F. Noise and Vibration

Setting

Sound Descriptors

Decibel

Sound is characterized by various parameters that describe the rate of oscillation (frequency) of sound waves, the distance between successive troughs or crests in the wave, the speed that it travels, and the pressure level or energy content of a given sound. The sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound, and the decibel (dB) scale is used to quantify sound intensity. Because sound can vary in intensity by over one million times within the range of human hearing, a logarithmic loudness scale is used to keep sound intensity numbers at a convenient and manageable level. Since the human ear is not equally sensitive to all sound frequencies within the entire spectrum, human response is factored into sound descriptions in a process called “A-weighting,” expressed as “dBA.” The dBA, or A-weighted decibel, refers to a scale of noise measurement that approximates the range of sensitivity of the human ear to sounds of different frequencies. On this scale, the normal range of human hearing extends from about 0 dBA to about 140 dBA. A 10-dBA increase in the level of a continuous noise represents a perceived doubling of loudness. The noise levels presented herein are expressed in terms of dBA, unless otherwise indicated. **Table 26** shows some representative noise sources and their corresponding noise levels in dBA.[187]

Planning for acceptable noise exposure must take into account the types of activities and corresponding noise sensitivity in a specified location for a generalized land use type. Some general guidelines[188] are as follows: sleep disturbance can occur at levels above 35 dBA; interference with human speech begins at about 60 dBA; and hearing damage can result from prolonged exposure to noise levels in excess of 85 to 90 dBA.

Leq, CNEL, Ldn

Time variations in noise exposure are typically expressed in terms of a steady-state energy level (called Leq) that represents the acoustical energy of a given measurement. Leq (24) is the steady-state energy level measured over a 24-hour period. Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law requires that, for planning purposes, an artificial dBA increment be added to “quiet time” noise levels to form a 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL). CNEL adds a 5-dBA “penalty” during the evening hours (7:00 p.m. to 10:00 p.m.) and a 10-dBA penalty during the night hours (10:00 p.m. to 7:00 a.m.).

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[187] U.S. Department of Housing and Urban Development, *The Noise Guidebook*, 1985. Available on the internet at: http://www.hud.gov/offices/cpd/energyenviron/environment/resources/guidebooks/noise/.

[188] U.S. Environmental Protection Agency, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March, 1974. Available on the internet at: http://nonoise.org/library/levels74/levels74.htm.

TABLE 26
TYPICAL SOUND LEVELS MEASURED IN THE ENVIRONMENT

Examples of Common, Easily Recognized Sounds	Decibels (dBA) At 50 feet	Subjective Evaluations
Near Jet Engine	140	Deafening
Threshold of Pain (Discomfort)	130	
Threshold of Feeling – Hard Rock Band	120	
Accelerating Motorcycle (at a few feet away)	110	
Loud Horn (at 10 feet away)	100	Very Loud
Noisy Urban Street	90	
Noisy Factory	85[1]	
School Cafeteria with Untreated Surfaces	80	Loud
Near Freeway Auto Traffic	60[2]	Moderate
Average Office	50[2]	
Soft Radio Music in Apartment	40	Faint
Average Residence Without Stereo Playing	30	
Average Whisper	20	Very Faint
Rustle of Leaves in Wind	10	
Human Breathing	5	
Threshold of Audibility	0	

1 Continuous exposure above 85 dBA is likely to degrade the hearing of most people.
2 Range of speech is 50 to 70 dBA.

SOURCE: U.S. Department of Housing and Urban Development, *The Noise Guidebook.* 1985.

Another 24-hour noise descriptor, called the day-night noise level (Ldn), is similar to CNEL, except that Ldn adds only the 10-dBA nighttime penalty, not the evening penalty. In practice, Ldn and CNEL usually differ by less than 1 dBA at any given location for transportation noise sources, which is generally an imperceptible difference. The San Francisco Noise Ordinance uses the Ldn descriptor.

Health Effects of Environmental Noise

The World Health Organization (WHO) is perhaps the best source of current knowledge regarding health impacts due to the fact that the European nations have continued to study noise and its health effects, while the U.S. Environmental Protection Agency all but eliminated its noise investigation and control program in the 1970s.[189] According to WHO, sleep disturbance can occur when continuous indoor noise levels exceed 30 dBA or when intermittent interior noise levels reach 45 dBA, particularly if background noise is low. With a bedroom window slightly open (a reduction from outside to inside of 15 dB), the WHO criteria would suggest exterior continuous (ambient) nighttime noise levels should be 45 dBA or below, and short-term events should not generate noise in excess of 60 dBA. WHO also notes that

189 The *San Francisco General Plan* Land Use Compatibility Guidelines for Community Noise, presented below in Figure 19, were created during the same era.

maintaining noise levels within the recommended levels during the first part of the night is believed to be effective for the ability to fall asleep.[190]

Other potential health effects of noise identified by WHO include decreased performance on complex cognitive tasks, such as reading, attention, problem solving, and memorization; physiological effects such as hypertension and heart disease (after many years of constant exposure, often by workers, to high noise levels); and hearing impairment (again, generally after long-term occupational exposure, although shorter-term exposure to very high noise levels, for example, exposure several times a year to concert noise at 100 dBA). Noise can also disrupt speech intelligibility at relatively low levels; for example, in a classroom setting, a noise level as low as 35 dBA can disrupt clear understanding. Finally, noise can cause annoyance, and can trigger emotional reactions like anger, depression, and anxiety. WHO reports that, during daytime hours, few people are seriously annoyed by activities with noise levels below 55 dBA, or moderately annoyed with noise levels below 50 dBA.[191]

Fundamentals of Vibration

As described by the Federal Transit Administration (FTA), ground-borne vibration, in contrast to airborne noise, is not a common environmental problem, and it is uncommon for vibration caused by heavy vehicles, such as trucks and buses, to be perceptible, even close to major roads. However, the FTA notes that “ground-borne vibration can be a serious concern for nearby neighbors of a transit system route or maintenance facility, causing buildings to shake and rumbling sounds to be heard.” Another common source of vibration is certain construction activities, such as pile-driving and the operation of heavy earthmoving equipment.[192]

Several different methods are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal in inches per second. The PPV is most frequently used to describe vibration impacts to buildings. The root mean square (RMS) amplitude is most frequently used to describe the effect of vibration on the human body. The RMS amplitude is defined as the average of the squared amplitude of the signal. Decibel notation (Vdb) is commonly used to measure RMS. The decibel notation acts to compress the range of numbers required to describe vibration. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receptors for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration-sensitive equipment.

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190 World Health Organization, *Guidelines for Community Noise.* Geneva, 1999. Available on the internet at: http://www.who.int/docstore/peh/noise/guidelines2.html. This document is also available for review at the Planning Department, 1650 Mission Street, Suite 400, in Case File No. 2004.0160E.

191 *Ibid*.

192 Federal Transit Administration, Office of Planning and Environment, *Transit Noise and Vibration Impact Assessment*, May 2006. Available on the internet at: http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf. Reviewed May 25, 2011.

The effects of ground-borne vibration include movement of the building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, the vibration can cause damage to buildings. Building damage is not a factor for most projects, with the occasional exception of activities such as pile driving during construction. Annoyance from vibration often occurs when the vibration exceeds the threshold of perception by only a small margin. A vibration level that causes annoyance will be well below the damage threshold for normal buildings.

Existing Noise Environment

The level of long-term environmental noise in urban areas is, in general, largely dependent on vehicle traffic volumes and travel speeds as well as the mix of vehicle types. The existing ambient noise environment within the Transit Center District Plan area, typical of most urban areas, is dominated by vehicular traffic (autos, trucks, buses) on local roadways. BART and Muni trains operate underground below Market Street, which is the northern boundary of the Plan area, and thus do not generate substantial noise at street level.

The San Francisco Department of Public Health (DPH) has mapped transportation noise throughout the City of San Francisco, based on modeled baseline traffic volumes derived from the San Francisco County Transportation Authority travel demand model. DPH mapping indicates the range of Ldn noise levels that occur on every street within the City. The portion of this map that covers the Plan area is presented as **Figure 55**.

As indicated in this figure, existing noise levels immediately adjacent to most streets in the Plan area from Main Street and west (other than some mid-block "alleys") exceed 70 dBA (Ldn).[193] However, mapping also shows that noise levels decrease with distance from streets, particularly where buildings tend to serve as noise barriers, so that the interiors of some city blocks within the Plan area are subject to lower noise levels (between 55 and 69 dBA (Ldn). The noise map also indicates that the elevated I-80 freeway, located approximately 1,000 feet to the south, does not substantially influence the local noise environment. The highest traffic-generated noise levels (greater than 70 dBA, Ldn) in Plan area primarily occur along First Street, Fremont Street north of Folsom Street, Mission Street, Howard Street, Harrison Street west of Second Street, and New Montgomery Street, as well as on Third Street, just west of the Plan area.

In addition to vehicle traffic, continuous sources of mechanical noise also contribute to ambient noise levels. On the other hand, short-term noise sources, such as truck back-up beepers, the crashing of material being loaded or unloaded, and car doors slamming and engines starting up of parked cars, contribute very little to 24-hour noise levels but are capable sleep disturbance and severe annoyance. The importance of noise to receptors is dependent on both time of day and context. For example, long-term

193 Note that the noise levels presented in the figure are 24-hour noise levels, in which nighttime noise is given additional weight. These noise levels are not directly comparable to the noise levels discussed under "Health Effects of Environmental Noise," as those noise levels are for specified periods of less than 24 hours.

SOURCE: San Francisco Departmet of Public Health, 2008

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Figure 55
Existing Transportation Noise Levels

high noise levels from large traffic volumes can make conversation at a normal voice level difficult or impossible, while short-term peak noise levels, if they occur at night, can disturb sleep.

The Plan area does not contain a substantial number of stationary sources of noise. Such sources are often associated with heavy commercial and light industrial uses (commercial building contractors, wholesale distribution and trucking facilities, and processing facilities) that do not generally exist in the Plan area, with the notable exception of the Transit Center currently under construction and scheduled for completion in 2017. (Until that time, bus operations are being conducted at the Temporary Transbay Terminal, a surface facility located on the block bounded by Main, Beale, Howard, and Folsom Streets.) The primary stationary noise sources in the Plan area are mechanical (heating, ventilation, and air conditioning) equipment on building roofs.

The San Francisco Department of Public Health (DPH), which is responsible for enforcement of the City's Noise Ordinance related to operational noise from such stationary sources (see discussion of Noise Ordinance below) has responded to a variety of noise complaints in recent years in neighborhoods surrounding the Plan area. In many cases, such complaints have arisen when new residential and live-work buildings have been constructed in areas historically dominated by heavy commercial and light industrial uses. DPH staff reports that, in many such instances, noise measurements taken subsequent to the receipt of complaints revealed that commercial/industrial uses were generating noise levels in excess of those permitted under the City's Noise Ordinance; in many cases, it is possible that the noise level had been a long-time phenomenon that only rose to the level of enforcement action when a new residential or other sensitive use was introduced nearby. According to DPH staff, noise complaints from occupants of new residential projects have revealed that existing, and in some instances long-standing, commercial/industrial uses are in violation of the Noise Ordinance. As a result of DPH response to these complaints, existing facilities have been cited and, in some cases, required to retrofit existing equipment and/or change operations.[194]

Because the Plan area is substantially dominated by existing office uses, such conflicts are less likely to arise in the Plan area, although it is noted that construction of The Infinity residential complex, in Rincon Hill, generated a large number of noise complaints concerning rooftop mechanical equipment on a computer "server farm" on an adjacent parcel. According to DPH staff, the server farm, which existed prior to construction of the new residential building, was required to insulate its mechanical equipment to reduce noise levels at the adjacent residential building. It can be difficult to analyze or predict such conflicts in advance because noise measurements made at ground level often do not accurately reflect noise generated by rooftop equipment, especially when such equipment is many stories above grade. Even tenants of office buildings proximate to such noise sources (such as from a neighboring office building) may not be aware of the noise because nearly all newer office buildings have closed windows. Residential towers, on the other hand, often have operable windows or outdoor balconies, or both, which can expose residents to greater noise levels than office tenants at the same distance from a noise source.

194 Tom Rivard, Senior Environmental Health Specialist, San Francisco Department of Public Health, personal communication.

Transit Tower Site

The proposed Transit Tower would be developed immediately adjacent to the new Transit Center. In addition to bus traffic, the noise environment in the site vicinity is dominated by auto, bus, and truck, traffic on First, Fremont, and Mission Streets.

Sensitive Receptors

Sensitive noise receptors are generally considered to include hospitals, skilled nursing/convalescent care facilities, schools, churches, libraries, and residences. Land uses within the Transit Center District Plan area are described in detail in Section IV.A, Land Use. Residential uses occur in parts of Plan area, with most located in the eastern portion of the Plan area. There are no schools or churches located in the Plan area, although there are several day care centers, as described in Section IV.A, Land Use. There are no hospital or skilled nursing/convalescent care facilities nor are there any public libraries in the Plan area. However, there are several small libraries associated with institutions and agencies (i.e., U.S. Environmental Protection Agency, Golden Gate University School of Law) located within the Plan area.

Regulatory Setting

Federal Regulations

Federal regulations establish noise limits for medium and heavy trucks (more than 4.5 tons, gross vehicle weight rating) under 40 Code of Federal Regulations (CFR), Part 205, Subpart B. The federal truck pass-by noise standard is 80 dBA at 50 feet from the vehicle pathway centerline, under specified test procedures. These controls are implemented through regulatory controls on truck manufacturers. There are no comparable standards for vibration, which tend to be specific to the roadway surface, the vehicle load, and other factors.

California Noise Insulation Standards

State regulations include requirements for the construction of new hotels, motels, apartment houses, and dwellings other than detached single-family dwellings that are intended to limit the extent of noise transmitted into habitable spaces. These requirements are collectively known as the California Noise Insulation Standards and are found in Title 24 of the California Code of Regulations (the California Building Code). For limiting noise transmitted between adjacent dwelling units, the noise insulation standards specify the extent to which walls, doors, and floor ceiling assemblies must block or absorb sound. For limiting noise from exterior sources, the noise insulation standards set forth an interior standard of 45 dBA (Ldn) in any habitable room and, where such units are proposed in areas subject to noise levels greater than 60 dBA (Ldn), demonstration of how dwelling units have been designed to meet this interior standard. If the interior noise level depends upon windows being closed, the design for the structure must also specify a ventilation or air-conditioning system to provide a habitable interior environment. The typical range of noise reduction provided by residential dwellings is 12 – 18 decibels with windows partially open. An acoustically well-insulated home with windows and doors kept closed can provide 30 – 35 dB of noise attenuation whereas a more typical, unmodified dwelling might provide 20 – 25 dB of noise level reduction.[195]

San Francisco General Plan

The Environmental Protection Element of the *San Francisco General Plan* contains Land Use Compatibility Guidelines for Community Noise.[196] These guidelines, which are similar to state guidelines promulgated by the Governor's Office of Planning and Research, indicate maximum acceptable noise levels for various newly developed land uses. These guidelines are presented in **Figure 56**. Although this figure presents a range of noise levels that are considered compatible or incompatible with various land uses, the maximum "satisfactory" noise level is 60 dBA (Ldn) for residential and hotel uses, 65 dBA (Ldn) for school classrooms, libraries, churches and hospitals, 70 dBA (Ldn) for playgrounds, parks, office buildings, retail commercial uses and noise-sensitive manufacturing/ communications uses, and 77 dBA for other commercial uses such as wholesale, some retail, industrial/manufacturing, transportation, communications, and utilities. If these uses are proposed to be located in areas with noise levels that exceed these guidelines, a detailed analysis of noise reduction requirements will normally be necessary prior to final review and approval.

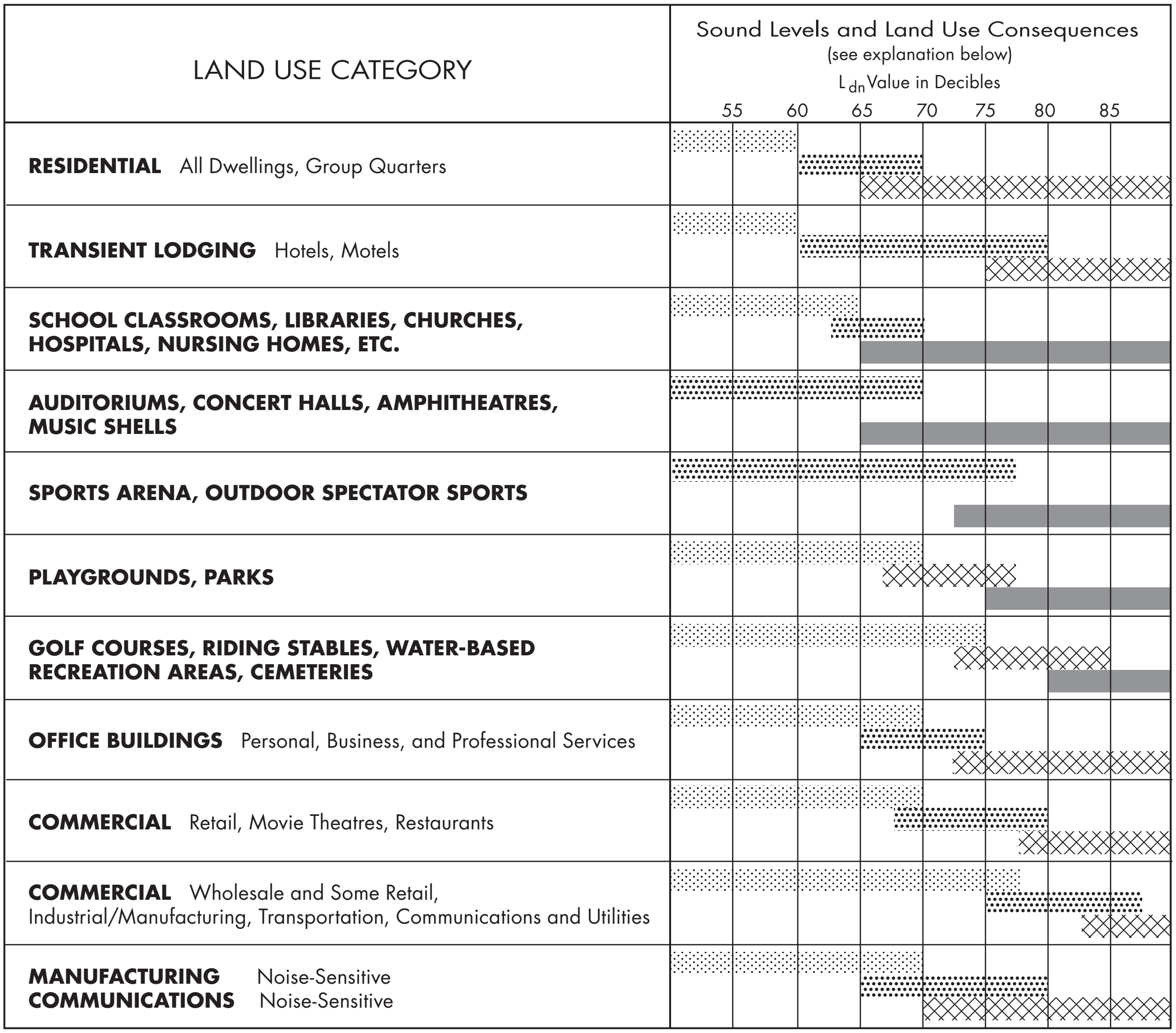
San Francisco Noise Ordinance

In the City, regulation of noise is stipulated in Article 29 of the Police Code (the Noise Ordinance), which states the City's policy is to prohibit unnecessary, excessive, and offensive noises from all sources subject to police power. Sections 2907 and 2908 of Article 29 regulate construction equipment and construction work at night, while Section 2909 provides for limits on stationary-source noise from machinery and equipment. Sections 2907 and 2908 are enforced by the Department of Building Inspection, and Section 2909 is enforced by the Department of Public Health. Summaries of these and other relevant sections are presented below:

Sections 2900(d) and 2918 establish a Noise Task Force to determine if there are additional adverse and avoidable noise sources not covered in this statute that warrant regulation. The Task Force reports annually to the Board of Supervisors regarding progress in protecting the noise environment, solving complaints, and necessary enabling legislation required to meet its legislative mandate. The issues surrounding new residential construction adjacent to existing commercial and industrial uses has been discussed at task force meetings; however, no decisions have been made as of summer 2011 to address these conflicts. The task force meets quarterly but will sunset in November 2011 unless it decides to continue.

[195] Wyle Laboratories, Wyle Research Report WR 94-23, "Raleigh-Durham International Airport New Construction Acoustical Design Guide," Prepared for Raleigh-Durham Airport Authority, September 30, 1994. This document is available at the Planning Department, 1650 Mission Street, Suite 500, in Case File No. 2007.0558E.

[196] Environmental Protection Element, Policy 11.1.



Satisfactory, with no special noise insulation requirements.

New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features included in the design.

New construction or development should generally be discouraged. If new construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

New construction or development should generally not be undertaken.

SOURCE: San Francisco General Plan, Environmental Protection Element

Figure 56
Land Use Compatibility Chart for Community Noise

Section 2907(a) of the Police Code limits noise from construction equipment to 80 dBA when measured at a distance of 100 feet from such equipment, or an equivalent sound level at some other convenient

distance. Exemptions to this requirement include impact tools with approved mufflers, pavement breakers and jackhammers with approved acoustic shields, and construction equipment used in connection with emergency work. Section 2908 prohibits nighttime construction (between 8:00 p.m. and 7:00 a.m.) that generates noise exceeding the ambient noise level by 5 dBA at the nearest property line unless a special permit has been issued by the City.

