco Health Code* requirements increase the watering frequency as well as adding monitoring, recordkeeping, third-party verification, and community outreach requirements not found in the BAAQMD guidelines.

Air Quality Assessment and Ventilation Requirement for Urban Infill Residential Developments

The *San Francisco Health Code* Article 38 requires an air quality assessment to evaluate the concentration of PM_{2.5} from local roadway traffic that may impact a residential development site. If the air quality assessment indicates that the concentration of PM_{2.5} at the site would be greater than 0.2 µg/m³ (micrograms per cubic meter), Section 3807 requires development on the site to be designed or relocated to avoid exposure greater than 0.2 µg/m³, or a ventilation system to be installed that would be capable of removing 80 percent of ambient PM_{2.5} from habitable areas of the residential units.

III.H.4 Impacts

■ Significance Criteria

The City and Agency have not formally adopted significance standards for impacts related to air quality, but generally consider that implementation of the Project would have significant impacts if it were to:

- H.a Conflict with or obstruct implementation of the applicable air quality plan
- H.b Violate any air quality standard or contribute substantially to an existing or projected air quality violation
- H.c Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal, state, or regional ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)
- H.d Expose sensitive receptors to substantial pollutant concentrations
- H.e Create objectionable odors affecting a substantial number of people

Criteria Pollutants

Construction

The BAAQMD does not recommend any significance thresholds for the emissions of fugitive dust during construction. Instead, the BAAQMD bases the criteria on a consideration of the control measures to be implemented. If all appropriate emissions control measures recommended by the *BAAQMD*

CEQA Guidelines are implemented for a project, construction emissions are not considered significant.¹⁸⁰ The City takes a similar approach. As discussed above, *San Francisco Health Code* Article 22B, Construction Dust Control, also requires preparation of a site-specific dust control plan (with mandatory control measures similar to the BAAQMD's) for construction projects within 1,000 feet of sensitive receptors (residence, school, childcare center, hospital or other health-care facility or group-living quarters).

Operation

The BAAQMD recommends that projects with operational emissions that exceed any of the following mass criteria pollutant thresholds be considered significant. These thresholds apply to the operational emissions associated with individual projects only; they do not apply to construction-related emissions. The operational emissions that are generated by individual projects and exceed these thresholds are also considered to be a cumulatively considerable contribution to cumulative air quality by the BAAQMD:

- 80 pounds per day (ppd) or 15 tons per year (tpy) of ROG,
- 80 ppd or 15 tpy of NO_x
- 80 ppd or 15 tpy of PM₁₀

Carbon Monoxide

Operational emissions of CO are considered significant if they cause or contribute to violations of the federal or state ambient air quality standards for CO (i.e., 35 ppm and 20 ppm, respectively, for one-hour averages; 9 ppm for eight-hour averages).

Toxic Air Contaminants

Construction

Though not explicitly required by BAAQMD CEQA Guidelines,¹⁸¹ a HRA was conducted to evaluate the human health effects from emissions of DPM and TAC-containing soil-PM₁₀ associated with Project construction activities. This analysis was deemed appropriate due to the scale (multi-year time horizon utilizing extensive construction equipment over a large area) and location (e.g., brownfield redevelopment on land which may contain residual chemicals in soil) of the Project. Therefore, the BAAQMD CEQA significance thresholds as described below were used to evaluate the possibility that emissions of DPM or soil-PM₁₀ emissions from Project construction activities would expose the public to potential airborne health risks:

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

¹⁸⁰ BAAQMD, *BAAQMD CEQA Guidelines: Assessing the Air Quality Impacts of Projects and Plans*, December 1999.

¹⁸¹ Ibid.

Operation

Pursuant to BAAQMD CEQA Guidelines,¹⁸² projects that would expose the public to potential airborne health risks in excess of the following thresholds would be considered to have a significant air quality impact:

- Probability of contracting cancer for the MEI exceeds 1×10^{-5} (10 in a million)
- Ground level concentrations of noncarcinogenic air contaminants/pollutants resulting in a HI greater than 1 for the MEI

PM_{2.5}

BAAQMD does not currently recommend a threshold of significance for determining impacts associated with PM_{2.5}. The San Francisco Department of Public Health (SFDPH) is concerned that individuals who live in the proximity of heavily travelled roads or freeways could incur adverse health effects as a result of exposure to vehicle emissions. To minimize contributions to health impacts associated with locating new residential projects near roadway “hot spots,” the SFDPH developed a strategy to assess and mitigate air pollution at these locations.¹⁸³ Their strategy is based on the use of an annual average threshold concentration of PM_{2.5} ($0.2 \mu\text{g}/\text{m}^3$) within a 150-meter zone (about 500 feet) of a new project as a means of assessing the potential for concern.¹⁸⁴ The threshold concentration of PM_{2.5} is meant to serve as a health-protective “proxy” or surrogate for pollutant exposures from vehicles, i.e., PM_{2.5} is not the only pollutant of concern.¹⁸⁵ The PM_{2.5} threshold serves as a concentration meant to protect the health of residents from all vehicle-associated emissions from a project.¹⁸⁶

Proposed BAAQMD CEQA Thresholds

As presented under the “Regional” discussion in Section III.H.3 (Regulatory Framework), as of the date of this Draft EIR, the BAAQMD is in the process of revising their CEQA guidelines and expects the draft to be approved by their Board of Directors by the end of 2009. On October 7, 2009, the BAAQMD released a draft table of Staff-Recommended CEQA Thresholds of Significance which indicates a number of modifications to existing guidelines, including changes to the maximum daily emissions thresholds for criteria pollutants emissions from operational sources as well as requirements for the quantification of criteria pollutant and TAC emissions from construction activities and comparison to mass emission or risk thresholds, respectively. As these draft guidelines have not been adopted by the BAAQMD’s Board of Directors, the Project is not subject to the draft requirements. However, the potential impacts of the Project with respect to the draft requirements are discussed at the end of this section.

¹⁸² BAAQMD, *BAAQMD CEQA Guidelines: Assessing the Air Quality Impacts of Projects and Plans*, December 1999.

¹⁸³ San Francisco Department of Public Health (SFDPH). 2008. Assessment and Mitigation of Air Pollutant Health Effects from Intra-urban Roadways: Guidance for Land Use Planning and Environmental Review. May 6.

¹⁸⁴ Ibid.

¹⁸⁵ Ibid.

¹⁸⁶ Ibid.

■ Analytic Method

Criteria Pollutants

Construction

This analysis takes into account that the Project would implement all PM₁₀ control measures recommended by the BAAQMD and required under the *San Francisco Health Code* Article 22B; these will be documented in a Project-specific dust control plan.

Operation

The Project's operational mass emissions of criteria air pollutants were estimated with the URBEMIS 2007¹⁸⁷ model initialized with land use specifications taken from the Project Description and traffic data taken from the Transportation Study.¹⁸⁸

The Project would generate criteria pollutant emissions from on-site area sources (i.e., natural gas combustion for space and water heating, combustion of other fuels by building and grounds maintenance equipment, etc.). Those area-source emissions were also estimated by the URBEMIS 2007 model based the Project's mix of land uses as defined in the Project Description.

The Project, at full build-out (2029), would also generate 78,109 daily external motor vehicle trips.¹⁸⁹ The URBEMIS 2007 model was used to calculate the criteria pollutant emissions associated with these trips. For purposes of this analysis, all trips associated with the Project were assumed to be new trips within the SFBAAB, although some portion of the trips attributed to the Project would be likely occur in the region whether or not the Project were developed. Thus, the Project emission estimates represent a conservative analysis of potential new emissions from mobile sources. The Project would incorporate features intended to reduce motor vehicle trips, designed as a dense, compact development with mixed land uses that would facilitate pedestrian, bicycle, and transit travel. As such, the Project vehicle trip generation would be substantially greater without these trip-reduction features. The Project's transportation analysis estimates that a similar development that did not include the Project's trip reduction features would generate 137,282 daily external motor vehicle trips (about 76 percent more than the Project's daily external motor vehicle trips).¹⁹⁰

The URBEMIS 2007 files used to develop the criteria pollutant emissions inventory for the Project can be found in Appendix H1.

¹⁸⁷ Urban Emissions Model (URBEMIS 2007) (Version 9.2.4 – 2008). Rimpo and Associates Inc. Available at: <http://www.urbemis.com>.

¹⁸⁸ Candlestick Point-Hunter Point Shipyard Phase II Development Plan Transportation Study. Prepared by CHS Consulting Group, Fehr & Peers and LCW Consulting, October 2009.

¹⁸⁹ Ibid.

¹⁹⁰ Ibid.

Carbon Monoxide

The Project's effects on CO concentrations were estimated with the California Department of Transportation's CALINE4 model,¹⁹¹ as recommended by the BAAQMD for Bay Area conditions, and initialized with traffic data taken from the Transportation Study.¹⁹² The CALINE4 modeling files used to evaluate CO concentrations for the Project can be found in Appendix H1.