Section 2909 generally prohibits noise from fixed mechanical equipment and music in excess of 5 dBA more than ambient noise from residential sources, 8 dBA more than ambient noise from commercial sources, and 10 dBA more than ambient on public property at a distance of 25 feet. Section 2909(d) establishes maximum noise levels for fixed noise sources (e.g., mechanical equipment) of 55 dBA (7:00 a.m. to 10 p.m.) and 45 dBA (10 p.m. to 7 a.m.) inside any sleeping or living room in any dwelling unit located on residential property to prevent sleep disturbance.

Impacts

Significance Criteria

The proposed project would result in a significant impact with respect to noise if it would:

- Result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project; or
- Be substantially affected by existing noise levels.

A project would also normally result in a significant impact with respect to noise if it would be located within an airport land use plan area, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, or if the project would expose people residing or working in the area to excessive noise levels. Additionally, for a project located in the vicinity of a private airstrip, the project would normally have a significant effect if it would expose people residing or working in the Plan area to excessive noise levels. The project site is not within an airport land use plan area, nor is it in the vicinity of a private airstrip. Therefore, these topics are not applicable.

Methodology

This analysis identifies potential noise impacts associated with future development that could result from implementation of the draft Plan. Noise issues evaluated in this section include: (1) noise generated by traffic generated by future growth under the Plan; and (2) compatibility of potential future uses with San Francisco Land Use Compatibility Guidelines for Community Noise. Project-specific analysis is also provided for the proposed Transit Tower.

In general, traffic noise increases of less than 3 dBA are barely perceptible to people, while a 5-dBA increase is readily noticeable.[197] Therefore, permanent increases in ambient noise levels of less than 3 dBA are typically considered to be less than significant, except in circumstances in which the resulting noise environment is relatively loud. Some guidance as to the significance of changes in ambient noise levels is provided by the 1992 findings of the Federal Interagency Committee on Noise (FICON), which assessed the annoyance effects of changes in ambient noise levels resulting from aircraft operations.[198] The recommendations are based upon studies that relate aircraft noise levels to the percentage of persons highly annoyed by the noise. Annoyance is a summary measure of the general adverse reaction of people to noise that generates speech interference, sleep disturbance, or interference with the desire for a tranquil environment. Although the FICON recommendations were specifically developed to assess aircraft noise impacts, they provide guidance with respect to other sources of noise. The FICON report recommended a variable scale of acceptable noise increase, with less increase deemed acceptable the higher the noise environment. This is based on the notion that a higher existing noise level requires a smaller increment to trigger annoyance among observers. Thus, for ambient noise levels of less than 60 dBA, Ldn, FICON recommended a threshold of allowable increase of 5 dBA. For noise environments of between 60 and 65 dBA, a 3-dBA threshold was recommended, while for ambient noise in excess of 65 dBA, the threshold was recommended at 1.5 dBA. This EIR relies on the FICON guidance for determining the significance of transportation noise impacts, as set forth in **Table 27**.

TABLE 27
MEASURES OF SUBSTANTIAL INCREASE FOR TRANSPORTATION NOISE EXPOSURE

Ambient Noise Level Without Project (Ldn)	Significant Impact Assumed to Occur If the Project Increased Ambient Noise Levels By:
60 – 65 dBA	+3.0 dBA or more
>65dBA	+1.5 dBA or more

SOURCE: Federal Interagency Committee on Noise, *Federal Agency Review of Selected Airport Noise Analysis Issues*, August 1992.

The Federal Transportation Administration (FTA) has developed criteria for judging the significance of vibration produced by transportation sources and construction activity. The FTA Guidelines provide screening distances for various transportation-related vibration sources. For a rapid transit railway, such as BART, the screening distance would be 200 feet (measured from source to receptor).

197 California Department of Transportation, Division of Environmental Analysis, "Technical Noise Supplement," November 2009; pp. 2-48 – 2-49. Available on the internet at: http://www.dot.ca.gov/hq/env/noise/pub/tens_complete.pdf.

198 Federal Interagency Committee on Noise, *Federal Agency Review of Selected Airport Noise Analysis Issues*, August 1992. Available on the internet at: http://www.fican.org/pdf/nai-8-92.pdf.

The FTA establishes the threshold of architectural damage for non-engineered timber or masonry structures at 0.2 inches per second PPV, and uses a human annoyance response threshold for ground-borne vibration of 80 VdB, RMS.[199] This is used as the threshold of significance in this EIR.

Impact Analysis

Transit Center District Plan

Impact NO-1: Implementation of the draft Plan, including the proposed Transit Tower, would not result in a substantial permanent increase in ambient noise or vibration levels, but Plan implementation could result in exposure of persons to noise levels in excess of standards in the *San Francisco General Plan* and could introduce new sensitive uses that would be affected by existing noise levels. (Significant and Unavoidable with Mitigation)

Traffic Noise Impacts

As indicated in the Setting, noise levels immediately adjacent to all major streets in the Plan area from Main Street to the west exceed 70 dBA (Ldn) under existing conditions. This exceeds the level at which the *General Plan* noise compatibility guidelines recommend that new residential construction "should generally be discouraged" and should be undertaken only following completion of a detailed noise analysis, with "needed noise insulation features included in the design."[200] At this noise level, very sensitive uses such as schools, libraries, hospitals, religious facilities, and the like "should generally not be undertaken." Such a recommendation would presumably apply to child care facilities as well. Additionally, above 65 dBA (Ldn), the FTA recommends an allowable noise increment of only 1 dBA. It is noted that, because noise diminishes with distance, in areas such as the Plan area with existing or proposed very tall residential buildings, traffic-generated noise levels at residential receptors several hundred feet above grade would be substantially lower than at street level. Therefore, in mixed-use towers where residential uses are located only at the upper levels, traffic noise would have less effect. Rooftop mechanical equipment can also generate noise, although typically at lower levels than traffic (other than large compressors and backup generators, if not sound-proofed).

Changes in noise level were estimated for the major streets in the Plan area, based on traffic volumes developed as part of the Plan transportation analysis. Noise levels generated by traffic in the Plan area would increase by less than 3 dBA, compared to existing conditions, and thus in most instances would not be readily perceptible to most observers. In general, background (cumulative) growth would be responsible for one-half to three-fourths (or more) of the overall change in noise levels between existing conditions and 2030 conditions with full implementation of the Plan, while the incremental increase due to Plan-generated growth would generally represent a much smaller noise increase (see **Table 28**). As shown in this table, the greatest peak-hour noise increases (2 dBA or more) overall would occur along

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199 FTA, *Transit Noise and Vibration Impact Assessment*; see footnote 192, p. 344. The threshold is based on potential damage to non-engineered timber and masonry buildings.

200 This recommendation is given for noise levels beginning at 65 dBA (Ldn); it overlaps with a less stringent recommendation in the range between 65 and 70 dBA (Ldn) and becomes exclusive above 70 dBA.

TABLE 28
FUTURE PEAK HOUR NOISE LEVELS ALONG PLAN AREA ROADWAY SEGMENTS

	Noise Level (dBA @ 50 feet from Roadway Centerline)									
Street (Segment Cross Streets)	**Existing**	**2030 Baseline**	**dBA Chg. From Existing**	**Existing + Plan Growth**	**dBA Chg. From Existing**	**dBA Chg. From Baseline**	**Growth + Pub. Realm**	**dBA Chg. From Existing**	**dBA Chg. From Baseline**	**dBA Chg. Fr. Project Growth**
Mission Street (Third-Second)	71.2	71.8	0.5	72.2	1.0	0.5	72.5	1.2	0.7	0.2
Mission Street (Second-First)	70.8	71.2	0.4	72.0	1.2	0.8	71.9	1.2	0.7	0.0
Mission Street (First-Fremont)	69.5	69.8	0.3	70.2	0.7	0.4	69.9	0.4	0.1	-0.3
Mission Street (Fremont-Beale)	69.7	70.0	0.3	70.8	1.1	0.8	71.2	1.5	1.2	0.4
Howard Street (Third-Second)	68.7	69.5	0.8	70.7	2.0	1.2	70.5	1.8	1.0	-0.3
Howard Street (Second-First)	68.7	69.4	0.7	71.1	2.4	1.7	71.0	2.3	1.6	-0.1
Howard Street (First-Fremont)	68.6	69.2	0.6	69.8	1.2	0.6	69.6	1.0	0.4	-0.1
Howard Street (Fremont-Beale)	68.6	69.4	0.8	69.8	1.1	0.4	69.2	0.6	-0.2	-0.6
Howard Street (Beale-Main)	66.5	67.5	1.0	67.6	1.1	0.1	67.1	0.6	-0.3	-0.5
Folsom Street (Third-Second)	67.9	69.5	1.7	69.8	1.9	0.2	69.4	1.5	-0.2	-0.4
Folsom Street (Second-First)	66.8	68.4	1.6	68.7	1.9	0.3	69.2	2.3	0.8	0.4
Folsom Street (First-Fremont)	65.4	66.7	1.3	67.5	2.1	0.8	68.3	2.8	1.5	0.8
Folsom Street (Fremont-Beale)	64.8	66.6	1.8	66.9	2.0	0.2	66.7	1.9	0.1	-0.2
Folsom Street (Beale-Main)	66.5	67.9	1.4	68.1	1.6	0.2	67.6	1.1	-0.3	-0.5
Folsom Street (Spear-Embarc.)	65.0	66.0	1.0	66.4	1.4	0.4	67.2	2.3	1.2	0.8
Harrison Street (Fifth-Fourth)	69.0	70.0	1.0	70.4	1.4	0.4	70.4	1.4	0.4	0.0
Harrison Street (Fourth-Third)	68.4	69.3	0.9	69.8	1.4	0.5	69.8	1.4	0.5	0.0
Harrison Street (Third-Second)	68.6	70.0	1.5	70.6	2.0	0.6	70.6	2.0	0.6	0.0
Harrison Street (Second-First)	67.5	68.5	1.1	68.6	1.2	0.1	68.8	1.4	0.3	0.2
Harrison Street (First-Fremont)	67.9	68.7	0.8	68.8	0.8	0.1	68.1	0.2	-0.6	-0.6
Harrison Street (Fremont-Main)	67.3	68.4	1.2	68.4	1.2	0.0	68.0	0.7	-0.5	-0.5
Harrison Street (Main-Spear)	65.6	66.6	0.9	66.6	1.0	0.0	65.9	0.3	-0.7	-0.7
Fremont Street (Mission-Howard)	70.3	70.7	0.4	71.5	1.2	0.8	71.1	0.9	0.5	-0.4
Fremont Street (Market-Mission)	70.6	71.6	1.0	72.1	1.5	0.5	71.9	1.3	0.3	1.9
Fremont Street (Mission-Howard)	71.1	72.1	1.0	71.6	1.6	0.5	72.1	1.0	0.0	1.2
Fremont Street (Howard-Folsom)	69.1	70.3	1.2	70.8	1.7	0.5	70.0	1.0	-0.3	-0.7
Fremont Street (Folsom-Harrison)	62.8	64.5	1.7	64.6	1.8	0.1	63.1	0.3	-1.3	-1.5
First Street (Market-Mission)	70.5	71.3	0.8	72.2	1.7	0.8	72.1	1.6	0.8	-0.1
First Street (Mission-Howard)	70.7	71.5	0.9	73.4	2.7	1.9	73.1	2.4	1.5	-0.3
First Street (Howard-Folsom)	70.8	71.5	0.7	72.6	1.8	1.1	71.5	0.7	0.0	-1.1
First Street (Folsom-Harrison)	71.2	71.8	0.6	72.4	1.2	0.6	72.6	1.5	0.9	0.3
Second Street (Market-Mission)	67.4	67.0	-0.5	67.4	0.0	0.4	67.4	0.0	0.5	0.0
Second Street (Mission-Howard)	69.4	69.5	0.1	70.1	0.7	0.6	70.1	0.7	0.6	0.0
Second Street (Howard-Folsom)	69.9	67.6	-2.2	70.0	0.1	2.4	71.2	1.4	3.6	1.2
Second Street (Folsom-Harrison)	70.2	69.5	-0.7	71.3	1.1	1.8	71.2	1.0	1.7	-0.1
Second Street (Harrison-Bryant)	71.5	72.1	0.6	72.6	1.1	0.5	72.6	1.1	0.5	0.0
New Montg'y St. (Market-Mission)	68.5	68.9	0.4	69.1	0.5	0.1	69.1	0.5	0.1	0.0
New Montg'y St. (Mission-Howard)	69.5	70.4	0.8	70.7	1.2	0.3	70.7	1.1	0.3	0.0
Third Street (Market-Mission)	71.4	72.7	1.3	73.0	1.6	0.3	72.8	1.5	0.1	-0.2
Third Street (Mission-Howard)	72.6	74.6	2.0	74.8	2.2	0.2	74.8	2.1	0.2	-0.1
Third Street (Howard-Folsom)	72.7	74.9	2.2	75.1	2.3	0.2	75.0	2.3	0.1	0.0
Third Street (Folsom-Harrison)	71.9	74.0	2.1	74.3	2.4	0.3	74.3	2.4	0.3	0.0
Third Street (Harrison-Bryant)	72.8	74.5	1.6	74.6	1.8	0.1	74.6	1.8	0.2	0.0
Beale Street (Market-Mission)	68.2	69.1	0.9	69.3	1.1	0.2	69.2	1.0	0.1	-0.1
Beale Street (Mission-Howard)	68.3	69.2	0.9	69.5	1.2	0.3	69.5	1.2	0.2	-0.1
Beale Street (Howard-Folsom)	65.6	66.6	1.1	66.7	1.1	0.0	67.6	2.1	1.0	1.0
Main Street (Market-Mission)	64.3	65.6	1.2	65.6	1.3	0.0	65.1	0.8	-0.4	-0.5
Main Street (Mission-Howard)	64.9	66.1	1.3	66.3	1.4	0.1	65.6	0.8	-0.5	-0.6
Main Street (Howard-Folsom)	65.6	66.5	0.9	66.6	1.0	0.1	65.7	0.1	-0.8	-0.9

Red values are higher; blue values are lower; values in black are relatively moderate.

NOTES: Assumptions include: Travel speeds on all streets, 30 mph; Vehicle Mix: 90% Autos/ 3% Medium Trucks / 7% Heavy Trucks (including buses) on streets with substantial bus and truck traffic (Mission, First, Second, Third, Fremont north of Howard; south of Howard, Fremont assumed as 93% / 3% / 4%); for other streets, 95% / 3% / 2%); Background noise levels due to traffic on other roadways and non-traffic related activities are not reflected in these noise levels. Noise levels in this table are intended to indicate incremental noise changes due to future growth and project development. Since they do not include background noise levels, they do not necessarily reflect actual noise levels along these roadway segments.

SOURCE: Environmental Science Associates, 2011.

Third Street (just west of the Plan area), Folsom Street, portions of Howard Street, and the block of First Street between Mission and Howard Streets, where the proposed Transit Tower would be located (and traffic from which would be the cause of most of that last increase). The largest incremental increase in noise due to the development resulting from the Plan itself would occur on First Street between Mission and Folsom Streets (adjacent to and south of the Transit Tower), on Mission Street between Fremont and Beale Streets, on Howard Street between First and Third Streets, and on parts of Folsom Street east of Fremont Street and Beale Street between Howard and Folsom Streets; these last two changes would largely be due to changes in circulation resulting from the Plan's proposed alterations to lane configurations on certain streets. The greatest traffic-generated noise levels would continue to be on Third Street, First Street, Fremont Street north of Folsom Street, Mission Street, Howard Street west of First Street, and Harrison Street west of Second Street. Streets such as Mission, Howard, Folsom, Harrison, First, and Third Streets, would also experience the largest increases in traffic noise with implementation of the draft Plan, with increases there (and on part of Beale Street) exceeding 1.5 dBA, when compared to existing conditions.[201] Based on the significance criterion described on p. 352, this would be a significant impact.

There are existing noise-sensitive land uses (residential units and child care centers) on some of these streets, such as Mission, Howard, Second, First, and Beale Streets. Additionally, other such sensitive land uses could be developed on these and nearby streets in the Plan area with implementation of the draft Plan.

The *General Plan* noise guidelines indicate that any new residential construction or development in areas with noise levels above 60 dBA (Ldn) should be undertaken only after a detailed analysis of noise reduction requirements is made and needed noise insulation features are included in the design. In areas where noise levels exceed 65 dBA (Ldn), new residential construction or development is generally discouraged, but if it does proceed, a detailed analysis of noise reduction requirements must be done and needed noise insulation features included in the design. Therefore, a detailed analysis of noise reduction requirements would typically be required for all future residential uses proposed in the Plan area. Because all new residential development in the Plan area is anticipated to comprise attached, multi-family residential units (i.e., there would not be expected to be any single-family homes constructed in the Plan area, given existing development densities and land costs), new residential development in the Plan area would be subject to Title 24 (*Building Code*) Noise Insulation requirements. This state regulation, adopted by the City, requires that multi-family residential units meet an interior standard of 45 dBA

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201 The modeling reveals one apparently anomalous result: the noise level on Second Street between Howard and Folsom Streets is predicted to *decrease* by more than 2 dBA between existing and future baseline (no project) conditions. The reason for this is that the transportation analysis includes planned changes to Second Street under the *San Francisco Bicycle Plan*, which are anticipated to eliminate left turns on Second Street. As a result, the Municipal Transportation Agency is considering a formal "detour" for Bay Bridge-bound traffic on Second Street, in which southbound vehicles would turn right on Howard Street, left on Hawthorne Street, and left on Harrison Street to reach the bridge. Accordingly, the transportation analysis assumes that the vast majority of traffic that today passes southbound on Second Street through the Howard Street intersection is projected to turn right instead, substantially reducing traffic volume on Second Street between Howard and Folsom Streets. Plan area growth is projected to add traffic back to Second Street, reaching approximately existing volumes, with changes in Plan-area lane configurations adding additional traffic growth to Second Street.

(Ldn) in any habitable room. Where such units are proposed in areas subject to noise levels greater than 60 dBA (Ldn), the project plans must demonstrate how dwelling units have been designed to meet this interior standard. Therefore, compliance with the state noise standards would ensure consistency with the *General Plan* noise standards for interior areas of new residential development in the Plan area. As stated in the Setting, it is noted that in areas with noise levels up to 70 dBA (Ldn), conventional construction can typically provide 25 dBA of noise insulation, while more advanced acoustical insulation can provide up to about 35 dBA insulation. While additional noise attenuation features beyond conventional construction may need to be incorporated into the building design where noise levels exceed 70 dBA (Ldn) to ensure that acceptable interior noise levels can be achieved, it is anticipated that the required interior noise level of 45 dBA can be achieved in new residential construction with incorporation of noise abatement features. Mitigation Measure M-NO-1a would require a noise study be completed for new residential projects prior to the completion of environmental review, to ensure that interior noise levels are suitable for residential use. However, required outdoor open space (decks, patios, gardens, and the like) would typically be subject to higher noise levels than noise-insulated interior areas. Mitigation Measure M-NO-1b would require new residential open spaces be sited to reduce, to the extent feasible, noise impacts associated with such open space. However, existing residential uses, including their open spaces, could be adversely affected by increases in traffic noise.

Other noise-sensitive land uses, such as day care centers (along with schools, libraries, and religious facilities) would also be subject to relatively high levels of traffic-generated noise in the Plan area. Many such special-purpose uses are subject to particular design and construction standards, and would likely meet appropriate interior noise levels as a matter of course. Day care centers, which are typically included in office buildings in the Plan area (and not in separate structures) could require noise insulation to achieve acceptable indoor noise levels; child care centers are also required to provide outdoor play space, and such areas would generally be subject to greater noise levels than those in the building interior. Without appropriate design, child care facilities and other non-residential noise-sensitive land uses could be subject to potentially significant impacts due to traffic-generated noise. To avoid the potential significant impact of exposure of such uses to noise levels in excess of *General Plan* recommendations, Mitigation Measure M-NO-1c would require that such uses would undergo appropriate noise analysis prior to approval and construction. Likewise, Mitigation Measure M-NO-1b would avoid potentially significant noise impacts to other new development in the Plan area by ensuring appropriate noise analysis, consistent with the *General Plan* noise guidelines for land use compatibility. However, existing sensitive uses could be adversely affected by increases in traffic noise.

The planned City Park atop the new Transit Center would be exposed to traffic noise, including increased noise generated by new development in the Plan area. However, noise levels in the park, which would be approximately 70 feet above grade, would be less than those at street level, because the distance above grade would preclude any direct line-of-sight connection between traffic and all areas behind the perimeter of the park. As a result, the bulk of the Transit Center building itself would serve to buffer City Park from street noise. Traffic noise would be further attenuated by the distance between the noise source and the park. Accordingly, noise impacts in City Park would be less than significant.

Other publicly accessible open spaces are or would be at ground level. These include the proposed Mission Square, at Fremont and Mission Streets, adjacent to the Transit Tower, and the proposed open space at the northeast corner of Second and Howard Streets. These open spaces, along with existing and to-be-developed open spaces created as part of office building development in the Plan area, would be exposed to traffic noise, including increased noise levels from subsequent development in the Plan area. To the extent feasible, site design, landscaping, street furniture, and similar features could be used to reduce noise levels in these open spaces. Because these spaces are located in a densely developed urban area, users of these spaces are presumed to be accustomed to noise levels that, under other circumstances, would be considered excessive. Moreover, because the increases in traffic noise described above would generally be limited (less than 3 dBA, or barely perceptible), this impact is considered less-than-significant.

Building Equipment Noise

As noted in the Setting, the primary stationary noise sources in the Plan area are mechanical (heating, ventilation, and air conditioning) equipment on building roofs. Although the Plan area is primarily an office district, and the draft Plan would maintain office space as the predominant land use in the area, there are existing residential units in the Plan area, and other residential buildings and mixed-use projects that would include residential units are anticipated with implementation of the Plan. As stated in the Setting, the City's Noise Ordinance limits noise from commercial properties to 8 dBA over the ambient noise level. Because rooftop equipment noise is not readily apparent to ground-level observers, and in recognition of the existing relatively high noise levels in the Plan area and the fact that the Plan area contains, and will continue to contain, a mix of uses including residential uses, Mitigation Measure M-NO-1d would require that noise from existing rooftop mechanical equipment be considered in the design of noise insulation for new residential uses. Additionally, Mitigation Measure M-NO-1e calls for the Planning Department to require the maximum feasible reduction of building equipment noise, such as through the enclosure of building mechanical equipment. However, existing residences and other sensitive uses could be adversely affected by the operation of new noisy building equipment proximate to those uses.

Vibration

As stated in the Setting, ground-borne vibration from operations of allowable uses in the Plan area is not a common environmental problem and even heavy-vehicle traffic (e.g., trucks and buses) does not generally result in perceptible vibration. Therefore, no significant long-term impacts with respect to vibration are anticipated.

Mitigation Measures

M-NO-1a: **Noise Survey and Measurements for Residential Uses.** For new residential development located along streets with noise levels above 70 dBA Ldn, the Planning Department shall require the preparation of an analysis that includes, at a minimum, a site survey to identify potential noise-generating uses within two blocks of the project site, and including at least one 24-hour noise measurement (with average and maximum noise level readings taken so as to be able to accurately describe maximum levels reached during nighttime hours), prior to completion of the environmental review for each subsequent residential project in the Plan area. The analysis shall be completed by person(s) qualified in acoustical analysis and shall demonstrate with reasonable certainty that Title 24 standards, where applicable, can be met, and that there are no particular circumstances about the proposed project site that appear to warrant heightened concern about noise levels in the vicinity. Should such concerns be present, the Department may require the completion of a detailed noise assessment by person(s) qualified in acoustical analysis and/or engineering prior to the first project approval action, in order to demonstrate that acceptable interior noise levels consistent with those in the Title 24 standards can be attained.

M-NO-1b: **Noise Minimization for Residential Open Space.** To minimize effects on residential development in the Plan area, the Planning Department, through its building permit review process and in conjunction with the noise analysis set forth in Mitigation Measure M-NO-1a, shall require that open space required under the Planning Code for residential uses be protected, to the maximum feasible extent, from existing ambient noise levels that could prove annoying or disruptive to users of the open space. Implementation of this measure could involve, among other things, site design that uses the building itself to shield on-site open space from the greatest noise sources, construction of noise barriers between noise sources and open space, and appropriate use of both common and private open space in multi-family dwellings, and implementation would also be undertaken consistent with other principles of urban design.

M-NO-1c: **Noise Minimization for Non-Residential Uses.** To reduce potential effects on new non-residential sensitive receptors such as child care centers, schools, libraries, and the like, for new development including such noise-sensitive uses, the Planning Department shall require, as part of its building permit review process, the preparation of an acoustical analysis by person(s) qualified in acoustical analysis and/or engineering prior to the first project approval action, in order to demonstrate that daytime interior noise levels of 50 dBA, based on the *General Plan* Environmental Protection Element, can be attained.

M-NO-1d: **Mechanical Equipment Noise Standard.** The Planning Department shall require that, as part of required the noise survey and study for new residential uses (Mitigation Measure M-NO-1a), all reasonable efforts be made to identify the location of existing rooftop mechanical equipment, the predicted noise generated by that equipment, and the elevation at which the predicted noise level would be of potential concern for new residential uses, as well as the necessary noise insulation for the new residential uses, where applicable.

M-NO-1e: **Interior Mechanical Equipment.** The Planning Department shall require, as part of subsequent project-specific review under CEQA, that effects of mechanical equipment noise on adjacent and nearby noise-sensitive uses be evaluated by a qualified acoustic consultant and that control of mechanical noise, as specified by the acoustical consultant, be incorporated into the final project design of new buildings to achieve the maximum feasible reduction of building equipment noise, consistent with *Building Code* and Noise Ordinance requirements and CEQA thresholds, such as through the use of quieter equipment, fully noise-insulated enclosures around rooftop equipment, and/or incorporation of mechanical equipment into intermediate building floor(s).

Level of Significance after Mitigation

Implementation of the above mitigation measures would reduce noise impacts to the maximum extent feasible, consistent with the *San Francisco General Plan*, and would render this impact less than significant with respect to new residential development and other new sensitive land uses. However, it cannot be stated with certainty that existing sensitive land uses would not be adversely affected by increased noise levels, particularly with respect to traffic noise. Therefore, because it is not generally feasible to retrofit existing uses to increase noise insulation, this impact is considered **significant and unavoidable**. It should be noted that the identification of this program level potentially significant impact does not preclude the finding of future less-than-significant impacts for subsequent projects, for which project-specific analysis finds that those project(s) would meet applicable thresholds of significance.

Impact NO-2: Construction activities in the Plan area could expose persons to temporary increases in noise levels substantially in excess of ambient levels. (Less than Significant with Mitigation)

Development that could result from implementation of the draft Plan would involve construction of new buildings, demolition, and possibly building rehabilitation and renovation. Limits on daytime construction hours of 7:00 a.m. – 8:00 p.m. are established by the *San Francisco Police Code*. Increased ambient noise levels from construction would be considered short-term and intermittent.

Construction activity noise levels at and near the construction areas would fluctuate depending on the particular type, number, and duration of uses of various pieces of construction equipment. Construction-related material haul trips would raise ambient noise levels along haul routes, depending on the number of haul trips made and types of vehicles used. In addition, certain types of construction equipment generate impulsive noises (such as pile driving), which can be particularly annoying. Due to the programmatic nature of the Draft Plan, it is unknown whether future development within the Plan area would involve pile driving, although it can be reasonably expected that at least some buildings—including the proposed Transit Tower—would require pile-supported foundations. Pile-driving may be more likely east of approximately First Street, where land was historically reclaimed from the margin of San Francisco Bay and soil conditions are typically poorer. **Table 29** shows typical noise levels during different construction stages.

Noise from construction activities generally attenuates at a rate of 6 to 7.5 dBA per doubling of distance. Based on the Plan area terrain, an attenuation of 6 dBA is assumed. Future construction could occur adjacent to sensitive receptors. Based on Table 29, the noise level associated with, for example, excavation is

TABLE 29
TYPICAL CONSTRUCTION NOISE LEVELS

Construction Phase	Noise Level (dBA, Leq)[a]
Pile Driving	101 (intermittent)
Excavation	89
Finishing	89
Structural Erection	85
Ground Clearing	84
Foundations	78

[a] Average noise levels correspond to a distance of 50 feet from the noisiest piece of equipment associated with a given phase of construction and 200 feet from the rest of the equipment associated with that phase.

SOURCE: U.S. Environmental Protection Agency, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, 1971.

89 dBA at 50 feet. Therefore, if sensitive receptors were located at this distance, construction noise at these levels would be substantially greater than existing noise levels throughout the Plan area. Impacts associated with construction noise, especially if the construction is to occur during the nighttime hours when most people are sleeping, would be significant.

Moreover, there is potential for simultaneous construction of multiple large buildings in a relatively small area under the Plan. For example, the new Transit Center is currently under construction, and construction activity will continue at that site until 2017. Several other projects are proposed (and one was approved in 2011) within about one block of the Transit Center site. Depending on the overlapping phases of construction, noise levels could be greater at certain locations.

In the event that pile driving is determined to be required for a subsequent development project, the sponsor of that project would implement Mitigation Measure M-NO-2a (Noise Control Measures for Pile Driving), which would reduce potential pile-driving noise impacts to a less-than-significant level. Moreover, as noted, the project sponsor would be required to comply with measures required for impact tools in Section 2907(b) of the Police Code. As a result, adverse impacts from pile-driving noise upon sensitive receptors near a particular project site would be reduced to a less-than-significant level.

Closed windows typically can reduce daytime interior noise levels to an acceptable level. Nevertheless, because of the number of sensitive receptors throughout the Plan area, implementation of Mitigation Measure M-NO-2b (General Construction Noise Control Measures), would be required for subsequent development projects to reduce construction noise to a less-than-significant level.

Mitigation Measures

M-NO-2a: **Noise Control Measures During Pile Driving.** For individual projects that require pile driving, a set of site-specific noise attenuation measures shall be completed under the supervision of a qualified acoustical consultant. These attenuation measures shall include as many of the following control strategies, and any other effective strategies, as feasible:

- The project sponsor of a development project in the Plan area shall require the construction contractor to erect temporary plywood noise barriers along the boundaries of the project site to shield potential sensitive receptors and reduce noise levels;
- The project sponsor of a development project in the Plan area shall require the construction contractor to implement "quiet" pile-driving technology (such as pre-drilling of piles, sonic pile drivers, and the use of more than one pile driver to shorten the total pile driving duration), where feasible, in consideration of geotechnical and structural requirements and conditions;
- The project sponsor of a development project in the Plan area shall require the construction contractor to monitor the effectiveness of noise attenuation measures by taking noise measurement; and
- The project sponsor of a development project in the Plan area shall require that the construction contractor limit pile driving activity to result in the least disturbance to neighboring uses.

M-NO-2b: **General Construction Noise Control Measures.** To ensure that project noise from construction activities is minimized to the maximum extent feasible, the project sponsor of a development project in the Plan area shall undertake the following:

- The project sponsor of a development project in the Plan area shall require the general contractor to ensure that equipment and trucks used for project construction utilize the best available noise control techniques (e.g., improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically-attenuating shields or shrouds, wherever feasible).
- The project sponsor of a development project in the Plan area shall require the general contractor to locate stationary noise sources (such as compressors) as far from adjacent or nearby sensitive receptors as possible, to muffle such noise sources, and to construct barriers around such sources and/or the construction site, which could reduce construction noise by as much as five dBA. To further reduce noise, the contractor shall locate stationary equipment in pit areas or excavated areas, if feasible.
- The project sponsor of a development project in the Plan area shall require the general contractor to use impact tools (e.g., jack hammers, pavement breakers, and rock drills) that are hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. Where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used, along with external noise jackets on the tools, which could reduce noise levels by as much as 10 dBA.
- The project sponsor of a development project in the Plan area shall include noise control requirements in specifications provided to construction contractors. Such requirements could include, but not be limited to, performing all work in a manner that minimizes noise to the extent feasible; use of equipment with effective mufflers; undertaking the most noisy activities during times of least disturbance to surrounding residents and occupants, as feasible; and selecting haul routes that avoid residential buildings inasmuch as such routes are otherwise feasible.
- Prior to the issuance of each building permit, along with the submission of construction documents, the project sponsor of a development project in the Plan area shall submit to the Planning Department and Department of Building Inspection (DBI) a list of measures to respond to and track complaints pertaining to construction

noise. These measures shall include (1) a procedure and phone numbers for notifying DBI, the Department of Public Health, and the Police Department (during regular construction hours and off-hours); (2) a sign posted on-site describing noise complaint procedures and a complaint hotline number that shall be answered at all times during construction; (3) designation of an on-site construction complaint and enforcement manager for the project; and (4) notification of neighboring residents and non-residential building managers within 300 feet of the project construction area at least 30 days in advance of extreme noise generating activities (defined as activities generating noise levels of 90 dBA or greater) about the estimated duration of the activity.

Level of Significance after Mitigation

Implementation of Mitigation Measures M-NO-2a and M-NO-2b would reduce the noise impact from future construction throughout the Plan area to a less than significant level.

Impact NO-3: Construction activities in the Plan area could expose persons to temporary increases in vibration levels substantially in excess of ambient levels. (Significant and Unavoidable with Mitigation)

Construction in the Plan area could potentially expose people to the impacts of excess groundborne vibration or noise levels. Specifically, vibration created through construction activities including pile driving could occur adjacent to sensitive receptors.

As shown in **Table 30**, pile driving can generate vibration levels as high as 1.518 inches per second (in/sec) PPV (112 Vdb RMS). Where pile driving is not required, use of heavy equipment for project construction generates vibration levels up to 0.089 in/sec PPV or 87 Vdb RMS at a distance of 25 feet, for the largest typical construction equipment such as a large bulldozer. Because most streets in the Plan area are 82.5 feet wide, vibration from construction would most affect receptors on adjacent parcels. Vibration levels, measured as PPV, across the street from construction sites would be reduced by more than 80 percent. Other pieces of equipment, such as a small bulldozer, would result in vibration impacts resulting in lesser PPV and RMS. Therefore, with the exception of pile driving, most construction activities would generate ground-borne vibration levels that would not exceed the FTA criteria of 0.2 in/sec PPV for structural damage but could exceed 80 RMS for human annoyance. Moreover, construction could adversely affect adjacent properties (i.e., those closer than 82.5 feet).

Groundborne vibration impacts associated with construction activities on historic resources, and mitigation for those effects, are addressed in Section IV.D, Cultural and Paleontological Resources, p. 270. Mitigation identified in that section would require contractors to undertake best practices during construction and to conduct pre-construction surveys of historical resources within 125 feet of proposed construction (to allow for a 25 percent safety factor) and to conduct construction-period monitoring of these resources to ensure that potential construction impacts would be reduced as feasible.

TABLE 30
VIBRATION VELOCITIES FOR CONSTRUCTION EQUIPMENT

Equipment/Activity	PPV at 25 ft (inches/second)[a]	PPV at 82.5 feet	RMS at 25 ft (Vdb)[c]	RMS at 82.5 feet
Pile Driver (upper range)	1.518	0.265	112	106
Pile Driver (typical)	0.644	0.113	104	98
Large Bulldozer	0.089	0.016	87	72
Loaded Trucks	0.076	0.013	86	71
Small Bulldozer	0.003	0.00	58	43

[a] Buildings can be exposed to ground-borne vibration levels of 0.2 PPV without experiencing structural damage.
[b] Assumes receptor is across the street.
[c] The human annoyance response level is 80 Vdb RMS.

SOURCE: ESA, 2010; Federal Transit Administration, *Transit Noise and Vibration Impact Assessment*, May 2006.

Mitigation Measures

Implement Mitigation Measure M-NO-2a, Noise Control Measures During Pile Driving.

- **Implement Mitigation Measure M-CP-5a, Construction Best Practices for Historical Resources, p. 270, and Mitigation Measure and M-CP-5b, Construction Monitoring Program for Historical Resources, p. 270.**

Level of Significance after Mitigation

- Implementation of Mitigation Measures M-NO-2a, M-CP-5a and M-CP-5b would reduce the vibration impact from future construction throughout most of the Plan area to a less than significant level. However, certain uses in close proximity to construction sites could, depending on the source and nature of the vibration, experience construction-related vibration that would be considered **significant and unavoidable**. It should be noted that the identification of this program level potentially significant impact does not preclude the finding of future less-than-significant impacts for subsequent projects, for which project-specific analysis finds that those project(s) would meet applicable thresholds of significance.

Transit Tower

Impact NO-4: The proposed Transit Tower project would not result in a substantial permanent increase in ambient noise levels in the project vicinity, and it would not expose persons to noise levels in excess of standards established in the local general plan or noise ordinance. (Less than Significant with Mitigation)

The *General Plan* Land Use Compatibility Guidelines indicate that, for office uses, the maximum "satisfactory" noise level without incorporating noise insulation into a project is 70 dBA (Ldn). The Guidelines indicate that office development should be discouraged at noise levels above 75 dBA (Ldn).

Where noise levels that exceed satisfactory level (i.e., 70 dBA), a detailed analysis of noise reduction requirements will normally be necessary prior to final review and approval. As noted in the Setting, traffic is the primary noise source in the Plan area, and the traffic noise level on all major streets in the project vicinity exceeds 70 dBA (Ldn). A 24-hour noise measurement at the intersection of Mission and Fremont Streets, diagonally across the intersection from the project site, measured the existing noise level (including all sources, not just traffic) at 76.5 dBA (Ldn), with a daytime (7:00 a.m. to 10:00 p.m. noise level of 73.3 dBA (Leq).[202] Hourly noise levels ranged from 63.8 dBA at 3:00 a.m. hour. to 77.4 dBA during the 8:00 a.m. hour. Given that the proposed project would contain primarily office use, with some retail space, and that these uses are not considered sensitive receptors for noise, it is anticipated that conventional construction techniques, including the use of noise-insulated glass, would result in reduction of interior noise levels of up to 30 dBA, resulting in levels adequate for the proposed uses. Accordingly, the impact of interior noise on the proposed project would be less-than-significant, and no further analysis is required.

Traffic Noise

Generally, traffic must double in volume to produce a noticeable increase in noise levels. Based on trip generation calculations prepared for the project, most trips to the project site would be made via transit and by foot. As described in the Plan analysis of traffic noise (Impact NO-1, above), the peak-hour traffic noise level would increase on First Street between Mission and Howard Streets (where the Transit Tower garage entrance/exit would be located) by almost 3 dBA. A portion of this increase would be due to traffic destined to and from the Transit Tower, which would generate approximately 5,500 daily vehicle trips (about 540 peak-hour vehicle trips). First Street currently has, and would continue to have, the highest noise levels in the Plan area, in large part because of the heavy traffic volume that uses First Street to reach the Bay Bridge on-ramp at First and Harrison Streets. Because traffic generated by the Transit Tower would result in an approximately 2 dBA increase in traffic noise, the impact is considered less than significant.

Although the proposed Transit Tower would be constructed adjacent to the planned City Park atop the new Transit Center, noise effects in the park would be less than significant, because the park would be approximately 70 feet above grade and would therefore be buffered from street noise by the Transit Center itself. Street noise would be further attenuated by distance.

Because the trip generation calculations on which the noise analysis is based are specific to travel activity in downtown San Francisco and already reflect robust transit use and a substantial number of bicycling and walking trips, it is not considered feasible to reduce vehicle trip generation by the more than 50 percent that would be required to avoid a project-specific significant impact. However, implementation of Mitigation Measures M-NO-1a, M-NO-1b, and M-NO-1c, p. 357, above, would avoid exposing sensitive receptors to this increased noise level.

[202] Noise measurements record all noise, not just traffic noise, and thus can result in higher numbers than the modeled results.

Level of Significance after Mitigation

With implementation of Mitigation Measures M-NO-1a, M-NO-1b, and M-NO-1c, project-specific effects of traffic noise would be less than significant.

Building Operation Noise

The proposed Transit Tower project would include mechanical equipment, such as air conditioning units and chillers, which could produce operational noise. These operations would be subject to Section 2909 of the San Francisco Noise Ordinance, Article 29 of the *San Francisco Police Code*. As amended in November 2008, this section establishes a noise limit from mechanical sources, such as building equipment, specified as a certain noise level in excess of the ambient noise level at the property line: for noise generated by residential uses, the limit is 5 dBA in excess of ambient, while for noise generated by commercial and industrial uses, the limit is 8 dBA in excess of ambient and for noise on public property, including streets, the limit is 10 dBA in excess of ambient.[203] In addition, the Noise Ordinance provides for a separate fixed-source noise limit for residential interiors of 45 dBA at night and 55 dBA during the day and evening hours. Compliance with Article 29, Section 2909, would minimize noise from building operations.

No detailed design information is available for the Transit Tower with respect to the location of mechanical equipment. Without mitigation, building equipment noise could be disruptive to existing and potential future residents in the Plan area, and, for purposes of a conservative assessment, this impact is considered potentially significant. Implementation of Mitigation Measures M-NO-1d and M-NO-1e, above, would further restrict the noise level for mechanical equipment in the Plan area and would require the project sponsor to fully enclose and noise-proof building mechanical equipment.

Mitigation Measures

Implement Mitigation Measure M-NO-1d, Mechanical Equipment Noise Standard, and Mitigation Measure M-NO-1e, Interior Mechanical Equipment.

Level of Significance after Mitigation

With implementation of Mitigation Measures M-NO-1d and M-NO-1e, operational noise from building equipment would be less than significant.

Impact NO-5: Construction of the proposed Transit Tower project would result in a temporary and/or periodic increase in ambient noise levels and vibration in the project vicinity above levels existing without the project. (Less than Significant with Mitigation)

Demolition, excavation, and building construction would temporarily increase noise in the project vicinity. Construction equipment would generate noise and possibly vibrations that could be considered an annoyance by occupants of nearby properties, or that could result in harm to individuals and/or surrounding buildings. The construction period for the Transit Tower would last approximately

203 Entertainment venues are also subject to a separate criterion for low-frequency (bass) noise.

36 months. Construction noise levels would fluctuate depending on construction phase, equipment type and duration of use, distance between noise source and listener, and presence or absence of barriers. Impacts would generally be limited to the period during which new foundations and exterior structural and facade elements would be constructed. Interior construction noise would be substantially reduced by the presence of exterior walls.

The Transit Tower would have a concrete slab foundation supported by driven piles anticipated to be founded on bedrock more than 200 feet below grade. The tower's structural system is anticipated to employ the concept of "megacolumns," which are very large structural columns several feet in width. The concentrated load supported by these megacolumns would be sustained by large diameter piles approximately 10 feet in diameter, with additional piles driven to support the building's foundation slab. Pile driving can generate noise levels in excess of 100 dBA at 50 feet each time the hammer strikes the pile. While potentially more startling than constant noise levels, pile driving noise is intermittent, occurring only when a pile is being driven, with breaks when driving one pile is complete and another is being placed in position. Therefore, the project sponsor would be required implement Mitigation Measure M-NO-2a (Noise Control Measures for Pile Driving), p. 360, above, which would reduce potential pile-driving noise impacts to a less-than-significant level. Moreover, as noted, the project sponsor would be required to comply with measures required for impact tools in Section 2907(b) of the *Police Code.* As a result, adverse impacts from construction noise upon sensitive receptors near the project site would be reduced to a less-than-significant level.