Toxic Air Contaminants

Construction

The methods used to analyze the human health effects from emissions of DPM and TAC-containing PM₁₀ associated with Project construction activities were developed consistent with BAAQMD, Cal/EPA, and 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 either DPM or TACs bound to soil-PM₁₀ emitted during construction activities at receptor locations, and (3) the estimation of excess lifetime cancer risks and noncancer health effects or HIs. Details of these analyses can be found in Appendix H3, Attachments I (Human Health Risk Assessment of Construction-related DPM) and II (Human Health Risk Assessment of Chemicals Bound to Airborne PM₁₀).

Construction activities associated with the development of Candlestick Point include asbestos and lead paint abatement inside buildings, demolition, grading, excavation, and foundation and structure construction, all of which could generate DPM and some of which could generate dust (PM₁₀) containing contaminated soil. Specifically, construction sources of DPM could include off-road construction equipment such as lifts, loaders, excavators, dozers, and graders spread over a 281-acre area. In addition, the following types of vehicle traffic could contribute to construction-related DPM emissions: equipment and material delivery, spoils and debris hauling, and employee commute. PM₁₀ emissions evaluated include demolition and soil grading activities associated with Project construction activities. Those Project areas where PM₁₀ emissions were from soils with chemicals present at concentrations above residential cleanup goals were included in the evaluation and chemical concentrations associated with the airborne PM₁₀ were estimated based on the chemical concentrations in soils.

Cancer risks and noncancer HIs were evaluated for off-site receptors in the Project vicinity including residents (child and adult), workers and other sensitive receptors (schoolchildren) located in the surrounding community and along the expected travel routes of on-road delivery and haul trucks, including residents at the HPS Phase I location as well as schoolchildren attending schools to the west of the Project area. Additionally, health impacts were evaluated for existing on-site sensitive receptors, including residents at the Alice Griffith Public Housing site. The Project would include redevelopment of Alice Griffith Public Housing to provide one-for-one replacement units, and eligible Alice Griffith Public Housing residents would have the opportunity to move to the new units directly from their existing Alice

¹⁹¹ California Department of Transportation. CALINE4 – A Dispersion Model for Predicting Air Pollutant Concentrations Near Roadways, FHWA/CA/TL-84/15, Final Revision June 1989.
<http://www.dot.ca.gov/hq/env/air/pages/CO.htm>.

¹⁹² Candlestick Point-Hunter Point Shipyard Phase II Development Plan Transportation Study. Prepared by CHS Consulting Group, Fehr & Peers and LCW Consulting, October 2009.

Griffith Public Housing units without having to relocate to any other area. Therefore, while construction would occur at one parcel, residents would continue to reside at the remaining parcels. As such, these residents have been identified as on-site receptors during Project construction.

Airborne concentrations of DPM and TACs bound to soil-PM₁₀ were estimated at receptor locations using the emissions estimates and the USEPA–recommended air dispersion model American Meteorological Society/Environmental Protection Agency Regulatory Model (AERMOD), version 07026. Based on the results of the exposure evaluation and air dispersion modeling, quantitative estimates of excess lifetime cancer risks and noncancer HIs associated with potential exposure to Project-related emissions were developed. The methods used to estimate excess lifetime cancer risks and noncancer HIs are consistent with risk assessment guidance from BAAQMD, Cal/EPA, and USEPA.

For the purposes of conducting the HRA of DPM, the Project, with construction of a new 49ers stadium, would involve the longest construction period and the heaviest use of construction equipment and would represent the greatest increase in potential human health risks from construction activities as compared to all other variants and alternatives (refer to Chapter IV [Project Variants] for further discussion of Project variants). It would be assumed that if exposures and associated risk estimates for the Project were below BAAQMD thresholds, the risks associated with the Project variants development program would also be below thresholds.

Since the HRAs for DPM or TACs bound to soil-PM₁₀ emitted during construction activities were completed, changes were made to the Project Description including the addition of roadway improvements on Ingerson and Jamestown Avenues, compaction of Candlestick Point construction schedule (completion in 2026), and slight changes to the Candlestick Point phasing boundaries. These changes to the Project Description were found not to change the HRA conclusions significantly, as documented in a technical memorandum included in Appendix H3, Attachment VI.

Operation

Based on the type of uses permitted under the Project, the potential for TACs to be emitted by the Project and affect nearby receptors would likely only occur within areas designated for R&D uses, which would be restricted to HPS Phase II. Because the Project land use designations provide that a wide range of development can operate in the R&D areas within the HPS Phase II site, the exact type of stationary sources and quantity of the emissions from those sources are not known. As a result, a conservative scenario was established so that the impact of the potential aggregate emissions from all future TAC emission sources in these R&D areas could be evaluated at surrounding receptor locations. Details regarding this assessment can be found in Appendix H3, Attachment III.¹⁹³

For this prospective screening-level analysis, a series of conservative assumptions was made:

- A wide range of stationary sources could operate in the R&D area; thus, the identity and amounts of the TACs emitted from these sources cannot be determined at this time.
- In order to approximate the maximum potential number of facilities with TAC emitting sources, the area designated for proposed R&D development would be divided into one-acre plots, which

¹⁹³ ENVIRON, *Ambient Air Quality Human Health Risk Assessment: Candlestick Point–Hunters Point Shipyard Phase II Development Plan*, Attachment III, September 28, 2009.

is consistent with the minimum size of a parcel based on the expected land uses within the R&D parcels.

- A single R&D facility (or a stationary source such as a collection of emitting sources like boilers, emergency generators, etc) would be constructed on the one-acre plot.
- The cancer risk at the boundary of each one-acre plot was set not to exceed a designated cancer risk level or chronic noncancer HI threshold (in this case a residential cancer risk of 10 in one million and a chronic noncancer HI of 1.0, in accordance with BAAQMD thresholds of significance).
- It was conservatively assumed that all receptor locations surrounding the R&D area were residential.

Potential health impacts of this scenario were evaluated at receptor locations within approximately 500 meters (about a third of a mile) of the R&D areas. Impacts would be lower beyond this distance. In addition, the TAC analysis conservatively used a total of 5 million square feet of R&D uses, the amount proposed in Variant 1. Refer to Chapter IV for further discussion of Project variants. It would be assumed that if exposures and associated risk estimates for that total R&D use were below health risk thresholds, the risks associated with the Project R&D program of 2.5 million square feet would also be below thresholds. For this screening evaluation, all surrounding receptors were conservatively evaluated as residential receptors (i.e., potential exposures/risks for other populations would be less, as the exposure frequency and duration would be less than a residential scenario).

Although excess lifetime cancer risk and chronic noncancer HIs were explicitly evaluated, acute risks were not evaluated, as it would be highly unlikely that all emissions sources would be operating at their maximum emission rate at the same time (e.g., for any single hour).

PM_{2.5}

The potential health impacts from traffic-related PM_{2.5} associated with the Project were evaluated by comparing predicted concentrations of PM_{2.5} to the SFDPH PM_{2.5} threshold of 0.2 µg/m³. The analysis of PM_{2.5} emissions from Project-related traffic was consistent with methodologies recommended by SFDPH. The details of the HRA for PM_{2.5} can be found in Appendix H3, Attachment IV.¹⁹⁴

Emissions from vehicle exhaust, tire wear, and brake wear were estimated using the most recent version of the Emission Factor model (EMFAC), developed by the California ARB, modified to account for emission reduction regulations recently implemented by California ARB which have not yet been incorporated into EMFAC. Vehicle traffic data for the Project were taken from the transportation technical report.¹⁹⁵

The concentration of PM_{2.5} from vehicular emissions was characterized by developing exposure point concentrations at residential receptors surrounding the thoroughfares and roadways evaluated: Third Street; Innes Avenue/Hunters Point Boulevard/Evans Avenue; Palou Avenue; Gilman Avenue/Paul Avenue; Jamestown Avenue; Ingerson Avenue; and Harney Way. Those thoroughfares would connect

¹⁹⁴ ENVIRON, *Ambient Air Quality Human Health Risk Assessment: Candlestick Point–Hunters Point Shipyard Phase II Development Plan*, Appendix IV, September 28, 2009.

¹⁹⁵ Candlestick Point-Hunter Point Shipyard Phase II Development Plan Transportation Study. Prepared by CHS Consulting Group, Fehr & Peers and LCW Consulting, October 2009.

the Project and major arterials to US-101 or downtown San Francisco. In addition, Innes Avenue/Hunters Point Boulevard/Evans Avenue and Harney Way were identified as streets with substantial truck traffic and thus would be expected to yield more $PM_{2.5}$ compared to other roads. Palau Avenue and Gilman Avenue/Paul Avenue were evaluated quantitatively as there are residences in the vicinity of these roads where individuals may incur exposure to $PM_{2.5}$, while Jamestown and Ingerson Avenues were evaluated in a semi-quantitative manner as they are immediately adjacent to residences; however, have much lower expected Project-related vehicle traffic than Palau and Gilman/Paul.