Construction noise is regulated by the San Francisco Noise Ordinance (Article 29 of the *Police Code*), amended in November 2008. The ordinance requires that noise levels from individual pieces of construction equipment, other than impact tools, not exceed 80 dBA at a distance of 100 feet from the source. Impact tools (jackhammers, hoerammers, impact wrenches) must have both intake and exhaust mufflers as well as be equipped with acoustically attenuating shields or shrouds to the satisfaction of the Director of Public Works or the Director of Building Inspection. Section 2908 of the Ordinance prohibits construction work between 8:00 p.m. and 7:00 a.m., if noise would exceed the ambient noise level by five dBA at the project property line, unless a special permit is authorized by the Director of Public Works or the Director of Building Inspection. The project must comply with regulations set forth in the Noise Ordinance.

The closest sensitive noise receptors to the project site that have the potential to be adversely affected by construction noise are the residential units in the Millennium Tower, across Fremont Street from the project site, and two child care facilities located about one block away, one in the PG&E building at 77 Beale Street, and a second at 342 Howard Street. Closed windows typically can reduce daytime interior noise levels to an acceptable level. Nevertheless, because of the proximity to these receptors, implementation of Mitigation Measure M-NO-2b (General Construction Noise Control Measures), p. 361, above, would be required to reduce construction noise to a less-than-significant level. Therefore, although construction noise could be annoying at times, with mitigation, construction noise would not be expected to exceed noise levels commonly experienced in an urban environment, and would not be considered significant.

Concerning vibration, because there are no sensitive uses closer than across the street (i.e., greater than 82.5 feet) from the Transit Tower site, vibration impacts would be anticipated to be less than significant, as described in Impact NO-3, except for potential impacts to historical resources, for which Mitigation Measures M-CP-5a and M-CP-5b would reduce impacts to a less-than-significant level.

Mitigation Measures

- **Implement Mitigation Measure M-NO-2a, Noise Control Measures for Pile Driving, Mitigation Measure M-NO-2b, General Construction Noise Control Measures, Mitigation Measure M-CP-5a, Construction Best Practices for Historical Resources, p. 270, and Mitigation Measure and M-CP-5b, Construction Monitoring Program for Historical Resources, p. 270**

Level of Significance after Mitigation

- With implementation of Mitigation Measures M-NO-2a, M-NO-2b, M-CP-5a, and M-CP-5b, project-specific construction noise and vibration impacts would be reduced to a less-than –significant level.

Impact NO-6: The proposed Transit Tower project would not be substantially affected by existing noise levels. (Less than Significant)

Ambient noise levels in the project vicinity are typical of noise levels in downtown San Francisco, which are dominated by vehicular traffic, including trucks, cars, Muni buses, and emergency vehicles. Mission, First, and Fremont Streets all experience relatively heavy traffic and generate moderate to high levels of traffic noise. Observation during weekday business hours by the environmental consultant indicates that surrounding land uses do not conduct noticeably noisy operations.

With regard to effects of the ambient area noise on project occupants, the proposed project would include a noise-reducing dual-pane glass assembly in its glazing system, which would reduce outdoor noise levels by up to 30 dBA, sufficient to ensure an adequately quiet interior noise environment for office use.

Mitigation: None required.

Cumulative Impacts

Impact C-NO: The draft Plan and proposed Transit Tower, in combination with past, present, and reasonably foreseeable future projects, would result in cumulative noise impacts. (Significant and Unavoidable with Mitigation)

The traffic noise analysis in Impact NO-1, above, includes noise from traffic increases due to background (cumulative) development. As indicated there, this cumulative growth would be responsible for one-half to three-fourths (or more) of the overall change in noise levels between existing conditions and 2030 conditions with full implementation of the Plan, while the incremental increase due to Plan-generated growth would represent a smaller noise increase. Mitigation Measures M-NO-1a, M-NO-1b, and M-NO-1c, p. 357, would reduce traffic noise impacts, but not necessarily to a less-than-significant level.

Therefore, cumulative increases in ambient noise, generally from traffic, are considered significant and unavoidable.

Cumulative construction impacts would occur from other projects in the vicinity, most notably the new Transit Center itself, which is currently under construction immediately south of the Transit Tower site. There are several other projects for which the Planning Department has applications on file in proximity to the Transit Tower site, including a project approved in 2011 at 350 Mission Street, diagonally across the Fremont and Mission Streets intersection from the proposed Mission Square park. Other potential development includes a high-rise project with three towers at the northwest corner of First and Mission Streets, a mixed-use tower on Fremont Street south of the new Transit Center, and a mid-rise residential building on Tehama Street between First and Second Streets. Other potential projects identified in the analysis for the Transit Center District Plan include towers on Mission Street between First and Second Street (Golden Gate University site) and on the north side of Howard Street between First and Second Streets. Each of these projects would generate construction noise. To the extent that simultaneous construction is undertaken in close enough proximity to the Transit Tower project site, or that two or more of the above projects are undertaken at the same time, such that cumulative effects related to construction noise would be anticipated, noise effects would be greater or last longer, or both. Additionally, the proposed underground extension of Caltrain service to the Transit Center, while it would occur beneath Second Street (two blocks east of the project site) would cause additional noise and vibration impacts if it is funded and built.

The construction of the proposed Caltrain Downtown Extension would temporarily introduce a new source of noise and vibration into the project area. However, this work would be primarily underground and more than 300 feet from the Transit Tower project site, At this distance, noise and vibration from the Caltrain Downtown Extension would not, along with the Transit Tower, result in significant cumulative impacts. The ongoing construction of the Transit Center will include construction of a lower level to accommodate future Caltrain (and potential high-speed rail) service. However, train track tunneling and construction would not occur until a later date, which is dependent on funding.

In the event that one or more nearby projects were to be undertaken at the same time as the proposed project, the Planning Department and the Departments of Building Inspection, Public Works, and Public Health, along with the Transbay Joint Powers Authority (sponsor of the Transit Center) and the Peninsula Joint Powers Board (sponsor of the Caltrain extension), would be expected to work to ensure that all projects comply with the San Francisco Noise Ordinance and that project construction schedules are coordinated so as to minimize, to the extent feasible, construction noise that could be disruptive. However, it is anticipated that, because of the large amount of construction ongoing and proposed in the Plan area, construction noise and vibration impacts could be significant for at least some existing, and possibly future, sensitive receptors.

Mitigation Measure

Implement Mitigation Measure M-NO-2a, Noise Control Measures for Pile Driving, and Mitigation Measure M-NO-2b, General Construction Noise Control Measures.

M-C-NO **Cumulative Construction Noise Control Measures.** In addition to implementation of Mitigation Measure NO-2a and Mitigation Measure NO-2b (as applicable), prior to the time that construction of the proposed project is completed, the project sponsor of a development project in the Plan area shall cooperate with and participate in any City-sponsored construction noise control program for the Transit Center District Plan area or other City-sponsored areawide program developed to reduce potential effects of construction noise in the project vicinity. Elements of such a program could include a community liaison program to inform residents and building occupants of upcoming construction activities, staggering of construction schedules so that particularly noisy phases of work do not overlap at nearby project sites, and, potentially, noise and/or vibration monitoring during construction activities that are anticipated to be particularly disruptive.

Level of Significance after Mitigation

With implementation of Mitigation Measures M-NO-2a, M-NO-2b, and M-C-NO, cumulative construction noise impacts would be reduced, but not necessarily to a less-than–significant level. It is also noted that the limitation on annual office development codified in *Planning Code* Section 321 could result in some "metering" of office development over time. While there is enough available space in the inventory of space available for large buildings to accommodate all Plan area buildings with applications currently on file, the entire amount of office space anticipated under the Plan represents about six years of annual allocations, or twice the amount of the current inventory. Therefore, if a number of additional projects—either in or outside of the Plan area—were to be proposed soon, not all could be approved at the same time. This could incrementally reduce the potential for cumulative construction noise in the Plan area. For purposes of a conservative assessment, however, this impact is considered **significant and unavoidable**. It should be noted that the identification of this program level potentially significant impact does not preclude the finding of future less-than-significant impacts for subsequent projects, for which project-specific analysis finds that those project(s) would meet applicable thresholds of significance.

G. Air Quality

This section addresses air quality impacts that could result from implementation of the Transit Center District Plan and Transit Tower project. The analysis estimates potential increases in criteria air pollutants that would be associated with project implementation.

Environmental Setting

The Plan area and the Transit Tower site are within the San Francisco Bay Area Air Basin, which includes all of San Francisco, Alameda, Contra Costa, Marin, San Mateo, Santa Clara, and Napa counties, and the southern and southwestern portions, respectively, of Sonoma and Solano counties. The Bay Area Air Quality Management District (BAAQMD) is the regional agency responsible for air quality planning in the Air Basin.

Ambient Air Quality – Criteria Air Pollutants

As required by the 1970 federal Clean Air Act, the United States Environmental Protection Agency (EPA) has identified six criteria air pollutants that are pervasive in urban environments and for which state and federal health-based ambient air quality standards have been established. EPA calls these pollutants criteria air pollutants because the agency has regulated them by developing specific public health- and welfare-based criteria as the basis for setting permissible levels. Ozone, carbon monoxide (CO), particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead are the six criteria air pollutants.

The BAAQMD's air quality monitoring network provides information on ambient concentrations of criteria air pollutants at various locations in the San Francisco Bay Area. **Table 31** is a five-year summary of highest annual criteria air pollutant concentrations (2006 to 2010), collected at the BAAQMD's air quality monitoring station at 10 Arkansas Street in San Francisco, which is located approximately 1.3 miles south of the Plan area.[204] Table 31 compares measured pollutant concentrations with the most stringent applicable ambient air quality standards (state or federal).

Ozone

Ozone is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG) and nitrogen oxides (NOx). The main sources of ROG and NOx, often referred to as ozone precursors, are combustion processes (including motor vehicle engines) and the evaporation of solvents, paints, and fuels. In the Bay Area, automobiles are the single largest source of ozone precursors. Ozone is referred to as a regional air pollutant because its precursors are transported and diffused by wind concurrently with ozone production through the photochemical reaction process. Ozone causes eye irritation, airway constriction, and shortness of breath

204 Data from this single location does not describe pollutant levels throughout San Francisco, as these levels may vary depending on distance from key emissions sources and local meteorology. However, the BAAQMD monitoring network does provide a reliable picture of pollutant levels over time.

TABLE 31
SUMMARY OF SAN FRANCISCO AIR QUALITY MONITORING DATA (2006–2010)

Pollutant	Most Stringent Applicable Standard	Number of Days Standards were Exceeded and Maximum Concentrations Measured				
		2006	2007	2008	2009	2010
Ozone						
- Days 1-hour Std. Exceeded	9 pphm [a]	0	0	0	0	0
- Max. 1-hour Conc. (pphm) [b]		5.3	6.0	8.2	7.2	7.9
- Days 8-hour Std. Exceeded	7 pphm [a]	0	0	0	0	0
- Max. 8-hour Conc. (pphm) [b]		4.6	5.3	6.6	5.6	5.1
Carbon Monoxide (CO)						
- Days 8-hour Std. Exceeded	9 ppm [a]	0	0	0	0	0
- Max. 8-hour Conc. (ppm)		2.1	1.6	2.3	2.9	1.4
Suspended Particulates (PM_{10})						
- Days 24-hour Std. Exceeded[c]	50 µg/m^3 [a]	3	2	0	0	0
- Max. 24-hour Conc. (µg/m^3)		**61**	**70**	41	35	39
Suspended Particulates ($PM_{2.5}$)						
- Days 24-hour Std. Exceeded [d]	35 µg/m^3 [b]	3	5	0	1	3.2
- Max. 24-hour Conc. (µg/m^3)		**54.3**	**45.5**	29.4	**35.5**	**45.3**
- Annual Average (µg/m^3)	12 µg/m^3 [a]	9.7	8.9	11.7	ND	10.5 [e]
Nitrogen Dioxide (NO_2)						
- Days 1-hour Std. Exceeded	25 pphm [a]	0	0	0	0	0
- Max. 1-hour Conc. (pphm) [b]		11	7	6	6	9
Sulfur Dioxide (SO_2)						
- Days 24-hour Std. Exceeded	40 ppb [a]	0	0	0	ND	ND
- Max. 24-hour Conc. (ppb) [b]		6	6	4	ND	ND

Notes: Bold values are in excess of applicable standard.
conc. = concentration; ppm = parts per million; pphm = parts per hundred million; ppb=parts per billion;
µg/m3 = micrograms per cubic meter
ND = No data or insufficient data.

[a] State standard, not to be exceeded.
[b] Federal standard, not to be exceeded.
[c] Based on a sampling schedule of one out of every six days, for a total of approximately 60 samples per year.
[d] Federal standard for $PM_{2.5}$ was reduced from 65 µg/m3 to 35 µg/m3 in 2006.
[e] Annual average based on federal method; state average not available.

SOURCE*:* California Air Resources Board

and can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema. Table 31 shows that, according to published data, the most stringent applicable standards (state 1-hour standard of 9 parts per hundred million (pphm) and the federal 8-hour standard of 8 pphm) were not exceeded in San Francisco between 2004 and 2008.

Carbon Monoxide (CO)

CO is an odorless, colorless gas usually formed as the result of the incomplete combustion of fuels. The single largest source of CO is motor vehicles; the highest emissions occur during low travel speeds, stop-and-go driving, cold starts, and hard acceleration. Exposure to high concentrations of CO reduces the oxygen-carrying capacity of the blood and can cause headaches, nausea, dizziness, and fatigue, impair central nervous system function, and induce angina (chest pain) in persons with serious heart disease. Very high levels of CO can be fatal. As shown in Table 31, no exceedances of state CO standards were recorded between 2006 and 2010. Measurements of CO indicate hourly maximums average 14 percent of the more stringent state standard, and maximum 8-hour CO levels approximately 20 percent of the allowable 8-hour standard. According to BAAQMD, CO emissions have decreased dramatically since the introduction of the catalytic converter in 1975, and there have been no local exceedances of state or federal standards since 1991.[205]

Particulate Matter (PM_{10} and $PM_{2.5}$)

Particulate matter is a class of air pollutants that consists of heterogeneous solid and liquid airborne particles from manmade and natural sources. Particulate matter is measured in two size ranges: PM_{10} for particles less than 10 microns in diameter, and $PM_{2.5}$ for particles less than 2.5 microns in diameter. In the Bay Area, motor vehicles generate about half of the Air Basin's particulates, through tailpipe emissions as well as brake pad and tire wear. Wood burning in fireplaces and stoves, industrial facilities, and ground-disturbing activities such as construction, as well as demolition and agricultural activities, are other sources of such fine particulates. PM_{10} and $PM_{2.5}$ are small enough to be inhaled into the deepest parts of the human lung and can cause adverse health effects. $PM_{2.5}$ poses an increased health risk because the particles can deposit deep in the lungs and contain substances that are particularly harmful to human health. These fine particulates are strongly associated with premature deaths, respiratory diseases and reduced lung development in children, hospital admissions, and cardiopulmonary disease.[206]

Among the criteria pollutants that are regulated, particulates represent a serious ongoing health hazard. As long ago as 1999, the BAAQMD was reporting, in its CEQA Guidelines published that year, that studies had shown that elevated particulate levels contribute to the death of approximately 200 to 500 people per year in the Bay Area. High levels of particulates have also been known to exacerbate chronic respiratory ailments, such as bronchitis and asthma, and have been associated with increased emergency room visits and hospital admissions. Current evidence suggests that $PM_{2.5}$ "is by far the most harmful air pollutant in [the Bay Area] in terms of the associated impact on public health."[207]

Table 31 shows that exceedances of the state PM_{10} standard have occurred periodically in San Francisco. The state 24-hour PM_{10} standard is estimated to have been exceeded between 3 and 21 days in 2006, and 2 and 14 days in 2007, but not exceeded in 2008 through 2010. The BAAQMD began monitoring $PM_{2.5}$

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205 Bay Area Air Quality Management District (BAAQMD), *California Environmental Quality Act (CEQA) Air Quality Guidelines*, Updated May 2011; p. 6-1. http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Updated-CEQA-Guidelines.aspx. Accessed August 18, 2011.

206 Bhatia, Rajiv and Thomas Rivard, San Francisco Department of Public Health, Occupational & Environmental Health Section, Program on Health, Equity, & Sustainability, "Assessment and Mitigation of Air Pollutant Health Effects from Intra-urban Roadways: Guidance for Land Use Planning and Environmental Review," p. 5, May 6, 2008. Available on the internet at: http://www.sfdph.org/dph/files/EHSdocs/AirQuality/MitigateRoadAQLUConlicts.pdf. This document is also available for review at the Planning Department, 1650 Mission Street, Suite 400, in Case File No. 2007.0558E.

207 BAAQMD, *CEQA Air Quality Guidelines*, May 2011 (see footnote 205, above); p. 5-2.

concentrations in San Francisco in 2002.[208] The federal 24-hour $PM_{2.5}$ standard was exceeded on three days in 2006 and five days in 2007, but not exceeded in 2008. It was exceeded on one day in 2009 and about 3 days in 2010. The state annual average standard was not exceeded between 2006 and 2010.

Nitrogen Dioxide (NO_2)

NO_2 is a reddish brown gas that is a byproduct of combustion processes. Automobiles and industrial operations are the main sources of NO_2. Aside from its contribution to ozone formation, NO_2 can increase the risk of acute and chronic respiratory disease and reduce visibility. NO_2 may be visible as a coloring component on high pollution days, especially in conjunction with high ozone levels. Table 31 shows that the standard for NO_2 is being met in the Bay Area, and pollutant trends suggest that the Air Basin will continue to meet these standards for the foreseeable future.

Sulfur Dioxide (SO_2)

SO_2 is a colorless acidic gas with a strong odor. It is produced by the combustion of sulfur-containing fuels such as oil, coal, and diesel. SO_2 has the potential to damage materials and can cause health effects at high concentrations. It can irritate lung tissue and increase the risk of acute and chronic respiratory disease.[209] Table 31 shows that the standard for SO_2 is being met in the Bay Area, and pollutant trends suggest that the Air Basin will continue to meet these standards for the foreseeable future.

Lead

Leaded gasoline (phased out in the United States beginning in 1973), paint (on older houses, cars), smelters (metal refineries), and manufacture of lead storage batteries have been the primary sources of lead released into the atmosphere. Lead has a range of adverse neurotoxic health effects; children are at special risk. Some lead-containing chemicals cause cancer in animals. Lead levels in the air have decreased substantially since leaded gasoline was eliminated.

Toxic Air Contaminants

Toxic air contaminants (TACs) are air pollutants that may lead to serious illness or increased mortality, even when present in relatively low concentrations. Potential human health effects of TACs include birth defects, neurological damage, cancer, and death. There are hundreds of different types of TACs with varying degrees of toxicity. Individual TACs vary greatly in the health risk they present; at a given level of exposure, one TAC may pose a hazard that is many times greater than another.

In the Plan area, the primary source of TACs is on-road mobile sources (vehicles traveling on freeways and local roadways). Mobile source air toxics are known or suspected to cause cancer or other serious health or environmental effects. Engine exhaust from diesel, gasoline, and other combustion engines, is a complex mixture of particles and gases, with collective and individual toxicological characteristics.

[208] PM concentrations are not measured daily; hence, the number of annual exceedances is estimated by extrapolating sampling data for approximately 60 days per year.
[209] BAAQMD, *CEQA Guidelines*, op. cit.; p. B-2.

Vehicle tailpipe emissions includes criteria air pollutants such as particulate matter and carbon monoxide, ozone precursor compounds such as nitrogen oxides (NOx) and other hazardous air pollutants (e.g., air toxics) not regulated by EPA as criteria pollutants. Criteria air pollutant levels in the Plan area are described above in Table 31. Motor vehicles also emit air toxics. The EPA has identified seven priority mobile source air toxics, including benzene, 1,3-butadiene, formaldehyde, acetaldehyde, acrolein, naphthalene, and diesel exhaust. Similarly, the California Air Resources Board (CARB) has identified 10 air toxics of concern, five of which are emitted by on-road mobile sources: benzene, 1,3-butadiene, formaldehyde, acetaldehyde, and diesel exhaust particulate matter. Benzene is of particular concern because it is a known carcinogen and most of the nation's benzene emissions come from mobile sources. Diesel particulate matter is a toxic air contaminant and known lung carcinogen resulting from combustion of diesel fuel in heavy duty trucks and heavy equipment.[210]

In addition to monitoring criteria pollutants (Table 31), both the BAAQMD and CARB operate TAC monitoring networks in the San Francisco Bay Area. These stations measure 10 to 15 TACs, depending on the specific station. The TACs selected for monitoring are those that have traditionally been found in the highest concentrations in ambient air, and therefore tend to produce the most significant risk. The BAAQMD operates an ambient TAC monitoring station at its Arkansas Street facility in San Francisco. When TAC measurements at this station are compared to ambient concentrations of various TACs for the Bay Area as a whole, the cancer risks associated with mean TAC concentrations in San Francisco are similar to those for the Bay Area as a whole.[211]

TACs do not have ambient air quality standards, but are regulated by the BAAQMD using a risk-based approach. This approach uses a health risk assessment to determine what sources and pollutants to control as well as the degree of control. A health risk assessment is an analysis in which human health exposure to toxic substances is estimated, and considered together with information regarding the toxic potency of the substances, to provide quantitative estimates of health risks.[212]

Diesel particulate matter (DPM), which is emitted in diesel engine exhaust, was identified as a toxic air contaminant by CARB in 1998. Unlike TACs emitted from industrial and other stationary sources noted above, most diesel particulate matter is emitted from mobile sources—primarily "off-road" sources such as construction and mining equipment, agricultural equipment, and truck-mounted refrigeration units, as well as trucks and buses traveling on freeways and local roadways. Agricultural and mining equipment are not relevant to San Francisco, while construction equipment typically operates for a limited time at changeable locations. As a result, the readily identifiable locations where DPM is emitted in the Plan area include high-traffic roadways and other areas with substantial truck and bus traffic. Therefore, diesel

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210 Bhatia, Rajiv, and Thomas Rivard, "Assessment and Mitigation of Air Pollutant Health Effects …"; p. 5 (see note 206, p. 373).