Annual average airborne concentrations of $PM_{2.5}$ attributable to Project-related traffic emissions were estimated by applying a Gaussian air dispersion model, CAL3QHCR, which approved by the USEPA and California ARB for use in the environmental documentation of transportation projects. Both free flowing traffic and queuing at intersections were evaluated.

■ Construction Impacts

Impact AQ-1: Criteria Pollutants

Impact AQ-1 **Construction activities associated with the Project would not result in short-term increases in emission of criteria air pollutants and precursors that exceed BAAQMD CEQA significance criteria. (Less than Significant with Mitigation) [Criteria H.b and H.d]**

Construction of the Project is anticipated to occur continuously for approximately 20 years. Construction activities would include site preparation, grading, placement of infrastructure, placement of foundations for structures, and fabrication of structures. Demolition, excavation and construction activities would require the use of heavy trucks, excavating and grading equipment, concrete breakers, concrete mixers, and other mobile and stationary construction equipment. Emissions during construction would be caused by material handling, traffic on unpaved or unimproved surfaces, demolition of structures, use of paving materials and architectural coatings, exhaust from construction worker vehicle trips, and exhaust from diesel-powered construction equipment.

Heavy construction activity on dry soil exposed during construction phases would cause emissions of dust. Throughout construction, pollutant emissions could vary day to day, depending on the specific phase. When considered in the context of long-term Project operations, demolition and construction-related emissions would be temporary, but these activities still could cause potentially significant effects on local air quality.

According to the BAAQMD, PM_{10} is the pollutant of greatest concern with respect to construction-related emissions.¹⁹⁶ Although heavy-duty equipment, material transport, and employee commutes result in emissions of criteria air pollutants (e.g., CO) and precursors (e.g., ROG and NO_x), these emissions are included in the regional emissions inventory, which serves as the basis for the air quality plans, and are not expected to impede attainment of the ozone standard or maintenance of the CO standard in the SFBAAB. Consequently, the BAAQMD has not adopted mass emission thresholds for construction-

¹⁹⁶ Ibid.

related emissions of ROG and NO_x and bases its determination of significance on consideration of the fugitive PM₁₀ dust control measures to be implemented.¹⁹⁷

To minimize dust emissions, *San Francisco Health Code* (Article 22B) and the BAAQMD¹⁹⁸ have identified a set of control measures. Implementation of MM HZ-15, which would require the Applicant to ensure that construction contractors comply with the dust control strategies included in an approved dust control plan as part of a site-specific dust control plan, would reduce the impacts caused by construction dust to a less-than-significant level.

Impact AQ-2: DPM from Construction Activities

As described earlier, an HRA¹⁹⁹ evaluated potential human health effects due to exposure to DPM from heavy equipment exhaust that may be emitted during Project-related construction activities including abatement, demolition, grading, excavation, and foundation and structure construction. Specifically, the construction sources of DPM evaluated include off-road construction equipment such as lifts, loaders, excavators, dozers, and graders. Potential exposures to DPM from on-road diesel trucks that transport construction materials and debris from the Project to the nearest freeways were also evaluated. On-road sources of DPM include on-road equipment such as haul trucks, and on-road support vehicles (e.g., pickups) as well as emissions associated with workers commuting to the Project site. DPM emissions from these activities were estimated assuming the following mitigation were in place:

- Construction equipment used for the Project will utilize a phased-in emission control technology in advance of a regulatory requirement such that 50 percent of the fleet will meet USEPA Tier 4 engine standards for particulate matter control (or equivalent) during 2010 and 2011 construction activities, increasing to 75 percent of the fleet in 2012 and 100 percent of the fleet starting in 2013 and for the duration of the Project
- Construction equipment used in the Alice Griffith parcels (CP01 through CP06) would utilize equipment which meets the USEPA Tier 4 engine standards for particulate matter control (or equivalent) throughout the entire duration of construction activities on those parcels.

Potential exposures to DPM from proposed Project construction activities were evaluated for off-site receptors in the vicinity of the Project and the expected travel routes of on-road diesel haul trucks (e.g., adult and child residents, workers, and schoolchildren). Potential exposures to DPM by potential on-site residents within the Alice Griffith Housing area were also evaluated. As discussed earlier, airborne concentrations of DPM were estimated at receptor locations using the emissions estimates and the USEPA-recommended air dispersion model, AERMOD. Based on the results of the exposure evaluation and air dispersion modeling, quantitative estimates of excess lifetime cancer risks and noncancer HIs associated with potential exposure to Project-related emissions were developed. The methods used to estimate excess lifetime cancer risks and noncancer HIs are consistent with risk assessment guidance from BAAQMD, Cal/EPA, and USEPA.

¹⁹⁷ Ibid.

¹⁹⁸ Ibid.

¹⁹⁹ ENVIRON, *Ambient Air Quality Human Health Risk Assessment: Candlestick Point–Hunters Point Shipyard Phase II Development Plan*, September 28, 2009. See Appendix H1.

Impact of Candlestick Point

Impact AQ-2a **Construction at Candlestick Point would not result in impacts to off-site populations from Project-generated emissions of DPM. (Less than Significant with Mitigation) [Criterion H.d]**

As noted earlier, BAAQMD CEQA Guidelines has an established threshold of 10 in one million for carcinogenic health risks. The HRA which took into account the mitigation measures described above concluded that the cancer risk at the MEI would be 3.3 in one million. This represents the maximum level of DPM experienced by all off-site sensitive receptors during Candlestick Point construction activities. Exposure to DPM from construction activities associated with Candlestick Point would not exceed the threshold.

In addition, the HRA concluded the maximum chronic noncancer HI to be 0.007, which is below the BAAQMD's significance threshold of 1.0. An analysis was not conducted to determine the impact of Candlestick Point construction activities without the mitigation described above; however, due to the scale of the construction activities and proximity to adjacent receptors, without mitigation the impacts would be potentially above the BAAQMD's significance threshold and would therefore be potentially significant.

As the carcinogenic and noncarcinogenic health risks posed by DPM emissions during construction activities associated with development of Candlestick Point have been determined to be below established thresholds, this impact is less than significant with mitigation measure MM AQ-2.1:

MM AQ-2.1 Implement Emission Control Device Installation on Construction. To reduce DPM 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 USEPA Tier 2 standards outfitted with California ARB Level 3 VDECS (Verified Diesel Emission Control Strategies) for particulate matter control (or equivalent) during 2010 and 2011 construction activities, increasing to 75% of the fleet in 2012 and 100% of the fleet starting in 2013 and for the duration of the Project.

Impact of Hunters Point Shipyard Phase II

Impact AQ-2b **Construction at HPS Phase II would not result in impacts to off-site populations from Project-generated emissions of DPM. (Less than Significant with Mitigation) [Criterion H.d]**

As noted above, BAAQMD CEQA Guidelines has an established threshold of 10 in one million for carcinogenic health risks; the HRA which took into account the mitigation measures described above concluded that the cancer risk at the MEI would be 3.8 in one million. This represents the maximum level of DPM experienced by all off-site sensitive receptors during HPS-Phase II construction activities. Construction activities associated with HPS-Phase II would not exceed the threshold.

In addition, the HRA concluded the maximum chronic non-cancer HI to be 0.01, which is below the BAAQMD's significance threshold of 1.0. An analysis was not conducted to determine the impact of Candlestick Point construction activities without the mitigation described above; however, due to the scale of the construction activities and proximity to adjacent receptors, without mitigation the impacts

would be potentially above the BAAQMD's significance threshold and would therefore be potentially significant.

As the carcinogenic and noncarcinogenic health risks posed by DPM emissions during construction activities associated with development of HPS-Phase II have been determined to be below established thresholds, this impact is less than significant with implementation of mitigation measure MM AQ-2.1.

Impact of Alice Griffith Public Housing

Impact AQ-2c **Construction activities associated with the Project would not result in impacts to the existing Alice Griffith Public Housing from Project-generated emissions of DPM. (Less than Significant with Mitigation) [Criterion H.d]**

As noted earlier, BAAQMD CEQA Guidelines has an established threshold of 10 in one million for carcinogenic health risks; the HRA which took into account the mitigation measures described above concluded that the cancer risk at the MEI would be 4.5 in one million. This represents the maximum level of DPM experienced by all on-site sensitive receptors during Project construction activities. Exposure to DPM from construction activities associated with the Project would not exceed the threshold. In addition, the HRA concluded the maximum chronic non-cancer HI to be 0.02, which is below the BAAQMD's significance threshold of 1.0. An analysis was not conducted to determine the impact of Candlestick Point construction activities without the mitigation described above; however, due to the scale of the construction activities and proximity to adjacent receptors, without mitigation the impacts would be potentially above the BAAQMD's significance threshold and would therefore be potentially significant.

As the carcinogenic and noncarcinogenic health risks posed by DPM emissions during construction activities associated with development of the Project have been determined to be below established thresholds, this impact is less than significant with implementation of mitigation measure MM AQ-2.1 and mitigation measure MM AQ-2.2:

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 construction equipment used in the Alice Griffith parcels (CP01 though CP06) would utilize equipment which meets the USEPA Tier 4 engine standards for particulate matter control (or equivalent) throughout the entire duration of construction activities on those parcels.

Combined Impact of Candlestick Point and Hunters Point Shipyard Phase II

Impact AQ-2 **Construction activities associated with the Project would not result in impacts to off-site populations from Project-generated emissions of DPM. (Less than Significant with Mitigation) [Criterion H.d]**

As noted earlier, BAAQMD CEQA Guidelines has an established threshold of 10 in one million for carcinogenic health risks; the HRA which took into account the mitigation measures described above concluded that the inhalation cancer risk at the MEI would be 4.5 in one million. This represents the

maximum level of DPM experienced by all off-site and on-site (i.e., Alice Griffith) sensitive receptors during Project construction activities. Exposure to DPM from construction activities associated with the Project would not exceed the threshold. In addition, the HRA concluded the maximum chronic noncancer HI to be 0.01, which is below the BAAQMD's significance threshold of 1.0. An analysis was not conducted to determine the impact of Candlestick Point construction activities without the mitigation described above; however, due to the scale of the construction activities and proximity to adjacent receptors, without mitigation the impacts would be potentially above the BAAQMD's significance threshold and would therefore be potentially significant.

As the carcinogenic and noncarcinogenic health risks posed by DPM emissions during construction activities associated with development of HPS Phase II have been determined to be below established thresholds, this impact is less than significant with implementation of mitigation measure MM AQ-2.1 and mitigation measure MM AQ-2.2.

Impact AQ-3: TACs from Construction Activities

Within the HPS Phase II site, there are many existing structures associated with ship repair, piers, dry-docks, storage, administrative, and other former Navy uses. Most of these structures are currently vacant, but the materials historically used in association with operation of these facilities have resulted in a number of hazardous materials release sites and associated contaminated soils. The types, levels, and extent of contamination of soils and other environmental media have been identified for the HPS Phase II area through a series of comprehensive environmental investigations conducted at the direction of the Navy. The Navy is currently in the process of remediating on-site conditions but some of the remedial activities may be conducted after approval of the Project, and, therefore, the current on-site conditions are considered during the evaluation of potential health hazards as a result of development of HPS Phase II. Similar to the activities described above for Candlestick Point, demolition and soil grading activities associated with HPS Phase II could release TACs bound to soil-PM₁₀ into the air and pose potential health risks to nearby receptors on and off site. As described earlier, an HRA evaluated the potential concentrations of the airborne soil-PM₁₀ at numerous receptors on site (residents at the Alice Griffith Public Housing units) and off site (adult and child residents, workers, and schoolchildren) in the Project vicinity.

In order to determine the concentration of TACs in soils during Project construction activities, a number of site investigations and HHRA were evaluated for HPS and CP.

- HPS—The Navy directed a series of comprehensive environmental investigations and HHRA at the former HPS. The selection of areas and chemicals for evaluation in this HHRA is based on information and analytical results presented in the Navy HHRA reports. The Navy applied a consistent investigation and risk assessment approach for each of the Parcels. Specifically, each Parcel was divided into “redevelopment blocks,” corresponding to the future reuse (e.g., residential or recreational) outlined in the Hunters Point Shipyard Redevelopment Plan (San Francisco Redevelopment Agency [SFRA] 1997). The Navy HHRA identified the proposed future use and associated soil cleanup levels (corresponding to residential, industrial, or recreational levels) for each redevelopment block. The selection of areas for evaluation in this HHRA was based on the environmental condition of the Parcels and/or redevelopment blocks within a Parcel at the time Project construction activities will commence, as provided by the Project Applicant. Specifically, if

a redevelopment block (within a Parcel) is designated for residential use (including mixed use), it was assumed that the redevelopment block had been remediated to residential cleanup levels prior to construction activities, and the redevelopment block was excluded from the analysis; all remaining redevelopment blocks within a Parcel were identified for quantitative evaluation. This is a conservative approach in that it is possible that areas designated for nonresidential uses will also have been remediated prior to construction activities. However, because residual concentrations in soil in these areas may remain above residential levels, as a screening-level approach, it was conservatively assumed that nonresidential areas had not been remediated.

- CP—Analytical results for chemicals in soils within the CP area were available from two investigations conducted by Geomatrix Consultants, Inc.: *Site Investigation and Risk Evaluation Report for the Proposed San Francisco 49ers Stadium and Mall Site: North Park and Last Port Areas*²⁰⁰ and *Addendum 1 to the Site Investigation and Risk Evaluation Report for the Proposed San Francisco 49ers Stadium and Mall Site: North Park and Last Port Areas*.²⁰¹

Emissions of soil PM₁₀ from construction activities were estimated assuming the mitigation measures discussed in MM HZ-15. Projected emissions without these mitigation measures were not quantified. As discussed earlier, airborne concentrations of TACs bound to soil-PM₁₀ were estimated at receptor locations using the emissions estimates and the USEPA–recommended air dispersion model, AERMOD. Based on the results of the exposure evaluation and air dispersion modeling, quantitative estimates of excess lifetime cancer risks and noncancer HIs associated with potential exposure to Project-related emissions were developed. The methods used to estimate excess lifetime cancer risks and noncancer HIs are consistent with risk assessment guidance from BAAQMD, Cal/EPA, and USEPA.

Impact of Candlestick Point

Impact AQ-3a **Construction at Candlestick Point would not result in impacts to off-site and Alice Griffith populations from emissions of TACs bound to soil-PM₁₀. (Less than Significant with Mitigation) [Criterion H.d]**

Historical operations within the Candlestick Point site have increased the concentration levels of certain metals and/or organic compounds in the on-site soils. During construction activities (demolition and soil grading) associated with development at Candlestick Point, these chemicals could be released into the air, bound to dust particles or particulate matter (PM₁₀) and pose health risks to nearby receptors on- and off site. As described earlier, an HRA evaluated the potential concentrations of the airborne soil-PM₁₀ at numerous receptors on site (residents at the Alice Griffith Public Housing units) and off site (adult and child residents, workers, and schoolchildren) in the Project vicinity.

As noted above, BAAQMD CEQA Guidelines has an established threshold of 10 in 1 million for carcinogenic health risks; the inhalation cancer risk at the point of maximum impact or MEI as a result of construction activities at the Candlestick Point would be 0.04 in one million. This represents the maximum level of PM₁₀ experienced by all sensitive receptors in and around the Project during

²⁰⁰ Geomatrix Consultants. 1998. Site Investigation and Risk Evaluation Report for the Proposed San Francisco 49ers Stadium and Mall Site: North Park and Last Port Areas. San Francisco, California. Volume I of IV.

²⁰¹ Geomatrix Consultants. 1998. Addendum 1 to the Site Investigation and Risk Evaluation Report for the Proposed San Francisco 49ers Stadium and Mall Site: North Park and Last Port Areas. Candlestick Point, San Francisco, California. Volume I of II.

construction activities. Exposure to soil-PM₁₀ from construction activities associated with Candlestick Point would not exceed the threshold.

In addition, the HRA concluded the maximum non-cancer HI to be 0.01, which would be below the BAAQMD's significance threshold of 1.0.

As the carcinogenic and noncarcinogenic health risks posed by soil-PM₁₀ emissions during construction activities associated with development of Candlestick Point have been determined to be below established thresholds, this impact is less than significant with mitigation measure MM HZ-15 discussed above. An analysis was not conducted to determine the impact of Project construction activities without the dust control mitigation measures described in MM HZ-15; however, due to the scale of the construction activities and proximity to adjacent receptors, without these dust control measures, the impacts from TACs bound to soil PM₁₀ would likely be above the BAAQMD's significance threshold and would therefore be potentially significant.

Impact of Hunters Point Shipyard Phase II

Impact AQ-3b Construction at HPS Phase II would not result in impacts to off-site and Alice Griffith populations from emissions of TACs bound to soil-PM₁₀. (Less than Significant with Mitigation) [Criterion H.d]

Historical operations within the HPS Phase II site have increased the concentrations of certain metals and/or organic compounds in the on-site soils. During construction activities (demolition and soil grading) associated with development at HPS Phase II, these chemicals could be released into the air, bound to dust particles or particulate matter (PM₁₀) and pose health risks to nearby receptors on and off site. As described earlier, an HRA evaluated the potential concentrations of the airborne soil-PM₁₀ at numerous receptors on site (residents at the Alice Griffith Public Housing units) and off site (adult and child residents, workers, and schoolchildren) in the Project vicinity.