211 BAAQMD, Toxic Air Contaminant Control Program, Annual Report 2003, Volume I and Appendix B-3. August 2007.

212 In general, a health risk assessment is required if the BAAQMD concludes that projected emissions of a specific air toxic compound from a proposed new or modified source suggest a potential public health risk, then the applicant is subject to a health risk assessment for the source in question. Such an assessment generally evaluates chronic, long-term effects, calculating the increased risk of cancer as a result of exposure to one or more TACs.

particulate matter is discussed further under “Roadway-Related Health Effects,” p. 376, below. Additionally, temporary emissions of DPM and $PM_{2.5}$ are associated with construction activities, notably building demolition and site excavation and grading, as off-road diesel equipment is prevalent in both of these phases of construction work.

Recently completed air toxics modeling determined that northeastern San Francisco, including the Plan area, has the highest annual DPM concentrations in the Bay Area.[213] Of the estimated annual DPM concentration of 18.3 micrograms per cubic meter, almost 93 percent of the DPM exposure was attributable to transportation sources. Because of the complex interaction between exact source locations and often vigorous localized mixing, this value should be considered more of an indicator of DPM exposure potential in the project vicinity rather than any specific risk.

Sensitive Receptors

Air quality does not affect every individual in the population in the same way, and some groups are more sensitive to adverse health effects than others. Population subgroups sensitive to the health effects of air pollutants include the elderly and the young, population subgroups with higher rates of respiratory disease such as asthma and chronic obstructive pulmonary disease, and populations with other environmental or occupational health exposures (e.g. indoor air quality) that affect cardiovascular or respiratory diseases such as asthma and chronic obstructive pulmonary disease, and populations with other environmental or occupational health exposures (e.g. indoor air quality) that affect cardiovascular or respiratory diseases. The factors responsible for variation in exposure are also often similar to factors associated with greater susceptibility to air quality health effects. For example, poorer residents may be more likely to live in crowded substandard housing and be more likely to live near industrial or roadway sources of air pollution.

Land uses such as schools, children’s day care centers, hospitals, and nursing and convalescent homes are considered to be the most sensitive to poor air quality because the population groups associated with these uses have increased susceptibility to respiratory distress. Residential areas are considered more sensitive to air quality conditions compared to commercial and industrial areas because people generally spend longer periods of time at their residences, with associated greater exposure to ambient air quality conditions.

Land uses within the Plan area are described in detail in Section IV.A, Land Use. Residential uses occur in the Plan area, with most located in the eastern portion of the Plan area. Recreational uses would also be considered sensitive compared to commercial and industrial areas due to the greater exposure to ambient air quality conditions. Parks and playgrounds in active recreational use may be considered moderately sensitive to poor air quality because persons engaged in strenuous work or exercise also have increased sensitivity to poor air quality; also, children are frequent users. However, exposure times are generally far shorter in parks and playgrounds than in residential locations and schools, for example, which typically

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213 Environ International Corp., *Demonstration Toxics Modeling for the Bay Area Using CAMx*, February 14, 2008. The grid resolution was 2 km x 2 km such that localized variations could not be determined.

reduces overall exposure to pollutants. While there are no existing public parks in the Transit Center District Plan area, there are privately owned, publicly accessible plazas and open space areas, with most located in the central and eastern portions of the Plan area. However, none of these open spaces offer space for active recreational activities. The lack of active uses and the fact that exposure times in Plan area open spaces are typically relatively short means that parks and open spaces are not considered sensitive air quality receptors for purposes of this analysis. (As noted above, day care centers, however, are considered sensitive; this includes the outdoor play areas at such facilities.)

In the vicinity of the proposed Transit Tower, the closest sensitive residential receptors are in the Millennium Tower, a high-residential structure at the southeast corner of Fremont and Mission Streets. This building has commercial and (non-public) community uses on the first two floors and residential uses beginning on the third floor; it is located approximately 82 feet east of the proposed Mission Square park, which would be developed adjacent to the Transit Tower, and approximately 180 feet east of the site of the Transit Tower itself. The licensed child-care facility closest to the Transit Tower site is located at 342 Howard Street (in the office building at 199 Fremont Street), at the northwest corner of Fremont and Howard Streets, some 400 feet southeast of the Transit Tower site. There is another child-care center in the PG&E Building at 77 Beale Street, with an outdoor play area on Mission Street at Main Street. This facility is about 600 feet east-northeast of the Transit Tower site.

Roadway-Related Health Effects

Both criteria pollutants and toxic air contaminants can result in adverse health impacts. Among criteria pollutants, fine particulate ($PM_{2.5}$) is of greatest concern. According to the BAAQMD, “A large body of scientific evidence indicates that both long-term and short-term exposure to $PM_{2.5}$ can cause a wide range of health effects (e.g., aggravating asthma and bronchitis, causing visits to the hospital for respiratory and cardiovascular symptoms, and contributing to heart attacks and deaths). According to the San Francisco Department of Public Health, epidemiological research that indicates that a concentration of 0.2 micrograms per cubic meter of $PM_{2.5}$ can result in an approximately 0.28 percent increase in non-injury mortality, or an increase of approximately 21 “excess deaths” per year (e.g., deaths that would occur sooner than otherwise expected) per one million population in San Francisco.[214,215]

Epidemiologic studies have consistently demonstrated that children and adults living in proximity to freeways or busy roadways have poorer health outcomes, including increased asthma symptoms and respiratory infections and decreased pulmonary function and lung development in children. Air pollution monitoring done in conjunction with epidemiological studies has confirmed that roadway-related health effects vary with modeled exposure to particulate matter and nitrogen dioxide. At this time, it is not possible to attribute roadway-related health effects to a single type of roadway, vehicle, or type of fuel. Vehicle tailpipe emissions contain diverse forms of particulate matter as well as well as

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214 “Excess deaths” (also referred to as premature mortality) refer to deaths that occur sooner than otherwise expected, absent the specific condition under evaluation; in this case, exposure to $PM_{2.5}$.

215 Bhatia and Rivard, “Assessment and Mitigation of Air Pollutant Health Effects….”; see note 206, p. 373.

ozone precursor compounds such as nitrogen oxides (NOx) and volatile organic compounds (VOC). Vehicles also contribute to particulates by generating road dust and through tire wear.

Air pollution studies have shown an association between respiratory and other non-cancer health effects and proximity to high traffic roadways. CARB community health risk assessments and regulatory programs have produced air quality information about certain types of facilities for consideration by local authorities when siting new residences, schools, day care centers, and medical facilities (i.e., sensitive land uses).[216] Sensitive land uses deserve special attention because children, pregnant women, the elderly, and those with existing health problems are especially vulnerable to the non-cancer effects of air pollution. There is also substantial evidence that children are more sensitive to cancer-causing chemicals.[217]

In traffic-related studies, the additional non-cancer health risk attributable to roadway proximity was seen within 1,000 feet of the roadway and was strongest within 300 feet. California freeway studies show about a 70 percent drop-off in particulate pollution levels at 500 feet from the roadway. Therefore, CARB recommends that new sensitive land uses (e.g., residences, schools, daycare centers, and medical facilities) not be located within 500 feet of a freeway or urban roads carrying 100,000 vehicles per day. This recommendation is put forth to minimize potential non-cancer health effects of exposure to pollutants known to increase incidence of asthma and other respiratory ailments, particularly fine particulates, as well as cancer risk from exposure to diesel particulates from truck and bus exhaust (discussed below) and benzene and 1,3-butadine from automobile exhaust.

CARB notes that these recommendations are advisory and should not be interpreted as defined "buffer zones." CARB acknowledges that land use agencies must balance other considerations, including housing and transportation needs, the benefits of urban infill, community economic development priorities, and other quality of life issues. With careful evaluation of exposure, health risks, and affirmative steps to reduce risk where necessary, CARB's position is that infill development, mixed-use, higher density, transit-oriented development, and other concepts that benefit regional air quality can be compatible with protecting the health of individuals at the neighborhood level.[218]

The closest freeway to the Plan area is located approximately 1,000 feet to the south. However, surface streets in the Plan area also carry high volumes of traffic that can generate substantial levels of pollutants, including $PM_{2.5}$. Modeling conducted by the Department of Public Health in connection with implementation of Article 38 of the *San Francisco Health Code* (discussed below on p. 385 under Air Quality Regulations and Plans) indicates that traffic volumes on some three-fourths of the blocks along major streets (i.e., excluding mid-block alleys) in the Plan area are high enough to potentially result in a roadside concentration of $PM_{2.5}$ that is in excess of the Code's "action level."

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216 As noted previously, parks and playgrounds are not normally considered sensitive receptors because of the lack of long-term exposure and active uses.
217 California Air Resources Board, *Air Quality and Land Use Handbook: A Community Health Perspective,* April 2005. Available on the internet at: http://www.arb.ca.gov/ch/handbook.pdf.
218 *Ibid*.

Diesel Particulate Matter and other Organic Gases

Diesel exhaust is a toxic air contaminant (TAC) that is of concern throughout California. CARB identified diesel particulate matter (DPM) as a TAC in 1998, primarily based on evidence demonstrating cancer effects in humans.[219] The exhaust from diesel engines include hundreds of different gaseous and particulate components, many of which are toxic. Many of these toxic compounds adhere to the diesel particles, which are very small and can penetrate deeply into the lungs. Mobile sources such as trucks, buses, and, to a much lesser extent, automobiles are some of the primary sources of diesel emissions. Studies show that diesel particulate matter concentrations are much higher near heavily traveled highways and intersections. DPM is the TAC most relevant to the draft Plan because of the high levels of bus traffic associated with the Transit Center.

The estimated cancer risk from exposure to diesel exhaust is much higher than the risk associated with any other toxic air pollutant routinely measured in the region. CARB estimated the average Bay Area cancer risk from diesel particulate, based on a population-weighted average ambient diesel particulate concentration, at about 480 in one million, as of 2000. The risk from diesel particulate matter has declined from 750 in one million in 1990 and 570 in one million in 1995. CARB estimated the average statewide cancer risk from DPM at 540 in one million in 2000.[220,221] Other studies have shown that diesel exhaust and other cancer-causing chemicals emitted from cars and trucks are responsible for much of the cumulative cancer risk from airborne toxics in California. Diesel exhaust also contains pulmonary irritants and hazardous compounds that could affect non cancer health effects in sensitive receptors such as young children, senior citizens, or those susceptible to chronic respiratory disease such as asthma, bronchitis, and emphysema.

In 2000, CARB approved a comprehensive Diesel Risk Reduction Plan to reduce diesel emissions from both new and existing diesel-fueled vehicles and engines. The Plan aims to develop and implement specific statewide regulations designed to reduce DPM emissions and the associated health risk 85 percent by 2020. In addition to implementing more stringent engine controls (diesel engines produced today have one-eighth the tailpipe exhausts of a truck or bus built in 1990), diesel fuel is required to have lower sulfur levels. As of June 1, 2006, at least 80 percent of on-road diesel fuel refined in the United States must be ultra-low sulfur diesel, which reduces sulfur emissions by 97 percent. All of the diesel fuel sold in California for use with on-road trucks is now ultra-low sulfur diesel.

Despite these dramatic reductions in emission rates, reducing DPM emissions will take time since older trucks will need to be retrofitted or phased out as part of fleet turnover. While these efforts are reducing

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219 California Air Resources Board, Fact Sheet, "The Toxic Air Contaminant Identification Process: Toxic Air Contaminant Emissions from Diesel-fueled Engines." October 1998. Available on the internet at: http://www.arb.ca.gov/toxics/dieseltac/factsht1.pdf.

220 CARB, *California Almanac of Emissions and Air Quality - 2009 Edition*, Table 5-44 and Figure 5-14. Available on the internet at http://www.arb.ca.gov/Aqd/almanac/almanac.htm. Viewed April 28, 2011.

221 This calculated cancer risk values from ambient air exposure in the Bay Area can be compared against the lifetime probability of being diagnosed with cancer in the United States, from all causes, which is more than 40 percent (based on a sampling of 17 regions nationwide), or greater than 400,000 in one million, according to the National Cancer Institute.

diesel particulate emissions on a statewide basis, they do not yet capture every site where diesel vehicles and engines operate.

Beyond DPM, other TACs emitted by non-diesel vehicles result in similar health risks, and each TAC has specific risk factors that are used when modeling health risk. BAAQMD recommends that when conducting health risk assessments to evaluate risk from traffic-generated pollutants, both DPM and other organic gases be considered.

Regulatory Setting

Air Quality Regulations and Plans

Federal Ambient Air Quality Standards

The 1970 Clean Air Act (last amended in 1990, 42 United States Code [USC] 7401 et seq.) required that regional planning and air pollution control agencies prepare a regional air quality plan to outline the measures by which both stationary and mobile sources of pollutants will be controlled in order to achieve all standards by the deadlines specified in the Clean Air Act. The ambient air quality standards are intended to protect the public health and welfare, and they specify the concentration of pollutants (with an adequate margin of safety) to which the public can be exposed without adverse health effects. They are designed to protect those segments of the public most susceptible to respiratory distress, known as sensitive receptors, including asthmatics, the very young, the elderly, people weak from other illness or disease, persons engaged in strenuous work or exercise, and residential areas, where people spend longer periods of time. Healthy adults can tolerate occasional exposure to air pollution levels that are somewhat above the ambient air quality standards before adverse health effects are observed.

The current attainment status for the San Francisco Bay Area Air Basin with respect to federal standards is summarized in **Table 32**. In general, the Bay Area Air Basin experiences low concentrations of most pollutants when compared to federal standards, except for ozone and particulate matter (both PM_{10} and $PM_{2.5}$), for which standards are exceeded periodically. The Air Basin's attainment status for ozone has changed several times over the past decade, but is now "nonattainment" for the 1-hour federal ozone standard. The Bay Area Air Basin is also "nonattainment" for the federal $PM_{2.5}$ standard and "unclassified" for the federal PM_{10} standard. In 1998, after many years without violations of any CO standards, the attainment status for CO was upgraded to "attainment." The Air Basin is also in attainment for other criteria pollutants.

State Ambient Air Quality Standards

Although the federal Clean Air Act established national ambient air quality standards, individual states retained the option to adopt more stringent standards and to include other pollution sources. California had already established its own air quality standards by the time that federal standards were established, and because of the unique meteorological problems in California, there are some differences between the state and national ambient air quality standards, as shown in Table 32. California ambient standards tend to be at least as protective as national ambient standards and are often more stringent.

TABLE 32
STATE AND FEDERAL AMBIENT AIR QUALITY STANDARDS

		(State) SAAQS[a]		(Federal) NAAQS[b]	
Pollutant	**Averaging Time**	**Standard**	**Attainment Status**	**Standard**	**Attainment Status**
Ozone	1 hour	0.09 ppm	**N**	NA	See Note c
	8 hour	0.07 ppm	**N**	0.075 ppm	**N**[d]
Carbon Monoxide (CO)	1 hour	20 ppm	A	35 ppm	A
	8 hour	9 ppm	A	9 ppm	A
Nitrogen Dioxide (NO_2)	1 hour	0.18 ppm	A	NA	NA
	Annual	0.030 ppm	A	0.053 ppm	A
Sulfur Dioxide (SO_2)	1 hour	0.25 ppm	A	NA	NA
	24 hour	0.04 ppm	A	0.14 ppm	A
	Annual	NA	NA	0.03 ppm	A
Particulate Matter (PM_{10})	24 hour	50 μg/m^3	**N**	150 μg/m^3	U
	Annual[e]	20 μg/m^3	**N**	NA	NA
Fine Particulate Matter ($PM_{2.5}$)	24 hour	NA	NA	35 μg/m^3	**N**[f]
	Annual	12 μg/m^3	**N**	15 μg/m^3	A
Sulfates	24 hour	25 μg/m^3	A	NA	NA
Lead	30 day	1.5 μg/m^3	A	NA	NA
	Cal. Quarter	NA	NA	1.5 μg/m^3	A
Hydrogen Sulfide	1 hour	0.03 ppm	U	NA	NA
Visibility-Reducing Particles	8 hour	See Note g	U	NA	NA

NOTES: A = Attainment; **N** = Nonattainment; U = Unclassified; NA = Not Applicable, no applicable standard;= ppm = parts per million; μg/m^3 = micrograms per cubic meter.

[a] SAAQs = state ambient air quality standards (California). SAAQS for ozone, carbon monoxide (except Lake Tahoe), sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, particulate matter, and visibility-reducing particles are values that are not to be exceeded. All other state standards shown are values not to be equaled or exceeded.

[b] NAAQs = national ambient air quality standards. NAAQS, other than ozone and particulates, and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The 8-hour ozone standard is attained when the three-year average of the fourth highest daily concentration is 0.08 ppm or less. The 24-hour PM_{10} standard is attained when the three-year average of the 99th percentile of monitored concentrations is less than the standard. The 24-hour $PM_{2.5}$ standard is attained when the three-year average of the 98th percentile is less than the standard.

[c] The EPA revoked the national 1-hour ozone standard on June 15, 2005.

[d] In 2008, the EPA lowered the 8-hour federal standard for ozone to 0.075 ppm. The EPA will issue final designations based on this standard, at which point it is expected that the Bay Area Air Basin will be designated as nonattainment.

[e] State standard = annual geometric mean.

[f] The EPA lowered the 24-hour $PM_{2.5}$ standard from 65 μg/m^3 to 35 μg/m^3 in 2006. The EPA issued attainment status designations for the 35 μg/m^3 standard on December 22, 2008. The EPA has designated the Bay Area as nonattainment for the 35 μg/m^3 $PM_{2.5}$ standard.

[g] Statewide visibility-reducing particle standard (except Lake Tahoe Air Basin): Particles in sufficient amount to produce an extinction coefficient of 0.23 per kilometer when the relative humidity is less than 70 percent. This standard is intended to limit the frequency and severity of visibility impairment due to regional haze and is equivalent to a 10-mile nominal visual range.

SOURCE: Bay Area Air Quality Management District (BAAQMD), Standards and Attainment Status. Website Accessed on January 15, 2010: http://hank.baaqmd.gov/pln/air_quality/ambient_air_quality.htm

In 1988, California passed the California Clean Air Act (California Health and Safety Code Sections 39600 et seq.), which, like its federal counterpart, called for the designation of areas as attainment or nonattainment, but based on state ambient air quality standards rather than the federal standards. As indicated in Table 32, the Bay Area Air Basin is designated as "nonattainment" for state ozone, PM_{10}, and $PM_{2.5}$ standards. The Air Basin is designated as "attainment" for all other pollutants listed in the table.

California Air Resources Board

CARB is the state agency responsible for regulating air quality. CARB's responsibilities include establishing state ambient air quality standards, emissions standards, and regulations for mobile emissions sources (e.g., autos, trucks, etc.), as well as overseeing the efforts of countywide and multi-county air pollution control districts, such as the BAAQMD, which have primary responsibility over stationary sources.

Bay Area Air Quality Management District

The BAAQMD regulates air quality through its planning and review activities. The district has permit authority over most types of stationary emission sources and can require stationary sources to obtain permits; it can also impose emission limits, set fuel or material specifications, or establish operational limits to reduce air emissions. The BAAQMD regulates new or expanding stationary sources of toxic air contaminants. However, the district has no direct regulatory authority over mobile sources (e.g., cars and trucks), nor does it have permit authority over transportation terminals, such as the new Transit Center, currently under construction to replace the Transbay Terminal.

Air Quality Plans to Achieve Compliance with State Standards

Air quality plans developed to meet federal requirements are referred to as State implementation Plans. The federal Clean Air Act and the California Clean Air Act require plans to be developed for areas designated as non-attainment (with the exception of areas designated as non-attainment for the State particulate matter standards plans for which are not required by California Code of Regulations). In September 2010, BAAQMD adopted the *2010 Bay Area Clean Air Plan*, which updated the *2005 Ozone Strategy*, and also to function as a "multi-pollutant plan to protect public health and the climate."[222] This plan includes ozone control measures and also consider the impacts of these control measures on particulate matter (PM), air toxics, and Greenhouse Gas Emissions (GHGs) in a single, integrated plan.

The *2010 Clean Air Plan* explains how the Basin will achieve compliance with the State one-hour air quality standard for ozone as expeditiously as practicable and how the region will reduce transport of ozone and ozone precursors to neighboring air basins. The Strategy also discusses related air quality issues of interest including the BAAQMD's public involvement process, climate change, fine particulate matter, BAAQMD's Community Air Risk Evaluation program, local benefits of ozone control measures, the environmental review process, national ozone standards, and photochemical modeling.

222 BAAQMD, *2010 Clean Air Plan*, September 2010. Available on the internet at: http://www.baaqmd.gov/Divisions/Planning-and-Research/Plans/Clean-Air-Plans.aspx.

In 1999, BAAQMD adopted its *CEQA Guidelines – Assessing the Air Quality Impacts of Projects and Plans*, as a guidance document to provide lead government agencies, consultants, and project proponents with uniform procedures for assessing air quality impacts and preparing the air quality sections of environmental documents for projects subject to CEQA. These BAAQMD Guidelines were revised and updated in June 2010, as the *BAAQMD CEQA Air Quality Guidelines*.

The 2010 *BAAQMD CEQA Air Quality Guidelines* is an advisory document and local jurisdictions are not required to utilize the methodology outlined therein, but the document is commonly relied upon by local agencies, including the San Francisco Planning Department.[223] The document describes the criteria that BAAQMD uses when reviewing and commenting on the adequacy of environmental documents. It recommends thresholds for use in determining whether projects would have significant adverse environmental impacts, identifies methodologies for predicting project emissions and impacts, and identifies measures that can be used to avoid or reduce air quality impacts. In practice, most local agencies rely on the *BAAQMD CEQA Air Quality Guidelines* when assessing the significance of air quality impacts.