As noted above, BAAQMD has an established threshold of 10 in 1 million for carcinogenic health risks; the inhalation cancer risk at the point of maximum impact or MEI as a result of construction activities at the HPS Phase II site would be 0.01 in one million. This represents the maximum level of PM₁₀ experienced by all sensitive receptors in and around the Project during construction activities. Exposure to soil-PM₁₀ from construction activities associated with Candlestick Point would not exceed the threshold.

In addition, the HRA concluded the maximum non-cancer HI to be 0.03, which would be below the BAAQMD's significance threshold of 1.0.

As the carcinogenic and noncarcinogenic health risks posed by soil-PM₁₀ emissions during construction activities associated with development of HPS Phase II have been determined to be below established thresholds, this impact is less than significant with mitigation measure MM HZ-15 discussed above. An analysis was not conducted to determine the impact of Project construction activities without the dust control mitigation measures described in MM HZ-15; however, due to the scale of the construction activities and proximity to adjacent receptors, without these dust control measure, the impacts from TACs bound to soil PM₁₀ would likely be above the BAAQMD's significance threshold and would therefore be potentially significant.

Combined Impact of Candlestick Point and Hunters Point Shipyard Phase II

Impact AQ-3 **Construction activities associated with the Project would not result in impacts to off-site and Alice Griffith populations from emissions of TACs bound to soil-PM₁₀. (Less than Significant with Mitigation) [Criterion H.d]**

As discussed earlier, construction activities at both Candlestick Point and HPS Phase II have the potential to generate TACs associated with soil-PM₁₀ and an HRA evaluated the potential concentrations of the airborne soil-PM₁₀ at numerous receptors on site (residents at the Alice Griffith Public Housing units) and off site (adult and child residents, workers, and schoolchildren) in the Project vicinity.

As noted above, BAAQMD has an established threshold of 10 in 1 million for carcinogenic health risks; the inhalation cancer risk at the point of maximum impact or MEI as a result of construction activities at the Project would be 0.04 in one million. This represents the maximum level of PM₁₀ experienced by all sensitive receptors in and around the Project during construction activities. Exposure to soil-PM₁₀ from construction activities associated with Candlestick Point would not exceed the threshold.

In addition, the HRA concluded the maximum non-cancer HI to be 0.03, which would be below the BAAQMD's significance threshold of 1.0.

As the carcinogenic and noncarcinogenic health risks posed by soil-PM₁₀ emissions during construction activities associated with development of HPS Phase II have been determined to be below established thresholds, this impact is less than significant with mitigation measure MM HZ-15 discussed above. An analysis was not conducted to determine the impact of Project construction activities without the dust control mitigation measures described in MM HZ-15; however, due to the scale of the construction activities and proximity to adjacent receptors, without these dust control measure, the impacts from TACs bound to soil PM₁₀ would likely be above the BAAQMD's significance threshold and would therefore be potentially significant.

■ Operational Impacts

Impact AQ-4: Criteria Pollutants

Impact AQ-4 **Operation of the Project would violate BAAQMD CEQA significance thresholds for mass criteria pollutant emissions from mobile and area sources and contribute substantially to an existing or projected air quality violation at full build-out in the year 2029. (Significant and Unavoidable) [Criteria H.a and H.c]**

The proposed Project's design incorporates a dense, compact development plan that includes a diverse mix of land uses that are well connected with regional mass transit systems. The analysis of Project emissions in the criteria pollutant emission inventory assumed certain Project features. The land use mixes and basic land plan design proposed in the Project Description are fundamental aspects of the Project and include certain features assumed in the criteria pollutant emissions inventory, including providing neighborhood-serving retail; providing automobile, public transportation and pedestrian connections between the Shipyard, Candlestick Point, and the larger BVHP neighborhood; providing for transportation and open space corridors; and integrating land use patterns with a multimodal street

network that facilitates walking and cycling for internal trips and transit for trips of greater distance. Other Project features assumed in the criteria pollutant emission inventory are more conceptual, such as landscape plans and plans related to energy efficiencies in building design. Further, transportation features proposed as part of the Project that would be implemented in part by San Francisco Municipal Transportation Agency (SFMTA) are identified in Section III.D (Transportation and Circulation) as mitigation measures. With these features included, the proposed Project at full buildout (2029) is expected to generate 78,109 daily external motor vehicle trips. In contrast, the proposed Project's Transportation Study estimates that a similar development not including the above-mentioned design features (termed the "Business as Usual" or BAU scenario) would generate 137,282 daily external motor vehicle trips (about 76 percent more).

The estimates of average daily operational emissions for the proposed Project used the CARB's URBEMIS 2007 computer model initialized with land use specifications from the Project Description and daily vehicle trip and average trip length estimates taken from the Transportation Study. Table III.H-5 (Operational Criteria Pollutant Emissions [Year 2030]) presents the emission modeling with comparisons to BAAQMD thresholds and the transportation scenario without trip reduction features (referred to as the Business as Usual [BAU] scenario). The estimated daily criteria pollutant emissions associated with the proposed Project and the BAU scenario are shown in Table III.H-5 in comparison with each other and with the BAAQMD CEQA significance criteria. Although the Project would generate substantially fewer emissions than the BAU scenario (i.e., from 14 to 50 percent less than BAU depending on the pollutant), Project emissions of ROG, NO_x, PM₁₀, and PM_{2.5} would exceed the BAAQMD thresholds. No additional feasible mitigation measures have been identified that would further reduce the Project's operational criteria emissions below the BAAQMD thresholds. This would be a significant and unavoidable impact.

However, the Project design is a dense, infill mixed-use project, with a transit-oriented design, which is consistent with Senate Bill 375 as well as the San Francisco's sustainable city initiatives to reduce emissions, on a per-capita basis by its very nature. However, the BAAQMD CEQA guidelines list a total mass of criteria pollutants as its CEQA threshold. Accordingly, a large project, such as this one, regardless of its design and location will always exceed these mass-based thresholds.

Impact AQ-5: Carbon Monoxide

Impact AQ-5 Operation of the Project would not cause local concentrations of CO to exceed State and federal ambient air quality standards due to motor vehicles trips. (Less than Significant) [Criterion H.b]

Project increases in traffic on streets would contribute to localized CO emissions. CALINE4 dispersion modeling to determine local CO concentrations was performed for receptors near four intersections in the adjacent Bayview residential neighborhood. These intersections were selected because they represent the locations where Project traffic would produce the greatest change in traffic level of service associated with the Project (and, therefore, the greatest increase in congestion, which would produce the greatest increase in CO emissions) and/or the highest total traffic volumes of all intersections in the Project vicinity. Table III.H-6 (Carbon Monoxide Concentrations at Selected Intersections in the Bayview

Table III.H-5 Operational Criteria Pollutant Emissions (Year 2030)

Scenario/Emission Source	ROG (lbs/day)	NO _x (lbs/day)	CO (lbs/day)	PM ₁₀ (lbs/day)	PM _{2.5} (lbs/day)
Candlestick Point					
Area*	449	70	53	4	4
Motor Vehicles (External)	217	195	2,224	1,026	193
Subtotal	666	265	2,276	1,029	197
HPS Phase II					
Area*	166	38	30	1	1
Motor Vehicles (External)	88	80	916	423	80
Subtotal	255	119	947	424	81
Project					
Area*	616	108	83	5	5
Motor Vehicles (External)	305	275	3,140	1,449	273
Motor Vehicles (Internal)	24	11	184	36	7
All Sources (Project)	945	394	3,406	1,490	285
BAAQMD Significance Threshold	80	80	None	80	None
Project Exceeds BAAQMD Threshold?	Yes	Yes	No	Yes	No
Comparison to Business as Usual (BAU)					
BAU Project					
Area*	616	108	83	5	5
Motor Vehicles	485	476	5,292	2,561	567
All Sources BAU	1,101	585	5,375	2,566	572
Project Reduction from BAU	-14%	-33%	-37%	-42%	-50%

SOURCE: PBS&J, 2009. Based on URBEMIS 2007 Version 9.2.4; model input/output is included in Appendix H1.

Daily emissions of ROG and NO_x were calculated under summer conditions when ambient ozone concentrations are highest. Daily emissions of CO, PM₁₀, and PM_{2.5} were calculated under winter conditions when associated ambient concentrations are highest.
<http://www.baaqmd.gov/Divisions/Communications-and-Outreach/Air-Quality-in-the-Bay-Area/Air-Pollutants.aspx>

* Area emissions are from sources located on the Project site, such as natural gas combustion for heating/cooling, maintenance equipment, consumer product use, etc.

— BAAQMD significance threshold for CO is based on air concentration and not mass emission rates.

Neighborhood) presents CO concentrations and shows that the Project would not cause exceedances of the state and federal standards. Other intersections affected by Project traffic and at a further distance from the Project would be expected to have CO concentration levels similar to or lower than the four analyzed intersections. Therefore, the Project effects on ambient CO standards would be less than significant. No mitigation is required.