<u>Air Quality Plans to Achieve Compliance with Federal Standards</u>

In response to the EPA re-designation of the basin for the 1-hour federal ozone standard to nonattainment, the BAAQMD, ABAG, and MTC were required to develop an ozone attainment plan to meet this standard. The *1999 Ozone Attainment Plan* was prepared and adopted by these agencies in June 1999. However, in March 2001, the EPA proposed and took final action to approve portions of the 1999 ozone plan and disapprove other portions, while also making the finding that the Bay Area had not attained the national 1-hour ozone standard. As a result, a revised Ozone Attainment Plan was prepared and adopted in October 2001. The 2001 Ozone Attainment Plan amends and supplements the 1999 plan. The 2001 Ozone Attainment Plan contains control strategies for stationary and mobile sources. The adopted mobile-source control program was estimated to substantially reduce volatile organic compound and NOx emissions between 2000 and 2006, reducing emissions from on- and off-road diesel engines (including construction equipment). In addition to emission reduction requirements for engines and fuels, the 2001 Ozone Attainment Plan identified 28 transportation control measures to reduce automobile emissions, including improved transit service and transit coordination, new carpool lanes, signal timing, freeway incident management, and increased state gas tax and bridge tolls.

San Francisco Policies and Ordinances

<u>San Francisco General Plan Air Quality Element</u>

The Air Quality Element of the *San Francisco General Plan* is composed of six sections, each of which focuses on different aspects of air quality improvement efforts. They are: (1) adherence to air quality standards, (2) improvements related to mobile sources, (3) land use planning, (4) public awareness, (5) reduction of dust, and (6) energy conservation. The overarching goal of the Air Quality Element is to "Give high priority to air quality improvement in San Francisco to protect its population from adverse

[223] BAAQMD, *CEQA Guidelines*, May 2011. See footnote 205, p. 373.

health and other impacts of air pollutants." No express conflict with policies of the Air Quality Element were identified in Chapter III, Plans and Policies, with the possible exception of Policy 3.5, which states that the City should "Ensure that growth will not outpace capital improvements to transit or the circulation system." The analysis in Section IV.E, Transportation, indicates that, in combination with other growth downtown, the Plan would result in ridership on BART, Golden Gate Transit buses, and certain Muni screenlines and corridors that would exceed capacity, and would cause most intersections in the Plan area to operate at unacceptable levels of service.

<u>San Francisco Dust Control Ordinance</u>

San Francisco Health Code Article 22B, and *San Francisco Building Code* Section 106.A.3.2.6, collectively the Construction Dust Control Ordinance, requires that all site preparation work, demolition, or other construction activities within San Francisco that have the potential to create dust or to expose or disturb more than 10 cubic yards or 500 square feet of soil comply with specified dust control measures whether or not the activity requires a permit from the Department of Building Inspection (DBI). The Director of DBI may waive this requirement for activities on sites less than one half-acre that are unlikely to result in any visible wind-blown dust.

The project sponsor and the contractor responsible for construction activities at the project site shall use the following practices to control construction dust on the site or other practices that result in equivalent dust control that are acceptable to the Director of DBI. Dust suppression activities may include watering all active construction areas sufficiently to prevent dust from becoming airborne; increased watering frequency may be necessary whenever wind speeds exceed 15 miles per hour. Reclaimed water must be used if required by Article 21, Section 1100 et seq. of the *San Francisco Public Works Code*. If not required, reclaimed water should be used whenever possible. Contractors shall provide as much water as necessary to control dust (without creating run-off in any area of land clearing, and/or earth movement). During excavation and dirt-moving activities, contractors shall wet sweep or vacuum the streets, sidewalks, paths and intersections where work is in progress at the end of the workday. Inactive stockpiles (where no disturbance occurs for more than seven days) greater than 10 cubic yards or 500 square feet of excavated materials, backfill material, import material, gravel, sand, road base, and soil shall be covered with a 10 millimeter (0.01 inch) polyethylene plastic (or equivalent) tarp, braced down, or use other equivalent soil stabilization techniques.

For project sites greater than one half-acre in size, the Ordinance requires that the project sponsor submit a Dust Control Plan for approval by the San Francisco Health Department. DBI will not issue a building permit without written notification from the Director of Public Health that the applicant has a site-specific Dust Control Plan, unless the Director waives the requirement. Interior-only tenant improvements, even if over one-half acre, that will not produce exterior visible dust are exempt from the site-specific Dust Control Plan requirement.

Toxic Air Contaminant (TAC) Regulations

State

In 2005, CARB approved a regulatory measure to reduce emissions of toxic and criteria pollutants by limiting the idling of new heavy-duty diesel vehicles, which altered five sections of Title 13 of the California Code of Regulations. The relevant changes are Sections 2480 and 2485, which limit idling of commercial motor vehicles (including buses and trucks) within 100 feet of a school or residential area for more than five consecutive minutes or periods aggregating more than five minutes in any one hour.[224] Buses or vehicles also must turn off their engines upon stopping at a school and must not turn their engines on more than 30 seconds before beginning to depart from a school. As noted above under Public Health Effects Related to Air Quality, state law prohibits locating public schools within 500 feet of a freeway or busy traffic corridor.

CARB has also adopted rules for new diesel trucks and for off-road diesel equipment. Along with rules adopted by the EPA, these regulations have resulted in substantially more stringent emissions standards for new diesel trucks and new off-road diesel equipment, such as construction vehicles. Effective January 2011, both federal (EPA) and CARB so-called Interim Tier 4 standards take effect in 2011 for new equipment with diesel engines of 175 hp or greater. The interim Tier 4 emissions standards for particulate matter are about 85 percent more restrictive than previous emissions standards (Tier 2 or Tier 3, depending on the size of the engine) for these larger off-road engines. As a result, use of engines that meet the interim Tier 4 standards would reduce diesel exhaust emissions by approximately 85 percent, compared to new engines produced under the previous standards. Tier 2 or Tier 3 engines (for larger equipment, those manufactured since 2006) can achieve generally the same reduction through retrofitting by installation of a diesel particulate filter (a CARB-certified Level 3 Verified Diesel Emissions Control System).

Regarding equipment already in use, CARB adopted rules for in-use off-road diesel vehicles—including construction equipment—in 2007. Those rules also limit idling to five minutes, require a written idling policy for larger vehicle fleets, and require that fleet operators provide information on their engines to CARB and label vehicles with a CARB-issued vehicle identification number. The off-road rules require the retrofit or replacement of diesel engines in existing equipment. This "repowering" was originally to be required beginning in 2010 (for the largest fleets). However, in early 2010, CARB suspended implementation of this aspect of the rule, and in December 2010, CARB formally delayed the start of repowering to 2014 for large fleets, 2017 for medium-sized fleets, and 2019 for small fleets.[225] CARB stated that the delayed implementation was justified because the recession had dramatically reduced emissions, and because the board staff found that the data on which the original rule was based had

[224] There are 12 exceptions to this requirement (e.g., emergency situations, military, adverse weather conditions, etc.), including: when a vehicle's power takeoff is being used to run pumps, blowers, or other equipment; when a vehicle is stuck in traffic, stopped at a light, or under direction of a police officer; when a vehicle is queuing beyond 100 feet from any restricted area; or when an engine is being tested, serviced, or repaired.

[225] Fleet size is based on total horsepower (hp): large fleets are those with more than 5,000 hp; medium fleets have 2,501 to 5,000 hp, and small fleets are those with less than 2,500 hp.

overestimated emissions. According to CARB, under the revised rules, diesel particulate emissions from off-road equipment will decrease by more than 40 percent from 2010 levels by the year 2020, and by 2030, they decrease by more than 75 percent.[226]

Local

The 2010 *BAAQMD CEQA Air Quality Guidelines*, adopted in June 2010, include quantitative CEQA significance thresholds for construction-related and operational emissions of TACs (see discussion under Significance Criteria and Impact Methodology).

In 2008, the City and County of San Francisco adopted an ordinance (*San Francisco Health Code*, Article 38, Air Quality Assessment and Ventilation Requirement for Urban Infill Residential Development). Article 38 requires that public agencies in San Francisco take regulatory action to prevent future air quality health impacts on new residential uses of 10 units or more proposed near busy roadways. The regulation requires a screening analysis of new residential projects for proximity to traffic and a calculation of the concentration of $PM_{2.5}$ from traffic sources where traffic volumes suggest a potential hazard. If modeled levels of traffic-attributable $PM_{2.5}$ at a project site exceed an action level (currently set at 0.2 micrograms per cubic meter), the project sponsor is required to incorporate ventilation systems, with particulate filtration if necessary, to remove 80 percent of $PM_{2.5}$ from outdoor air. The regulation does not place any requirements on proposed residential uses if modeled air pollutant levels fall below the action level. This ordinance only considers impacts from on-road motor vehicles, not impacts related to construction equipment or stationary sources.

As described above under Roadway-Related Health Effects, p. 376, most major streets in the Plan area have traffic volumes that could at least potentially result in a roadside concentration of $PM_{2.5}$ that exceeds the action level contained in Article 38. This means that, under Article 38, nearly any subsequent development project in the Plan area that proposes to introduce new residential units would be required to conduct dispersion modeling, based on traffic volumes on nearby streets, to determine whether the action level of 0.2 micrograms per cubic meter of $PM_{2.5}$ would be exceeded at the project site. If the modeling shows that this level would be exceeded, an enhanced ventilation system, potentially with filtration, would be required to be incorporated into the project design. In some cases, placement of a building's fresh-air intake at a level well above the ground (for example, on a building roof), along with installation of an enhanced ventilation system, can sufficiently reduce the $PM_{2.5}$ for new residential receptors; under Article 38, the Department of Public Health reviews the modeling results and the ventilation system to determine its adequacy.

The City is developing a Community Risk Reduction Plan (CRRP) to help identify locations and neighborhoods at particular risk of adverse health effects due to exposure to toxic air contaminants, including diesel particulate matter, and to fine particulate matter generally (i.e., $PM_{2.5}$). A CRRP is

[226] California Air Resources Board, "Staff Report: Initial Statement of Reasons for Proposed Rulemaking: Proposed Amendments to the Regulation for In-Use Off-Road Diesel-Fueled Fleets and the Off-Road Large Spark-Ignition Fleet Requirements," October 2010; p. 44. Available on the internet at: http://www.arb.ca.gov/regact/2010/offroadlsi10/offroadisor.pdf. Reviewed May 6, 2011.

designed to improve air quality, especially in neighborhoods and "hotspots" affected by poor air quality. The plan would set forth a variety of strategies designed to improve air quality, with emphasis focused upon those locations with poorest air quality. The plan would bring together governmental agency projects and plans and focus them in the direction of gradually improving air quality over the next 10 years. Transportation planning, truck routing, energy conservation, traffic speed control and enforcement, bicycle and pedestrian enhancement, use of alternate fuels and many other tools can be used in a CRRP to improve existing poor air quality. In addition, the plan will identify where new residential development can occur without project-specific air quality mitigation and where such development must provide protection for new residents; for example, by installation of a mechanical ventilation system with particulate filtration in new residential units. A CRRP would also likely require new sources of pollution to include the best available control technology and, potentially, to offset new sources of emissions through reduction in other sources or other controls. In San Francisco, the Planning Department and Department of Public Health are working with BAAQMD on development of a CRRP. The timeline for completion and implementation of the plan is not certain.

Odors

BAAQMD Regulation 7 places general limitations on odorous substances and specific emission limitations on certain odorous compounds. The limitations of this regulation limit the "discharge of any odorous substance which causes the ambient air at or beyond the property line…to be odorous and to remain odorous after dilution with four parts of odor-free air." The BAAQMD must receive odor complaints from ten or more complainants within a 90-day period in order for the limitations of this regulation to go into effect. If this criterion has been met, an odor violation can be issued by the BAAQMD if a test panel of people can detect an odor in samples collected periodically from the source.

Impacts

Significance Criteria

Transit Center District Plan

Criteria Air Pollutants

As noted in the setting, in 2010, BAAQMD published an update to its *CEQA Air Quality Guidelines* and adopted new significance thresholds for CEQA analysis; this document has been updated as of May 2011. Under the 2011 BAAQMD *CEQA Air Quality Guidelines* and thresholds,[227] the significance thresholds for assessment of a planning document, such as the draft Plan, involve an evaluation of the following questions:

(1) Would the plan be consistent with the "control measures" contained in the current regional air quality plan (the *2010 Bay Area Clean Air Plan*); and

[227] BAAQMD, *CEQA Guidelines*, May 2011. See footnote 205, p. 373.

(2) Would the projected rate of increase in vehicle miles traveled or vehicle trips under the plan would be less than or equal to the projected rate of population increase under the plan.

If the two foregoing questions can be answered in the affirmative, the plan would neither:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation; nor
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors).[228]

Community Risk and Hazard Impacts

This analysis also responds to the criterion that asks whether the proposed plan would:

- Expose sensitive receptors to substantial pollutant concentrations.

For plan-related health risks and hazards resulting from emissions of toxic air contaminants, BAAQMD recommends that overlay zones be established around existing and proposed land uses that emit TACs. These overlay zones should be included in proposed plan policies, land use maps, and implementing ordinances. Additionally, the plan must "identify goals, policies, and objectives to minimize potential impacts."[229]

Odors

For odors, a plan must identify the location of existing and planned odor sources in the Plan area. The plan must also include policies to reduce potential odor impacts in the Plan area. Typical odor sources of concern include wastewater treatment plants, sanitary landfills, transfer stations, composting facilities, petroleum refineries, asphalt batch plants, chemical manufacturing facilities, fiberglass manufacturing facilities, auto body shops, rendering plants, and coffee roasting facilities. Given that the draft Plan would not locate sensitive receptors within close proximity to these types of facilities and would not include development of such facilities, it can be reasonably concluded that no odor impact would occur. Therefore, impacts related to odor are not discussed further in this EIR.

Transit Tower

Project level thresholds of significance set by the BAAQMD reflect the level at which a project's individual emissions would result in a cumulatively considerable contribution to an existing air quality problem; therefore, if project impacts identified are significant, impacts would also be cumulatively considerable. As stated in the BAAQMD *CEQA Air Quality Guidelines*:

> Past, present and future development projects contribute to the region's adverse air quality impacts on a cumulative basis. By its very nature, air pollution is largely a cumulative impact.

228 The bulleted statements are the first three significance criteria in the City's CEQA Initial Study checklist.
229 BAAQMD *CEQA Air Quality Guidelines* (see footnote 205, p. 373); p. 9-71.

> No single project is sufficient in size to, by itself, result in nonattainment of ambient air quality standards. Instead, a project's individual emissions contribute to existing cumulatively significant adverse air quality impacts. If a project's contribution to the cumulative impact is considerable, then the project's impact on air quality would be considered significant.[230]

According to BAAQMD, no further cumulative analysis should be required beyond the analysis of whether a proposed project's impacts would contribute considerably to ambient levels of pollutants or greenhouse gases,[231] with the exception of the above-noted cumulative risk and hazard analysis for toxic air contaminants.

Criteria Air Pollutants

The BAAQMD-recommended significance thresholds for criteria pollutant emissions from operations of an individual project, such as the proposed Transit Tower, are as follows: for ROG, NOx and $PM_{2.5}$, a net increase of 54 pounds per day or 10 tons per year would be considered significant, while for PM_{10}, a net increase of 82 pounds per day or 15 tons per year would be considered significant. For CO, an increase would be considered significant if it leads to or contributes to CO concentrations exceeding the State Ambient Air Quality Standard, although quantification would not be required if a project is consistent with the local congestion management program and plans and traffic volumes at affected intersections are below 24,000 vehicles per hour. For construction-period impacts, the same thresholds apply for ROG, NOx, $PM_{2.5}$, and PM_{10}, except that the thresholds for $PM_{2.5}$ and PM_{10} apply only to exhaust emissions, and thresholds are specifically based on average daily emissions. There are no quantitative thresholds for construction dust emissions; instead, impacts are considered less than significant if standard best management practices are employed to control dust during construction activities, including demolition and excavation.

Community Risk and Hazard Impacts

With respect to risk and hazard impacts. BAAQMD recommends either that a project be found to be in compliance with a "qualified Community Risk Reduction Plan," or that significance thresholds be used for both construction and operational emissions based on commonly used standards employed in health risk assessment. The thresholds for project-specific impacts are: an increase in lifetime cancer risk of 10 chances in one million, an increase in the non-cancer risk equivalent to a chronic or acute "Hazard Index" greater than 1.0,[232] or an increase in the annual average concentration of $PM_{2.5}$ in excess of 0.3 micrograms per cubic meter. BAAQMD also recommends cumulative thresholds of 100 in one million cancer risk, a chronic Hazard Index greater than 10.0, and a $PM_{2.5}$ concentration greater than 0.8 micrograms per cubic meter. Unlike the volume-based thresholds for criteria pollutants noted above, the toxic air contaminant thresholds are used for specific receptor locations when a risk analysis is required for specific project components, such as permitted stationary sources (boilers, emergency generators, etc.), non-permitted sources such as the new Transit Center, or the use of diesel-powered

230 BAAQMD *CEQA Air Quality Guidelines* (see footnote 205, p. 373); p. 2-1.
231 *Ibid*.
232 Hazard Index represents the ratio of expected exposure levels to an acceptable reference exposure levels.

equipment, including construction equipment. Projects that do not exceed the project-level thresholds would not be considered to contribute considerably to cumulative health risks.

As stated on p. 385, the City is developing a Community Risk Reduction Plan, although the timeline for implementation is not certain.

Odors

- Would the proposed project create objectionable odors affecting a substantial number of people.

As stated above with respect to odor impacts for the draft Plan, the Plan would not locate sensitive receptors within close proximity to odor-generating facilities, nor would it include development of facilities commonly known to generate annoying odors. Because the same is true for the Transit Tower, the tower would not result in significant odor impacts. Therefore, impacts related to odor are not discussed further in this EIR.

Methodology

The above-noted quantitative significance thresholds also apply to long-term operational impacts of the proposed project. Construction exhaust emissions and operational emissions of criteria air pollutants were estimated using the URBan EMISsions (URBEMIS) 2007 model (version 9.2.4) for the expected project buildout and compared to BAAQMD significance thresholds. The model combines information on trip generation with vehicular emissions data specific to different types of trips in the San Francisco area (home-to-work, work-other, etc.) from the ARB's EMFAC 2007 BURDEN model to create an estimated daily emissions burden for travel within the San Francisco Bay Area Air Basin. The resulting quantification is compared against the BAAQMD's recommended thresholds.

For the health risk assessment related to use of diesel-powered construction equipment, the BAAQMD has prepared "screening tables" that allow a project to be found to have a less-than-significant impact if construction activities would occur at least 100 meters (330 feet), in most cases, from sensitive receptors. Because many projects in urban areas, including the Plan area and the site of the proposed Transit Tower, would be closer than this to sensitive receptors, a quantitative risk evaluation is conducted that involves dispersion modeling, using the AERMOD model, accounting for the construction equipment to be used, local meteorology, and nearby sensitive receptors, to determine whether the BAAQMD thresholds would be exceeded at any receptor location. For cancer risk and Hazard Index calculations, further computation is undertaken to convert the model's pollutant concentration outputs to risk numbers. Modeling was also employed to derive quantitative health risks for operational stationary sources, such as the new Transit Center and an emergency generator in the Transit Tower.

Impact Analysis

Transit Center District Plan

Criteria Air Pollutants: Consistency with the 2010 Clean Air Plan

Impact AQ-1: The draft Plan would not conflict with or obstruct implementation of the *2010 Clean Air Plan* or result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard. (Less than Significant)

Consistency with *2010 Clean Air Plan* Control Measures

The BAAQMD *CEQA Air Quality Guidelines* requires that consistency of a plan be evaluated based on the extent to which it implements, or does not hinder implementation of, the Air Quality Plan Control Measures outlined in the *2010 Clean Air Plan.* The *Clean Air Plan* contains 55 control measures aimed at reducing air pollution in the Bay Area. Some (18) of these measures address stationary sources (such as printing facilities and cement kilns, but also including residential and commercial heating systems), and will be implemented by BAAQMD using its permit authority and are therefore not suited to implementation through local planning efforts.[233] The remaining 37 measures are grouped into Transportation, Mobile Source, Land Use and Local Impact, and Energy and Climate measures. the Air Quality Plan Control Measures are discussed in detail below.[234]

The Control Measures most applicable to the draft Plan are the Transportation Control Measures. The Transportation measures concern improvements to transit systems, improving efficiency of the region's transportation system, encouraging residents and employees to exhibit "sustainable transportation behavior," improving bicycle and pedestrian facilities and supporting high-density growth. The draft Plan, through implementation of existing City policies and new programs in the draft Plan, would also further the *Clean Air Plan's* Energy and Climate Measures. The Land Use and Local Impact and Mobile Source measures primarily address the BAAQMD's own programs and regional air quality planning, and are less applicable to local agencies' decisions and projects.

Transportation Control Measures in the *2010 Clean Air Plan* (CAP) are identified in **Table 33**. Inasmuch as the Transportation measures are generally those most applicable to an individual plan or development project, the table identifies each measure or group of measures and correlates the measures to specific elements of the draft Plan or explains why the strategy does not apply to the Plan. As indicated in the table, the draft Plan directly addresses many of the Transportation Control Measures, particularly those that emphasize higher-density development, a mix of uses, and increased transit ridership and pedestrian and bicycle use.

233 For example, Stationary Source Measures 11 and 12 will ultimately require that new furnaces in the Air Basin emit lower levels of NOx.

234 Eighteen other measures are included in a list of measures for further study and are not yet identified as feasible for implementation under the *2010 Clean Air Plan*.