Table III.H-6 Carbon Monoxide Concentrations at Selected Intersections in the BVHP neighborhood

Intersection	One-Hour Average CO (ppm) ^a			Eight-Hour Average CO (ppm) ^a		
	Existing (2009)	Future Baseline (2030)	Future Project (2030)	Existing (2009)	Future Baseline (2030)	Future Project (2030)
Arelious Walker Dr./Gilman Ave.	2.5	2.7	3.1	1.6	1.7	2.0
Third St. / Gilman Ave.	3.1	2.9	3.2	2.0	1.9	2.1
Griffith St. / Palou Ave.	2.7	2.7	2.8	1.7	1.7	1.8
Evans Ave. / Jennings St.	2.9	3.0	3.0	1.9	2.0	2.0

SOURCE: PBS&J, 2008; model input/output included in Appendix H1.

The BAAQMD recommends that the current CO background for use with CALINE4 be chosen as the second highest recorded value over the last two years at the nearest BAAQMD station (i.e., the Arkansas Street station on Potrero Hill, in this case); these background levels are shown below. The California ARB has estimated San Francisco's CO emissions through the year 2020, but not for more distant future years; such CO emissions show a steady decrease over time at least up to 2020. Consequently, the current CO background levels were also used as the 2030 background levels, a conservative approach considering that 2030 levels are likely to be lower than current levels since ambient concentrations generally follow emission trends.

CO Background:

1-hour average: 3.6 ppm

8-hour average: 2.0 ppm

Ambient CO Standards:

1-hour average—federal: 35 ppm; state 20 ppm

8-hour average—federal and state: 9 ppm

a. Calculations reflect CO levels at 25 feet from roadside.

Impact AQ-6: Toxic Air Contaminants

Impact AQ-6 Implementation of HPS Phase II would not expose nearby receptors to an increase in local concentrations of toxic air contaminants due to the operation of Research and Implementation uses. (Less than Significant with Mitigation) [Criterion H.d]

The Project would include R&D facilities at HPS Phase II, which are situated on a peninsula extending to the East of the proposed stadium and south of the proposed residential areas. As the predominant winds are out of the West, on-site receptors will generally be upwind from these R&D areas. As such, the Project is designed to minimize potential adverse impacts between TAC sources in R&D areas and both on-site and off-site receptors.

Depending on the type of activity conducted at these planned R&D facilities, airborne TAC could be emitted. As the Project land use designations provide that a wide range of stationary sources could operate within the R&D uses, the exact type of stationary sources and quantity of TAC emissions from those sources are not known. However, for the purposes of this analysis, a conservative scenario of potential TAC emissions from each potential future source of TACs was modeled to estimate the potential health impact on nearby receptor locations. It was assumed that each allowable location for TAC emissions would emit chemicals at the maximum allowable rate, when, in fact, the TAC emissions at some of these locations within the R&D area would be below the maximum rate (for example, office building emissions for TAC would be zero or close to zero).

Using the assumptions discussed in the Analytic Method section, the HRA²⁰² estimated the excess lifetime cancer risk and chronic noncancer HI due to the combined TAC emissions from the R&D areas at any surrounding receptor location. All receptors were initially evaluated as residential receptors. The estimated excess lifetime cancer risks and HIs within areas designated for residential use were found not to exceed the BAAQMD's significance thresholds for carcinogenic and noncarcinogenic health risks. An analysis was not conducted to determine the impact without the assumptions discussed earlier; however, due to the potential number of R&D facilities with sources of TAC emissions capable of locating in the R&D areas and their proximity to adjacent receptors, without mitigation, the impacts would potentially be above the BAAQMD's significance threshold and therefore potentially significant.

The estimated cancer risks for long-term residential exposure would be above 10 in one million in an area designated as open space or stadium that would extend slightly south beyond the R&D boundary. The maximum estimated cancer risk for a residential receptor in this location would be 17 in one million; the noncarcinogenic health risks would have a HI of 1.6. However, as noted above, this receptor location would be in an area designated as open space or stadium use, and would not be a residential location. If cancer risks were estimated based on exposure assumptions consistent with recreational use of the open space, the risks would be reduced well below the threshold of 10 in one million. Due to the decrease in the frequency and duration of potential exposures, the chronic HI would also be reduced below the HI threshold of 1.0

The estimated health risks would be below BAAQMD thresholds for all residential receptor locations as a result of implementation of the Project, including implementation of the following mitigation measures. Impacts would be less than significant.

MM AQ-6.1 In accordance with the approach used to evaluate this impact, the minimum plot size for facility with sources of TAC emissions in R&D areas will be no smaller than 1 acre. If a facility with sources of TAC emission wishes to locate on a plot size smaller than 1 acre, an analysis will be required to show the facility, in conjunction with all other TAC emitting facilities in the R&D areas, will not cause these thresholds to be exceeded at the nearest residential locations.

MM AQ-6.2 Each facility with sources of TAC emissions will limit their emissions such that residential cancer risk and chronic non-cancer hazard index evaluated at the facility boundary does not exceed 10 in one million or 1.0, respectively. If these thresholds are exceeded at the boundary, an analysis will be required to show the facility, in conjunction with all other TAC emitting facilities in the R&D areas, will not cause these thresholds to be exceeded at the nearest residential locations.

²⁰² ENVIRON, *Ambient Air Quality Human Health Risk Assessment: Candlestick Point–Hunters Point Shipyard Phase II Development Plan*, Attachment III, September 28, 2009.

Impact AQ-7: Traffic PM_{2.5}

Impact AQ-7 **Operation of the Project would not exceed SFDPH thresholds or otherwise affect the health of nearby receptors as a result of an increase in local concentrations of vehicle emissions (PM_{2.5}) associated with vehicle use attributable to operation of the Project. (Less than Significant) [Criterion H.d]**

With development of the Project, vehicle trips and thereby vehicle emissions along local roadways would increase. The exposure of residential receptors to increased vehicle emissions could affect human health. As a result, and as discussed above, potential PM_{2.5} concentrations at select roadways with the addition of Project traffic were estimated compared against SFDPH thresholds to determine the potential health risks attributed to vehicle emissions that would be associated with the Project. Several roadway segments were chosen based on whether Project-related traffic would use these streets to access neighboring freeways and other areas of San Francisco and/or currently or would experience significant truck traffic. The roadways chosen include:

- Third Street
- Innes Avenue/Hunters Point Boulevard/Evans Avenue
- Palou Avenue
- Gilman Avenue/Paul Avenue
- Harney Way
- Jamestown Avenue
- Ingerson Avenue

With the addition of Project-related traffic, no receptors along the streets listed above would experience PM_{2.5} concentrations in excess of SFDPH's 0.2 µg/m³ threshold.²⁰³

Concentrations would not exceed SFDPH's threshold, or the BAAQMD's proposed threshold, and as such, impacts would be less than significant. No mitigation is required.

Impact AQ-8: Odors

Impact AQ-8 **Implementation of the Project would not generate objectionable odors affecting a substantial number of people. (Less than Significant) [Criterion H.e]**

According to the current BAAQMD CEQA Guidelines, odor impacts could result from siting a new odor source near existing sensitive receptors or siting a new sensitive receptor near an existing odor source. Examples of land uses that the BAAQMD regards with potential to generate considerable odors include: wastewater treatment plants, landfills, confined animal facilities, composting stations, food manufacturing plants, oil refineries and chemical plants. The Project would be a large mixed-use development containing residential, office, retail, R&D, recreational, and entertainment uses. Although there may be some potential for small-scale, localized odor issues to emerge around Project sources such as solid waste collection, food preparation, etc., substantial odor sources and consequent effects on on-

²⁰³ ENVIRON, *Ambient Air Quality Human Health Risk Assessment: Candlestick Point–Hunters Point Shipyard Phase II Development Plan*, Appendix IV, September 28, 2009.

site and off-site sensitive receptors would be unlikely and would be resolved by interventions after receipt of any complaints. This would be a less-than-significant impact. No mitigation is required.

Impact AQ-9: Consistency with Regional Air Plans

Impact AQ-9 The Project would conform to the current regional air quality plan. (Less than Significant) [Criterion H.a]

The most current air quality plan for the BAAQMD is the *Bay Area 2005 Ozone Strategy*. The BAAQMD is currently drafting its *2009 Clean Air Plan (CAP)*, which represents a unique approach to air planning, by including GHGs as well as criteria pollutants and TACs. For the 2005 Plan, the travel activity adjustments used in preparing the on-road mobile source inventory for the 2005 Plan are the same as were used in the Transportation Air Quality Conformity Analysis for the MTC's *Transportation 2030*. MTC's travel demand model utilizes regional demographic forecasts from ABAG's socioeconomic and population projections, in this case, *Projections 2003*. The bulk of the emissions into the air from the Project stems from the operation of mobile sources, accordingly, to evaluate consistency, a review of the mobile source emissions are needed. Both the draft CAP and the 2005 Plan emphasize the need for smart growth and a reduction of single automobile usage. The Project is consistent with these plans, in that it promotes the use of alternative transportation modes, such as transit, biking and walking. In addition, it puts housing in close proximity with jobs and retail establishments, reducing the length of trips and further reducing reliance on single-occupancy vehicles. Therefore, this project conforms to the regional air quality plan and would be a less-than-significant impact. No mitigation is required.

The purpose of the 2009 CAP, which is currently under preparation, is to comply with California *Clean Air Act*, and in particular, to: reduce ozone precursor emissions; comply with transport mitigation requirements; reduce ambient concentrations of particulate matter; reduce ambient concentrations of TACs; and, reduce GHG emissions. The current draft control strategy has 57 control measures: 19 stationary source control measures; 10 mobile source control measures; 18 transportation control measures; 6 land use and local impacts measures; four energy and climate measures; and 14 further study measures. Of particular import to the project are the transportation control measures and land use and local impacts measures.

The transportation control measures are grouped into five categories: improve transit services; improve system efficiency; encourage sustainable travel behavior; support focused growth and implement pricing strategies. The Project supports four out of these five categories. It improves transit services by adding and expanding certain transit routes. It improves the system efficiency and encourages sustainable travel behavior by locating residences near jobs, shopping and services. It supports focused growth by locating high-density residences near transit and services.

The proposed land use and local impacts measures are intended to promote focused growth to reduce the need for motor vehicle travel, and ensure that we plan for focused growth in a way that protects people from exposure to air pollution from stationary and mobile sources of emissions. There are no significant stationary sources within 1,000 feet of the proposed residential development. The potential for exposure to mobile sources was evaluated in the air quality section and found to be less than significant. Finally, the project is an example of focused growth that reduces the need for vehicle travel.

Although the 2009 CAP is under development, and the control measures may evolve over time, the Project is consistent and supports the transportation control measures and land use and local impact measures currently considered for inclusion in the 2009 CAP.

■ Cumulative Impacts

Generally, the geographic context for the analysis of construction and operational air quality impacts is the SFBAAB, which is the basin considered and evaluated by the BAAQMD in its evaluation of air quality impacts. For certain issues, however, the geographic context is more limited to areas immediately surrounding the Project. This is true for construction dust and DPM emissions, PM_{2.5} and CO associated with Project traffic and TACs from facilities in Project R&D areas; as opposed to regional issues such as the release of PM₁₀ or ozone forming precursors (NO_x and ROG). Based on BAAQMD guidance as contained in BAAQMD CEQA Guidelines (*Assessing the Air Quality Impacts of Projects and Plans*),²⁰⁴ any proposed project that would individually have a significant air quality impact would also be considered to have a significant cumulative air quality impact.

Construction

Construction emissions associated with new developments underway or at the planning stage in the area of the Project have the potential to combine with Project-related construction emissions to cause significant impacts. However, as discussed below, these impacts considered together are unlikely to cause significant impacts.

As shown in Figure III.A-1 (Proposed Developments in the Project Area), new proposed developments in the area of the Project are summarized below.

- Hunters View: 550 new homes
- India Basin Shoreline Area C: approximately 1,240 homes; 100,000 sq. ft. of retail; 1,365,000 sq. ft. of commercial space
- Hunters Point Shipyard Phase I (HPS Phase I): 1,600 homes
- Brisbane Baylands: 8,400,000 sq. ft. of development
- Executive Park: 2,800 homes; 90,000 sq. ft. of retail /restaurant
- Jamestown: - approximately 200 homes
- Visitacion Valley: 1,250 homes; 100,000 sq. ft. of retail
- Cow Palace Redevelopment: 1,700 homes; 550,000 sq. ft. of commercial/R&D

When evaluating combined impacts, the relative location of the other proposed project to the Project is a critical factor to consider as local wind patterns affect the transport of pollutants from each location. As shown in Figure 1 of the HHRA Appendix V,²⁰⁵ the winds in the vicinity of the Project are predominantly from the west, blowing directly east. As such, only construction activities on other projects directly west of the Project are likely to combine with Project-related construction activities. As

²⁰⁴ Bay Area Air Quality Management District (BAAQMD), *BAAQMD CEQA Guidelines: Assessing the Air Quality Impacts of Projects and Plans*, December 1999.

²⁰⁵ ENVIRON, *Ambient Air Quality Human Health Risk Assessment: Candlestick Point–Hunters Point Shipyard Phase II Development Plan*, Appendix V, September 28, 2009.

the Project is on the San Francisco Bay shoreline, there are no additional project immediately east. As shown in the map, the adjacent project with the most likely chance of causing a combined impact is the HPS Phase I development; however, infrastructure and grading is scheduled to be complete on that project by 2010 with full build-out in 2014 (depending on market conditions). Because the predominant wind direction is from the west to the east, the HPS Phase I project could impact the Project; however, the first occupancy of the HPS Phase II portion of the Project is not expected until 2016 or later, as such it is not expected that construction activities associated with HPS Phase I will cause adverse impacts on receptors in the HPS Phase II portion of the Project. The Project will not substantially impact HPS Phase I; the impacts of Project-related construction activities on HPS Phase I were explicitly evaluated in Impact AQ-2 and Impact AQ-3, as discussed above.

The Jamestown project is located directly west of CP, however, due to its limited size and indeterminate timeline, it is not likely to combine with Project-related construction activities to cause a significant impact. Additionally, as discussed in the preceding mitigation measures, the Project applicant is committing to a number of mitigation measures to reduce impacts to a less-than-significant level, for example the stringent dust control measures outlined in mitigation measure MM AQ-1. As all other nearby projects are subject to BAAQMD requirements and most are subject to San Francisco requirements, they will also have to implement dust control measures which would keep combined construction impacts to less than significant.

As stated under Impact AQ-1, fugitive dust associated with Project construction would not be expected to cause violations of AAQS with the inclusion of a City mandated and approved dust control plan. As stated under Impact AQ-2 and Impact AQ-3, emissions of DPM and soil-PM₁₀ from construction activities associated with the Project would not exceed BAAQMD's thresholds for determining potential impacts to human health. With this plan in place, Project dust emissions would be controlled consistent with BAAQMD CEQA Guidelines and, therefore, construction fugitive dust emissions would be considered to have a less-than-significant project impact. With Project emissions well controlled, the Project would not make a considerable contribution to a cumulative impact.

Operation

Project operational emissions of the ozone precursors, ROG and NO_x, and of the criteria pollutants PM₁₀ and PM_{2.5} would exceed the BAAQMD project-specific significance thresholds. Therefore, as discussed earlier, these emissions would be considered to have a significant and unavoidable cumulative impact. However, these emissions are typically addressed through the BAAQMD Clean Air Plan so that Project emissions, in combination with all adjacent projects, will be addressed at a regional level.

As discussed earlier, Project operational motor vehicle emissions of CO, including existing traffic volumes, would not cause violations of AAQS and the SFBAAB is expected to remain an Attainment area for CO. Additionally, as CO hotspots are a very localized impact and the CO analysis conducted includes cumulative traffic volumes, the cumulative CO impacts from the Project and any additional projects in the area will not cause a localized CO hotspot. Therefore, CO emissions would be considered to have a less-than-significant cumulative impact.

Project stationary source TACs and the PM_{2.5} from motor vehicles on site access roads, which could present human health risks to nearby receptors as a result of operation of the Project, would not exceed

current or proposed BAAQMD thresholds. In addition, the analysis of potential health hazards resulting from mobile emissions took into account future (including all existing) traffic, including that attributed to future growth within the cumulative context, and the relative health risks future motor vehicle traffic would impose would not exceed BAAQMD thresholds. Therefore, in accordance with BAAQMD guidelines, TAC and PM_{2.5} emissions would be considered to have a less-than-significant cumulative impact.²⁰⁶

■ Discussion of Proposed BAAQMD CEQA Guidelines

As discussed in the “Regional” section of Section III.H.3 (Regulatory Framework), as of the date of this Draft EIR the BAAQMD is in the process of revising their CEQA guidelines and expects the draft to be approved by their board of directors by the end of 2009. On October 7, 2009, the BAAQMD released a draft table of Staff-Recommended CEQA Thresholds of Significance which indicates a number of modifications to existing guidelines, including changes to the maximum daily emissions thresholds for criteria pollutants emissions from operational sources as well as requirements for the quantification of criteria pollutant and TAC emissions from construction activities and comparison to mass emission or risk thresholds, respectively. As these draft guidelines have not been adopted by the BAAQMD’s Board of Directors, the Project is not subject to the draft requirements. However, the impacts of the Project with respect to the draft requirements, which differ from the current, approved requirements are described below.