TABLE 33
TRANSPORTATION CONTROL MEASURES OF THE *2010 CLEAN AIR PLAN*

2010 CAP Control Measure	Elements of the Proposed Project Consistent with the Measure or Explanation of Non-applicability
Transportation Control Measures (TCMs)	
TCM A-1 and A-2: Improve Local and [Regional Bus and Rail Services	The Plan proposes increased residential density in proximity to an extensive array of bus and rail transit, including the new Transit Center currently under construction, which is planned as the terminus of the state's high-speed rail system draft Plan Objective 4.1 states, "The district's transportation system will prioritize and incentivize the use of transit. Public transportation will be the main, non-pedestrian mode for moving into and between destinations in the Transit Center District." Objective 4.3 states, "The district's transportation system will meet changing transit needs, particularly to support the new Transbay Transit Center and accommodate increased densities. Make changes in the circulation network that ensure delivery of reliable and convenient transit service to the Transbay Transit Center and for district residents, employees, and visitors." Objective 4.9 states, "Prioritize transit movements through and within the district over all other transportation modes." And Objective 4.11 states, "Ensure that changes to the circulation network, including pedestrian and streetscape improvements, are designed to support and enhance the operation of transit." Additional objectives and policies in the draft Plan support regional transit improvements, including the Transit Center. Phase 2 of Measure TCM-A-1 includes partial funding for Muni's Van Ness Avenue Bus Rapid Transit project. Phase 2 of Measure TCM-A-2 includes partial funding for the new Transit Center, the Muni Metro Central Subway now under construction and for the downtown extension and system-wide electrification of Caltrain.
TCM B-1 through B-4: Improve Transportation System (freeways and arterials; transit; express lanes; goods movement) Efficiency	Although these measures addresses infrastructure improvements to increase operational efficiencies such as common fare payment systems and are geared primarily toward regional agencies such as the Metropolitan Transportation Commission and Caltrans, San Francisco (Muni) participates in the 511 transit information system). Freeway and arterial improvements are less relevant to the proposed Plan. Objective 4.6 of the draft Plan states, "The district's transportation system will require management of Bay Bridge queues to reduce and mitigate impacts of regional traffic on transit circulation and the public realm in the district." Objective 4.15 states, "Use demand management strategies to reduce overall levels of auto traffic in the plan area and downtown, particularly in the peak hours, in order to reduce auto impacts on other transportation modes and enable the creation of a high quality public realm."
TCM C-1: Voluntary Employer-Based Trip Reduction Programs	San Francisco employers operate (or contract for) numerous shuttle bus services, most of which serve the Plan area's transit hubs. The City's Commuter Benefits Ordinance (Section 421 of the *Environment Code*) requires that employers with more than 20 employees provide pre-tax purchase of transit passes, employer-paid passes, or employer-provided transit.
TCM C-2: Safe Routes to School and Safe Routes to Transit	This measure funds pedestrian and bicycle improvements. While there are no elementary or secondary schools in the Plan area, the Plan does propose extensive improvements to transit access and pedestrian and bicycle circulation. Moreover, Objective 4.4 of the draft Plan states, "The district's transportation system will prioritize pedestrian amenity and safety. Invest in circulation modifications and urban design measures that support the creation of an attractive and memorable public realm." Objective 4.12 states, "Provide high-quality facilities and experience for transit passengers," and Policy 4.4 states, "Provide sidewalk space and facilities for enhanced transit stops with passenger amenities on Mission Street and other primary transit streets."
TCM C-3: Ridesharing Services and Incentives	Through the 511 commuter information program, preferential vanpool parking, guaranteed ride home in emergencies, and carpool parking permits are provided in San Francisco. The *Planning Code* (Sec. 166) requires that car-share parking be provided in new parking garages. (See also the next measures.)

TABLE 33 (Continued)
TRANSPORTATION CONTROL MEASURES OF THE *2010 CLEAN AIR PLAN*

2010 CAP Control Measure	Elements of the Proposed Project Consistent with the Measure or Explanation of Non-applicability
TCM C-4 and C-5: Public Outreach/Education and Smart Driving	These measures concern efforts to influence commuters' and drivers' behavior and are not directly relevant to the draft Plan. However, subsequent development projects in the Plan area would be required under Section 163 of the *Planning Code* to participate in transportation brokerage services to facilitate the use of transit, ridesharing, and other means of minimizing the use of single-occupant vehicles in commuting. Objectives 4.15 through 4.19 and Policies 4.9 through 4.20 of the draft Plan discuss transportation demand management. Also, the draft Plan proposes to reduce the size of projects to which *Planning Code* Section 163 is applicable from 100,000 square feet to 25,000 square feet.
TCM D-1 and D-2: Improvements to Bicycle and Pedestrian Facilities and Access.	The draft Plan encourages pedestrian activity and bicycle use and would make streetscape and other improvements to encourage both. Objectives 4.20 through 4.28 and Policies 4.21 through 4.35 of the draft Plan discuss enhancements to pedestrian activity, while Objectives 4.29 through 4.33 and Policies 4.36 through 4.43 are concerned with improving bicycle circulation.
TCM D-3: Local Land Use Strategies (to encourage higher density and mixed uses).	The draft Plan would continue and intensify the high-density and mixed-use character of the Plan area.
TCM E-1: Value Pricing Strategies	This measure primarily addresses congestion pricing, which is in effect on Bay Area bridges that charge higher tolls during rush hour. The measure also references a proposal for "congestion pricing" that has been proposed for downtown San Francisco, including the Plan area (this is not proposed in the draft Plan).
TCM E-2: Promote Parking Policies to Reduce Motor Vehicle Travel	The *Planning Code* currently requires that new off-street parking provided for uses other than residential units and hotels in the downtown, including the Plan area, be priced so as to discourage long-term commuter parking, while still providing adequate short-term parking. Section 155(g) of the Code requires that the cost for four hours of parking be no more than four times the rate charged for the first hour, and that the rate charge for eight or more hours of parking be no less than 10 times the rate charged for the first hour. Further, weekly or monthly discounts are prohibited. Code Section 167 requires that residential parking be priced separately from dwelling units themselves. The draft Plan would maintain these requirements. The draft Plan also proposes an absolute cap on off-street parking in the Plan area and, until the appropriate number for such a cap is determined, that the maximum amount of building floor area devoted to non-residential be reduced from the current 7 percent of gross floor area (GFA) to 3.5 percent of GFA. The draft Plan further proposes to prohibit new surface parking in the Plan area and to apply the City's existing parking tax to all non-residential spaces, even those not available to the general public.
TCM E-3: Implement Transportation Pricing Reform	While not directly applicable to the proposed Plan, this measure calls for increasing the cost of driving to reflect "external" costs such as air pollution. Higher gasoline taxes or other taxes or fees would be necessary to implement this measure. The Plan area is well-positioned to benefit from such potential changes due to its high level of transit service and the draft Plan's emphasis on pedestrian and bicycle travel.

SOURCE: *2010 Clean Air Plan*; Environmental Science Associates, 2011.

Based on the analysis in Table 33, Implementation of the draft Plan would promote implementation of, and in some cases, go beyond, these measures, and therefore **the draft Plan would be consistent with the applicable Transportation Control Measures in the *2010 Clean Air Plan***.

Energy and Climate Measures, newly added in the *2010 Clean Air Plan*, are "designed to reduce ambient concentrations of criteria pollutants, reduce emissions of CO2, and protect our climate" by promoting building energy conservation and efficiency and renewable energy; reducing "urban heat island" effects by increasing reflectivity of roofs and parking lots; and promoting (low-VOC) tree planting.[235] Many of the City plans and programs that achieve consistency with and promote these measures are discussed in detail in Section IV.H, Greenhouse Gas Emissions. In general, consistency with these measures is directly promoted by the City's energy-efficiency requirements and programs, including the San Francisco Green Building Requirements for Energy Efficiency, Stormwater Management, Water Reduction, Renewable Energy, Solid Waste, and Construction and Demolition Debris Recycling, all of which are contained in Chapter 13C of the *San Francisco Building Code* (the green building regulations), as well as the street tree planting requirement of *Planning Code* Section 138.1(c)(1). Subsequent development projects in the Plan area would be required to comply with these City requirements, and therefore **the draft Plan would be consistent with the Energy and Climate Control Measures in the *2010 Clean Air Plan***. Subsequent development projects in the Plan area would also be subject to Plan policies concerning sustainability, many of which would reduce emissions. For example, the draft Plan proposes that "all major development in the Plan Area to produce a detailed Energy Strategy document outlining how the design of the building minimizes its use of fossil fuel driven heating, cooling and power—through energy efficiency, efficient supply, and no or low carbon generation" (November 2009 Draft Plan, Policy 6.8); that all new buildings in the Plan area be "of leading edge design in terms of sustainability" (Objective 6.4); and that "all major buildings in the Plan Area … achieve the minimum LEED levels established in the SF Green Building Ordinance, not including credits for the given inherent factors of location, density, and existing City parking controls, in order to achieve high-performance buildings" (Policy 6.12).

Land Use and Local Impact Control Measures are also newly added in the *2010 Clean Air Plan*, are "designed to (1) promote mixed-use, compact development to reduce motor vehicle travel and emissions, and (2) 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."[236] These measures include reducing diesel particulate and greenhouse gas emissions from trucks; development of an "indirect source review rule" primarily aimed at reducing emission from transportation and from construction equipment by imposing limitations on emissions from a particular site; updating the BAAQMD's *CEQA Air Quality Guidelines* and enhancing the district's review of CEQA documents to help new projects reduce emissions; assisting local governments in adopting "smart growth" land use patterns to reduce mobile source emissions, exposure of persons to toxic air contaminants, and emissions related to energy use and waste disposal; reducing and tracking health risk in communities affected disproportionately by pollution exposure; and enhancing the district's air quality monitoring program. Although all of the Land Use and Local Impact Control Measures address BAAQMD programs and are not directly applicable to the draft Plan, by increasing development density in proximity to transit, the draft Plan would strongly further the District's goals of reducing emissions from commuter travel and would not conflict with any of the

235 BAAQMD, *2010 Clean Air Plan*, p. 4-10.
236 BAAQMD, *2010 Clean Air Plan* (see note 222, p. 382), p. 4-9.

foregoing measures. Therefore, **the draft Plan would be consistent with the Land Use and Local Impact Control Measures in the *2010 Clean Air Plan***.

Mobile Source Control Measures (MSMs) are those intended to reduce emissions by accelerating the replacement of older, dirtier vehicles and equipment through programs such as the BAAQMD's Vehicle Buy-Back and Smoking Vehicle Programs, as well as promoting advanced-technology vehicles. Such region-wide measures are not directly applicable to the draft Plan, although it is noted that the City is cooperating in the implementation of MSM A-2 (Zero-Emission Vehicles and Plug-In Hybrids) by installing electric vehicle charging stations; the implementation of MSM A-3 (Green Fleets) by incorporation into the City vehicle fleet of both hybrid vehicles and vehicles that use biodiesel fuel; and the implementation of MSM C-1 (Construction and Farm Equipment) by requiring, through its Clean Construction Ordinance, that most equipment on city-contracted construction projects use biodiesel fuel (minimum of 20 percent biodiesel, or B20) and employ Tier 2 diesel engines or employ "best available control technology." The draft Plan would not conflict with any of these measures, and therefore **the draft Plan would be consistent with the Mobile Source Control Measures in the *2010 Clean Air Plan***.

Moreover, the draft Plan would not otherwise disrupt or hinder implementation of any of the Air Quality Plan Control Measures by, for example, precluding extension or expansion of bicycle paths or routes (on the contrary, the draft Plan would foster implementation of the City's Bicycle Plan in the Transit Center District Plan area through proposed streetscape improvements); precluding extension of a transit line (the draft Plan aims to enhance transit use); or provision of excessive parking beyond parking requirements (the draft Plan proposes to decrease the amount of parking that is permitted in office buildings, the Plan area's predominant land use).

Finally, to demonstrate consistency with the *2010 Clean Air Plan*, the *BAAQMD CEQA Air Quality Guidelines* state that the a plan should support the primary goals of the *Clean Air Plan*, which are as follows:

- Attain air quality standards;
- Reduce population exposure and protecting public health in the Bay Area; and
- Reduce greenhouse gas emissions and protect the climate.

As described above, the draft Transit Center District Plan would strongly support a large number of the applicable control measures in the *2010 Clean Air Plan* that are intended to help the Bay Area attain state and federal air quality standards. Implementation of the draft Plan, including implementation of mitigation measures identified in this EIR, would also help reduce population exposure to air pollutants, thereby protecting public health.

Greenhouse gas emissions are discussed in Section IV.H, where it is determined that the draft Plan would be consistent with a Greenhouse Gas Reduction Strategy approved by the BAAQMD, and therefore would result in less than significant impacts with regard to greenhouse gas emissions.

In light of the above, the draft Plan **would be consistent with the Air Quality Plan Control Measures in the *2010 Clean Air Plan* and would support the primary goals of the *2010 Clean Air Plan*.**

Growth in Vehicle Trips Compared to Growth in Population

Consistency of the draft Plan must also be demonstrated by comparing the projected population growth in the Plan area with the forecast growth in vehicle trips. Growth projections prepared by the Planning Department (and discussed in detail in Section IV, Population and Housing, Business Activity and Employment, indicate that the Plan area household population would increase from approximately 1,465 to 10,730 by 2030, the analysis horizon year. This represents an increase of 632 percent. This percentage increase is extremely high because the Plan area currently supports a very small residential population, and therefore the rate of population increase would far outstrip the rate of increase in vehicle trips, since most travel to and from the Plan area is generated by employment uses, primarily office. Moreover, much of the population increase is expected to occur through growth on sites in Zone 1 of the approved Transbay Redevelopment Area, which was established through a separate planning process from the current Transit Center District Plan. Accordingly, for purposes of a more realistic and more conservative assessment, this analysis compares the growth in both population and employment to the growth in traffic. Employment is projected to increase from 77,630 under existing conditions to approximately 106,915 by 2030. The combined population-employment ("service population") increase would therefore be approximately 49 percent ([106,915 + 10,730] ÷ [77,630 + 1,465] = 1.49).

Based on output from the County Transportation Authority travel demand model, the number of person-trips made by vehicle to and from the Plan area would increase by approximately 20.2 percent by 2030. Because the increase in vehicle trips would be less than the increase in "service population," the draft Plan would result in a less-than-significant impact, in accordance with the BAAQMD-recommended criteria.

The draft Plan includes goals and policies that would apply to development within the Plan area. These policies would reduce criteria pollutant emissions, compared to other potential development in the City or in the region by providing for additional high-density mixed-use development in an area with the most extensive array of transit service in the Bay Area, and by improving pedestrian and bicycle access within and to and from the Plan area. The draft Plan seeks to improve transit, pedestrian, and bicycle accessibility and connections, thereby minimizing the need for automobile travel. The transportation analysis for the proposed Plan reveals that vehicle trip generation would be substantially less than would be anticipated for a comparable level of development elsewhere in the Bay Area. In light of the above, implementation of the draft Plan would result in a less-than significant impact with respect to regional emissions of criteria air pollutants.

As noted, the threshold of significance for evaluation of a Plan's emissions of criteria air pollutants is based on consistency with regional air quality planning. On the other hand, the significance of a subsequent individual development project—while ultimately based on the same concept—is determined by a quantitative comparison to the significance thresholds established by BAAQMD. (See the analysis of the Transit Tower, p. 419.) It is possible that individual development projects, if large enough, could result in significant effects related to emissions of criteria air pollutants, even if the overall Plan is determined to have a less-than-significant impact.

Carbon Monoxide

Unlike other criteria pollutants, whose effects are regional, carbon monoxide (CO) impacts are evaluated locally. However, BAAQMD recommends intersection-specific modeling of CO concentrations only for intersections where traffic volumes would exceed 44,000 vehicles per hour, or 24,000 vehicles per hour in areas, like much of the Plan area, where mixing of the air is substantially limited, such as in "urban canyons" created by tall buildings. Based on the traffic analysis completed for the draft Plan, the maximum future (with project) peak-hour traffic volume at any of the study intersections in the Plan area would be less than 5,000 vehicles, and the maximum at any of the study intersections would be fewer than 6,500 vehicles. Therefore, modeling of CO concentrations is not required, and the draft Plan would not be anticipated to exceed the state one-hour or 8-hour CO standards. Therefore, effects related to CO would also be less than significant.

Mitigation: None required.

Community Risk and Hazard Impacts

Impact AQ-2: The draft Plan would expose new sensitive receptors to substantial concentrations of $PM_{2.5}$ and toxic air contaminants. (Significant and Unavoidable with Mitigation)

As described in the Setting, epidemiologic studies have demonstrated that people who live near freeways and high-traffic roadways have poorer health outcomes, including increased asthma symptoms and respiratory infections and decreased pulmonary function and lung development in children. Health effects, both chronic and acute, may result from exposure to both criteria air pollutants and mobile source air toxics. Health effects of air pollutant exposures may also involve synergistic effects among air pollutants, traffic noise and other traffic-related stressors. The evidence relating proximity to roadways and a range of non-cancer and cancer health effects provides the basis of the ARB's guidance on locating sensitive land use in proximity to such roadways.[237]

As noted in the Regulatory Setting discussion of Article 38 of the *San Francisco Health Code*, subsequent residential development projects that include 10 or more dwelling units in most locations in the Plan area would be required to undergo modeling for $PM_{2.5}$ concentrations and, if necessary, incorporate enhanced ventilation systems into building design and construction. Compliance with Article 38 would, in some cases, result in subsequent residential projects being subject to lesser concentrations of $PM_{2.5}$ concentrations and cancer and non-cancer health risks, compared to conditions without implementation of Article 38 requirements. However, the BAAQMD *CEQA Air Quality Guidelines* analysis of $PM_{2.5}$ concentrations and risk- and hazard-related significance determinations, including both cancer risk and chronic and acute hazard index, from both roadway- and stationary-source-generated emissions, not just roadway emissions as is the case with Article 38. These potential risks in the Plan area would arise from both permitted and non-permitted sources. In the case of permitted sources, impacts would be caused

[237] California Air Resources Board, *Air Quality and Land Use Handbook* (see footnote 217, p. 378).

mostly by diesel emissions from standby generators regulated by BAAQMD. Non-permitted-source risks would be generated in large part by operation of the new Transit Center (which will be served by buses primarily fueled by diesel engines), with an additional increment generated by traffic on Plan area streets, including both diesel and non-diesel powered vehicles.

It is noted that much of the future emissions of $PM_{2.5}$, diesel particulate matter, and other toxic air contaminants would come from many sources currently operating in the Plan area: diesel buses currently travel to and from (and through) the Plan area, with the Temporary Transbay Terminal on the block bounded by Howard, Main, Folsom, and Beale Streets serving as a major terminal and, therefore, resulting in a concentration of diesel emissions. (Essentially the same bus operations formerly took place at and around the old Transbay Terminal, on Mission between First and Fremont Streets, prior to that facility's demolition in 2010.) Large volumes of other traffic also travel through the Plan area under existing conditions, particularly commuter traffic heading to and from the Bay Bridge. And, as noted above, many existing high-rise buildings are equipped with backup generators, mostly diesel-fueled.[238] However, inasmuch as the draft Plan would allow for new sensitive receptors (i.e., residential units) to be developed in the Plan area and thus to be exposed to the pollutants generated by these sources, this analysis focuses on the exposure of *new* sensitive receptors to future levels of $PM_{2.5}$ and various toxic air contaminants, even if most of those pollutants are emitted in the Plan area today.

There are dozens of individual permitted sources of toxic air contaminants (TACs) in the Plan area. Most of these are diesel-powered emergency (standby) generators, which are installed in nearly all high-rise buildings to allow for emergency lighting and elevator operations in the event of a power failure. Generators, like most stationary sources of pollutants, require a permit from BAAQMD; under existing regulations, a permit for a new generator is generally not issued unless the generator would result in emissions that would create a lifetime cancer risk from exposure to diesel exhaust of less than 10 in one million (i.e., 10 cases per one million exposed persons, or "receptors"). Older generators, however, may continue to operate even if they have greater emissions. (For purposes of BAAQMD permitting, generator emissions are those emitted during routine testing, which typically involves operating the generator no more than 50 hours per year. Emissions during power failures or other "emergencies" are not subject to permit requirements.) Other common permitted sources of toxic air contaminants in an urban setting include gasoline stations (none are present in the Plan area) and dry cleaners that produce TACs as a byproduct of the cleaning process, and therefore these facilities do not pose health risks locally. Although there are "dry cleaners" in the Plan area, none is permitted to operate a cleaning plant on-site. In the Plan area, some large office buildings operate their own cogeneration (combined heat and electricity) facilities or hot-water boilers; in general, these facilities are fueled by natural gas. Therefore, the permitted stationary sources of TAC emissions in the Plan area are almost exclusively diesel generators and natural gas-fired boilers and cogeneration plants.

238 Section 403.4.7 of the 2010 *San Francisco Building Code* requires provision of a "standby power system" in high-rise buildings (those with occupied floors above 75 feet above grade).

A major unpermitted source is the new Transit Center (replacement for the Transbay Terminal), which will be served by buses from Muni, AC Transit, Golden Gate Transit, SamTrans, and the Western Contra Costa Transit Authority ("Lynx"), along with Greyhound and Amtrak buses.[239] The Transit Center and other individual stationary sources would result in potential health risks (primarily lifetime cancer risk) to "sensitive receptors" in new development projects, which would be expected to consist mostly of persons living in new residential projects developed in the Plan area.[240] Because of the large number of stationary sources within the Plan area, and because of the relatively high traffic volumes on many Plan area streets, there is no location within the Plan area that is not within 1,000 feet—the BAAQMD-recommended distance from a receptor at which sources should be included in dispersion modeling—of at least one such source, and most locations are within 1,000 feet of several sources.

Exposure of new sensitive receptors, such as residents and children in day-care centers, to roadway-generated concentrations of $PM_{2.5}$ and TACs, and exposure of such receptors to TACs generated by stationary sources such as the Transit Center and individual buildings' diesel generators, boilers, and cogeneration plants would potentially result in significant impacts resulting from implementation of the draft Plan. It is also possible that new buildings constructed in the Plan area could include one or more of these emissions sources, although it would be speculative to try to quantify or otherwise analyze in detail those emissions, absent any detailed design proposals.