Construction

Modifications from Existing Requirements

The proposed guidelines differ from the existing guidelines in two main areas:

1. Mass emission limits for ROG, NO_x, PM₁₀ (exhaust) and PM_{2.5} (exhaust) are proposed
2. A cancer risk of 10 in one million, non-cancer HI of 1.0, and a PM_{2.5} concentration threshold of 0.3 µg/m³ have been proposed

Impact Conclusion Based on Draft Guidelines

As stated above, the Project construction-related emissions would be less than significant with mitigation in accordance with the current BAAQMD CEQA Guidelines in effect at the time of this Draft EIR, which do not require quantification of construction-related emissions. However, in anticipation of the future implementation of proposed new BAAQMD CEQA quantitative thresholds of significance for construction-related emissions, this section provides a quantitative analysis of the Project’s construction emissions to determine whether they would exceed the proposed thresholds. Worst-case, construction related emissions of criteria air pollutants and precursors were modeled in accordance with BAAQMD-recommended methodologies. Emissions of criteria air pollutants and precursors were modeled based on Project specifications (e.g., amount and type of equipment) described previously and default and BAAQMD-recommended settings and parameters attributable to the activity period and site location.

²⁰⁶ Bay Area Air Quality Management District (BAAQMD), *BAAQMD CEQA Guidelines: Assessing the Air Quality Impacts of Projects and Plans*, December 1999.

Table III.H-7 (Construction Criteria Pollutant Emissions) summarizes the modeled Project-generated, construction-related emissions of each criteria air pollutant and precursor. As shown in the table, construction-related emissions of ROG and NO_x would have potentially significant and unavoidable impacts on air quality in accordance with the proposed BAAQMD thresholds of significance.

Table III.H-7 Construction Criteria Pollutant Emissions				
<i>Emission Source</i>	<i>ROG (lbs/day)</i>	<i>NO_x (lbs/day)</i>	<i>Exhaust PM₁₀ (lbs/day)</i>	<i>Exhaust PM_{2.5} (lbs/day)**</i>
Candlestick Point*	527 (2019)	453 (2106)	2.8 (2016)	2.6 (2016)
HPS Phase II*	639 (2016)	1,036 (2016)	8.5 (2016)	7.8 (2016)
Project*	724 (2106)	1,490 (2016)	11.2 (2016)	10.3 (2016)
Proposed BAAQMD Significance Threshold*	54	54	82	54
Project Exceeds Proposed BAAQMD Threshold?	Yes	Yes	No	No

SOURCE: ENVIRON, 2009. Based on URBEMIS 2007 Version 9.2.4.

* Values in parentheses represent year of construction when maximum daily emissions occur.

** Per URBEMIS 2007, exhaust PM_{2.5} is calculated as 92% of exhaust PM₁₀.

As discussed in Impact AQ-2 and Impact AQ-3, the estimated cancer risk and noncancer HIs associated with Project-related construction activities are below the current and proposed significance thresholds. As such, Impact AQ-2 and Impact AQ-3 would be less than significant with mitigation. While a detailed evaluation has not been separately documented, the analysis conducted to evaluate risks and hazards from construction exhaust can be used to evaluate the proposed PM_{2.5} standard of 0.3 µg/m³. At no off-site location did the estimated concentration of DPM exceed this threshold; therefore, construction activity associated with the Project would be less than significant when judged against this proposed standard.

Operational

Modifications from Existing Requirements

The proposed guidelines differ from the existing guidelines in two main areas:

1. Mass emission limits for ROG, NO_x, PM₁₀ (exhaust) are changed and a mass emission rate is proposed for PM_{2.5} (exhaust) and fugitive dust
2. A PM_{2.5} concentration threshold of 0.3 µg/m³ has been proposed

Impact Conclusion Based on Draft Guidelines

The proposed mass emission limits for ROG, NO_x, PM₁₀ (exhaust), and PM_{2.5} (exhaust) are shown in parentheses next to the existing mass emission limits and in Table III.H-8 (Operational Criteria Pollutant Emissions [Year 2030]). As shown in the table, the criteria pollutant emissions from mobile and area sources would continue to be above the proposed significance thresholds, Impact AQ-1 would remain significant and unavoidable.

Table III.H-8 Operational Criteria Pollutant Emissions (Year 2030)					
<i>Scenario/Emission Source</i>	<i>ROG (lbs/day)</i>	<i>NO_x (lbs/day)</i>	<i>CO (lbs/day)</i>	<i>PM₁₀ (lbs/day)</i>	<i>PM_{2.5} (lbs/day)</i>
Candlestick Point					
Area*	449	70	53	4	4
Motor Vehicles (External)	217	195	2,224	1,026	193
Subtotal	666	265	2,276	1,029	197
HPS Phase II					
Area*	166	38	30	1	1
Motor Vehicles (External)	88	80	916	423	80
Subtotal	255	119	947	424	81
Project					
Area*	616	108	83	5	5
Motor Vehicles (External)	305	275	3,140	1,449	273
Motor Vehicles (Internal)	24	11	184	36	7
All Sources (Project)	945	394	3,406	1,490	285
Proposed BAAQMD Significance Threshold**	54	54	None	82	54
Project Exceeds Proposed BAAQMD Threshold?	Yes	Yes	—	Yes	Yes

SOURCE: PBS&J, 2009. Based on URBEMIS 2007 Version 9.2.4.

Daily emissions of ROG and NO_x were calculated under summer conditions when ambient ozone concentrations are highest. Daily emissions of CO, PM₁₀, and PM_{2.5} were calculated under winter conditions when associated ambient concentrations are highest. <http://www.baaqmd.gov/Divisions/Communications-and-Outreach/Air-Quality-in-the-Bay-Area/Air-Pollutants.aspx>

* Area emissions are from sources located on the Project site, such as natural gas combustion for heating/cooling, maintenance equipment, consumer product use, etc.

** Represent mass daily emissions thresholds reflected in draft Staff-Recommended CEQA Thresholds of Significance table released by the BAAQMD on October 7, 2009.

— BAAQMD significance threshold for CO is based on air concentration and not mass emission rates.

As shown in the “Impact AQ-7: Traffic PM_{2.5}” discussion above, PM_{2.5} concentrations associated with Project-related traffic at 2030, would be below the SFDPH standard of 0.2 µg/m³. As the proposed BAAQMD standard is 0.3 µg/m³, the traffic-related operational emissions would meet the proposed BAAQMD standard. As such, Impact AQ-4 would be less than significant.

Cumulative

Modifications from Existing Requirements

The proposed guidelines differ from the existing guidelines in proposing to add a zone of influence analysis for any operational or construction source within 1,000-foot radius of the Project fence line, such that the combined impacts cannot exceed any of the following:

- Cancer risk of 100 in one million
- Non-cancer HI of 1.0
- PM_{2.5} concentration threshold of 0.8 µg/m³ have been proposed

Impact Conclusion Based on Draft Guidelines

As shown in Figure III.H-1 (1,000-Foot Buffer Surrounding Project Fenceline), there are few, if any, additional large emission sources within 1,000 feet of the Project fenceline. The only potential exceptions are:

- Operational emissions associated with traffic on US-101 to the southwest of CP, which is greater than 500 feet from the Project fenceline and only within 1,000 feet of the shoreline park section of the Project
- Construction emissions from development of other project in the vicinity, as discussed above

As shown previously, Impact AQ-3, Impact AQ-4, Impact AQ-7, and Impact AQ-8 indicate that operational and construction emissions associated with the Project are less than significant. As there are no additional major sources of emissions sources within 1,000 feet of the Project fenceline, it is unlikely that the cumulative impacts would exceed the proposed standards. The impact of US-101 has not been directly evaluated; however, that section of freeway is only within 1,000 feet of the portion of the Project designated as a shoreline park where no residents would locate. As such, based on the proposed BAAQMD CEQA Guidelines, the freeway would not adversely affect residents at the Project. Therefore the cumulative impacts would likely be less than significant for the proposed thresholds.

However, the area adjacent to the Project zoned commercial where small-scale TAC or PM_{2.5} emissions sources, such as automotive repair or refinishing, dry cleaning, or artist shops. As the identity of these sources is not known, if they exist at all, it is impossible to determine what cumulative impacts may be though there is the potential for these cumulative impacts to exceed the proposed BAAQMD CEQA thresholds. At workshops discussing the proposed CEQA guidelines, the BAAQMD indicated that a District-wide database of TAC/PM_{2.5} sources would be released at some point in the future to support this effort. However, at this time, it is not possible to accurately predict the potential cumulative risks in the Project vicinity. Nonetheless, given the potential for these cumulative impacts to exceed the proposed BAAQMD CEQA thresholds, it is possible that the Project would contribute considerably to a cumulative impact from such sources and, therefore, may result in a significant cumulative air quality impact to sources of TAC emissions. If such an impact exists, this impact would be considered significant and unavoidable at this time, given the inability to determine the nature of such an impact accurately and, therefore, to determine whether any mitigation measures would be effective to reduce the impact to a less than significant level.



SOURCE: ENVIRON, 2009.

PBS&J 10.30.09 08068 | JCS | 09

FIGURE III.H-1



Candlestick Point — Hunters Point Shipyard Phase II EIR
1,000-FOOT BUFFER SURROUNDING PROJECT FENCELINE