Likewise, it is not feasible at this time to quantify or provide detailed analysis of any potential district-wide combined heat and power (cogeneration) facility that might at some point be developed to serve multiple buildings in the Plan area. As noted in Chapter II, Project Description, a cogeneration plant generates both electricity and heat from the same equipment, with exhaust heat given off during electricity generation being captured to heat, cool, and/or dehumidify interior air or provide hot water or steam. Such a system in the Plan area, which could entail development of one or more power/heat generating plants, is called for in the draft Plan's Chapter 6, District Sustainability. However, no combined heat and power plant is currently proposed, nor is there any information available as to the size, configuration, or operation of any such facility at some possible time in the future. As stated above, such a facility would be subject to review by the BAAQMD, at a minimum, and could be subject to further CEQA analysis.

In general, a cogeneration plant would likely be fueled by natural gas, and would generate emissions from combustion of that gas. The natural gas engine—whether a traditional reciprocating (piston and cylinder) engine, a combustion turbine (analogous to a jet airplane engine), or a microturbine (a newer,

[239] During construction of the new Transit Center, these buses are operating to and from the Temporary Transbay Terminal, at Beale and Howard Streets.

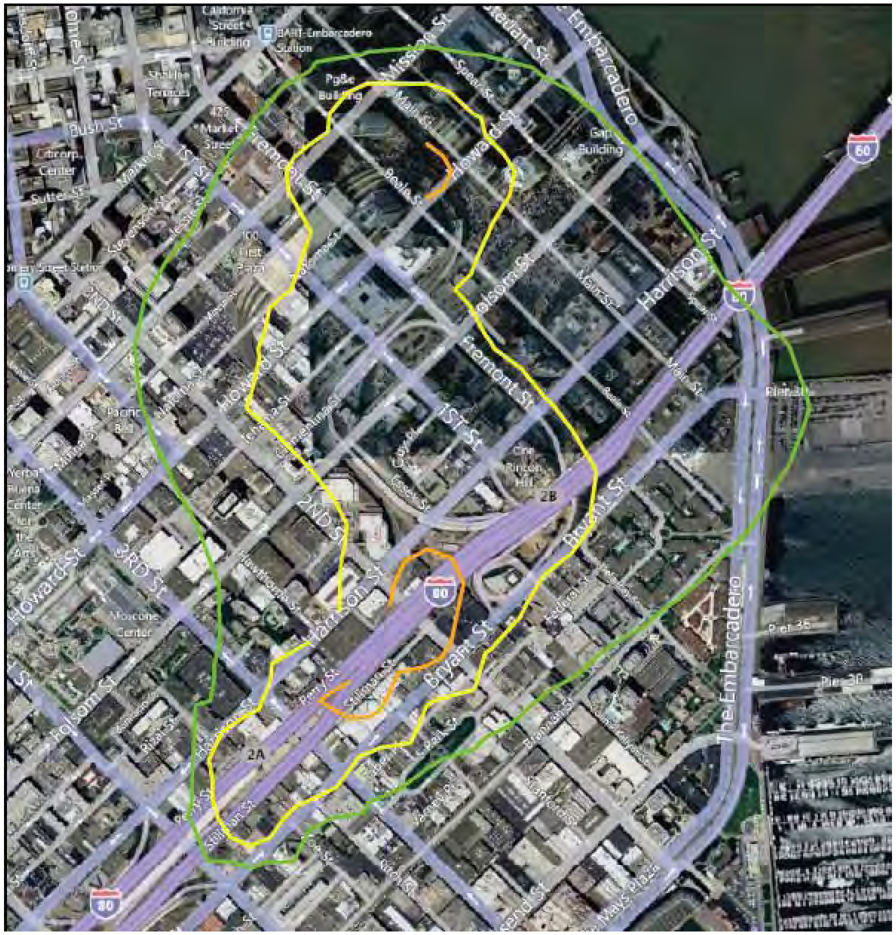
[240] Under standard health risk assessment protocols, lifetime cancer risks to residents are calculated based on assumed exposure for 24 hours per day over a 70-year period, with additional risk factors included for infants and children. In contrast, employee risks are normally calculated based on exposure for 8 hours per day over 40 years. Therefore, for the same receptor location, resident risks are always higher than worker risks, and residents are considered "sensitive receptors," while workers are not. Other sensitive receptors likely to be found in the Plan are include children and infants at child-care centers, of which there are several in the Plan area. Hotel occupants are not considered sensitive receptors because they are transient, meaning they are exposed to risks at a particular location for only a few days at a time under most circumstances.

more compact and quieter engine)[241] —would be required to meet current emissions standards established by the EPA and CARB. Because a combined heat and power plant is generally more efficient than separate electricity and heating/cooling facilities, such a facility would be expected to generate lesser emissions, and therefore result in lesser health risks, than separately operating facilities of comparable size. However, to the extent that such a district-wide plant were to be placed in new operation, it could result in an increase in emissions of criteria air pollutants and toxic air contaminants, compared to existing conditions. A project-specific health risk assessment would likely be undertaken for any combined heat and power facility that might be proposed in the Plan area in the future.

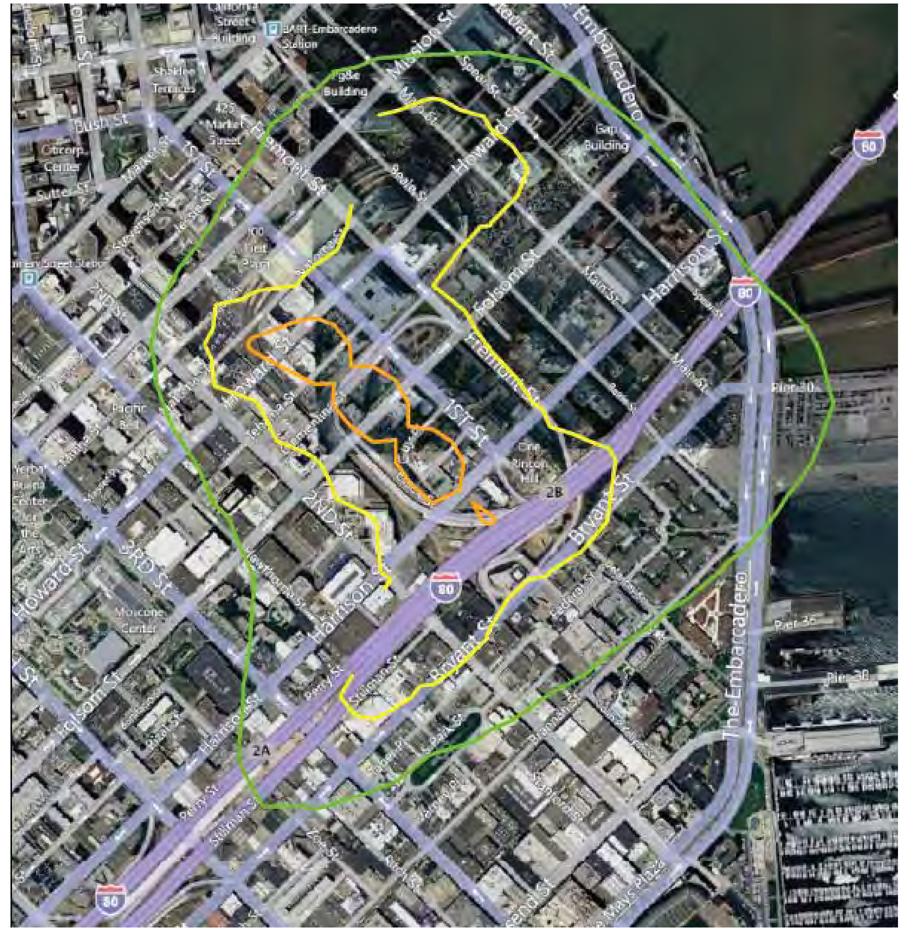
Regarding operation of the Transit Center, because bus operations can be estimated, air quality modeling of diesel buses that will serve the Transit Center was undertaken. The analysis focused on the new Transit Center, because that is where there will be the greatest concentration of diesel-powered buses in the Plan area. The analysis revealed that those bus operations could generate a lifetime cancer risk in excess of 10 in one million at locations proximate to the Transit Center and the ramp linking the terminal to the Bay Bridge, and at elevations from at grade to approximately 100 feet (30 meters) above street level (see **Figure 57**). Subsequent residential development projects (and other projects with sensitive receptors) in these areas, therefore, would be subject to a potential significant impact from diesel bus emissions, exceeding the 10 in one million BAAQMD project-specific guideline for a single source impact on new receptors. Therefore, these projects would likely have to implement mitigation measures, such as installation of a filtration system as described in Mitigation Measure M-AQ-2.

These potential significant air-quality impacts due to exposure to roadway pollutants and stationary source risks, including $PM_{2.5}$ concentrations and cancer and non-cancer health risks, would be reduced with implementation of Mitigation Measure AQ-2, which would require that the final Transit Center District Plan provide that the entire Plan area be encompassed within an area in which site-specific analysis or refined modeling would be required in advance of the approval of subsequent development projects that would include sensitive receptors, and that the Transit Center District Plan include "goals, policies, and objectives to minimize potential impacts."[242] Mitigation Measure M-AQ-2 would also require that residential development projects in the Plan area be designed to reduce air quality impacts to residents through building design (e.g., ventilation and air filtration systems). This measure would apply to the entire Plan area because of the large number of permitted and unpermitted stationary sources—mostly diesel generators and boilers—and the high percentage of streets with traffic volumes that could generate relatively high concentrations of $PM_{2.5}$ throughout the Plan area and vicinity. Because the pollutant concentrations vary by location, it is not possible to conclude that Mitigation Measure M-AQ-2 would bring concentrations or the resulting health risks below the BAAQMD-specified levels for each subsequent project with sensitive receptors. Therefore, this impact would remain significant at the Plan level after mitigation.

[241] A hydrogen fuel cell can power a cogeneration plant, but this equipment is not in common use at present.
[242] BAAQMD, *CEQA Air Quality Guidelines* (see footnote 205, p. 373); p. 9-7.



Cancer Risk at Ground Level



Cancer Risk at 33 feet above grade (10 meters)

5
10
25

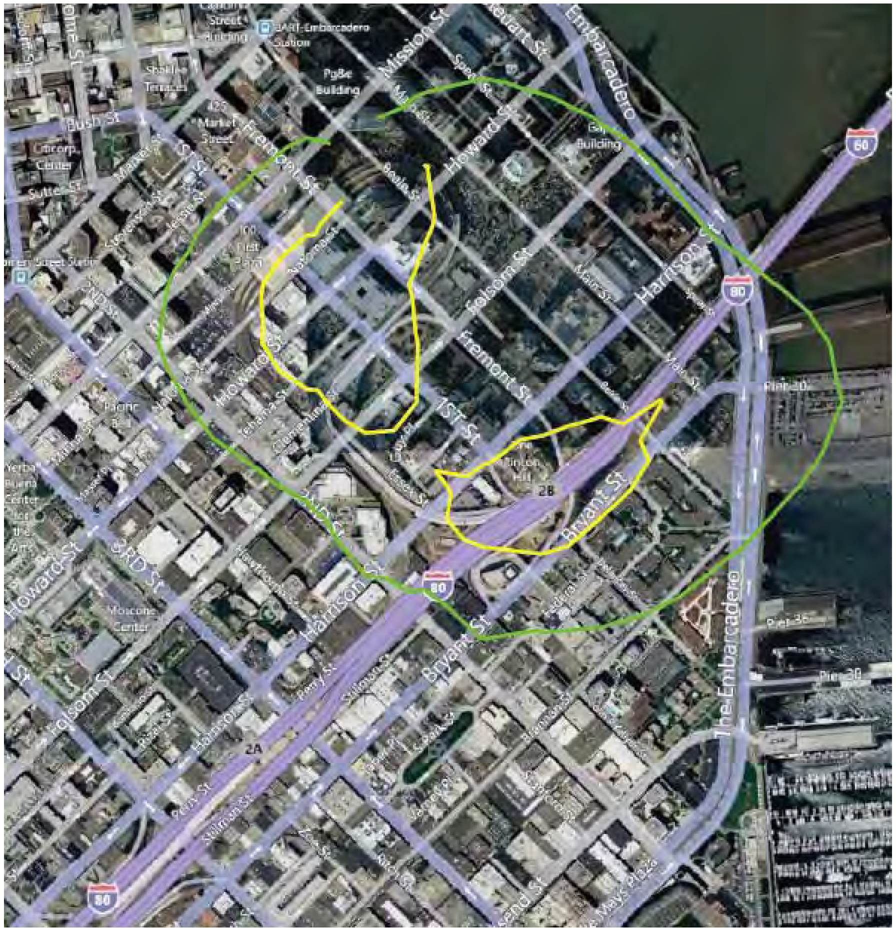
Cancer Risk (chance in one million)

Case Nos. 2007.0558E and 2008.0789E: Transit Center District Plan and Transit Tower. 207439

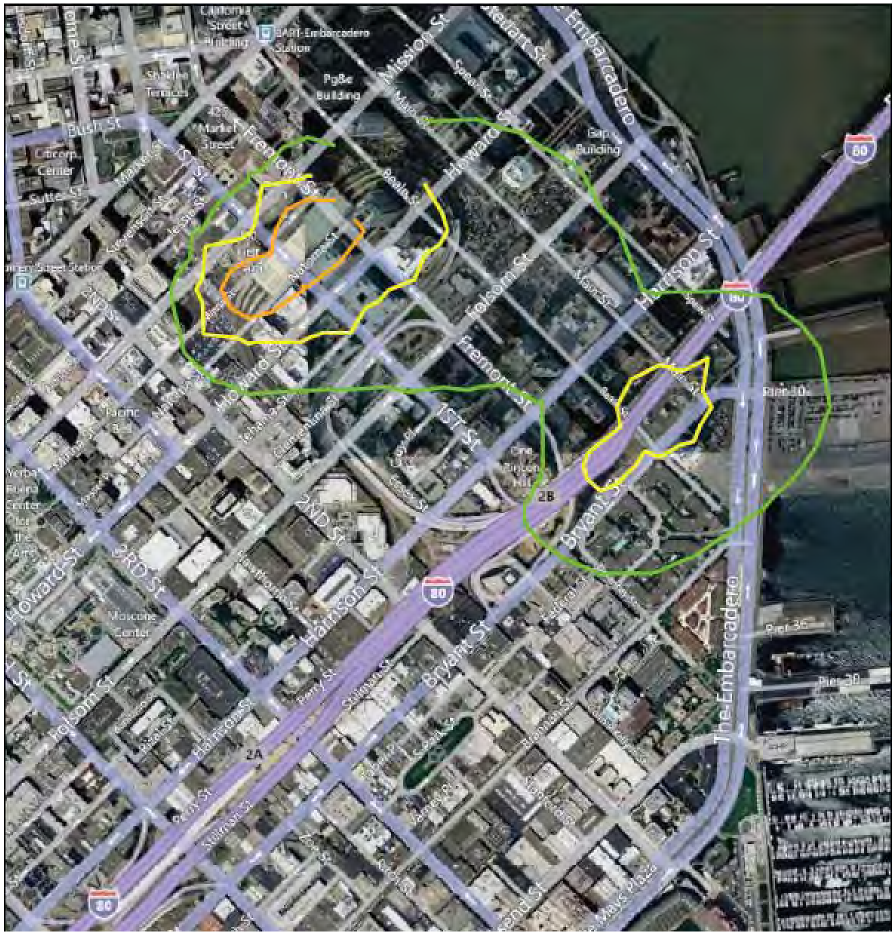
SOURCE: Environ International

Figure 57A

Cancer Risk Due to Transit Center Bus Operations



Cancer Risk at 66 feet above grade (20 meters)

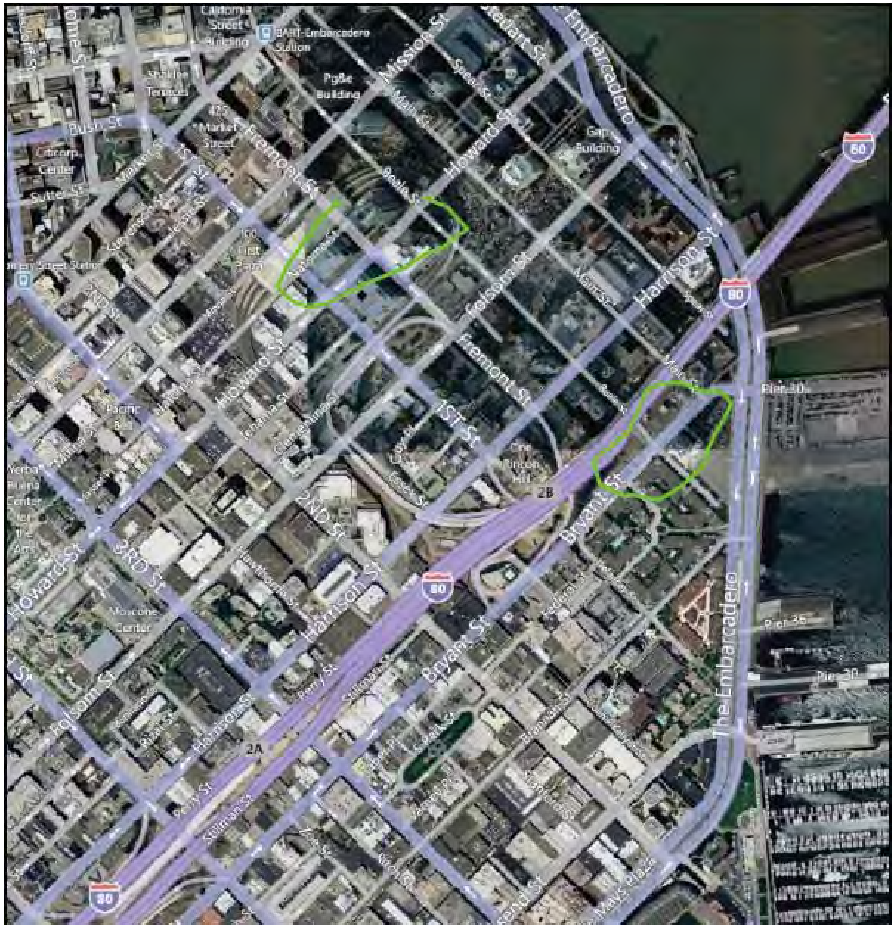


Cancer Risk at 98 feet above grade (30 meters)

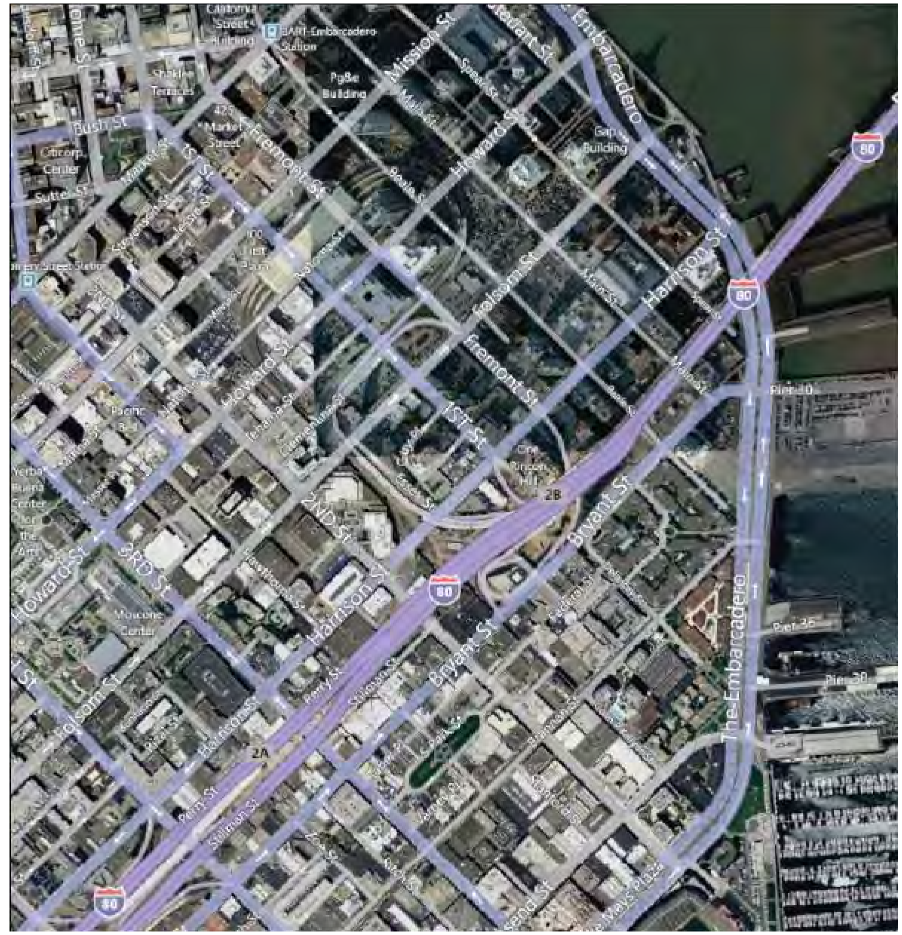
5
10 Cancer Risk (chance in one million)
25

SOURCE: Environ International

Figure 57B
Cancer Risk Due to Transit Center Bus Operations



Cancer Risk at 131 feet above grade (40 meters)



Cancer Risk at 164 feet above grade (40 meters)

5
10 Cancer Risk (chance in one million)
25

SOURCE: Environ International

Figure 57C
Cancer Risk Due to Transit Center Bus Operations

In addition to the overlay zone, the final Plan should also include "goals, policies, and objectives to minimize potential impacts." The BAAQMD *CEQA Air Quality Guidelines* refer to recommendations included in the CARB *Air Quality and Land Use Handbook* for policy recommendations with respect to locating sensitive receptors near uses, such as high-volume roadways, associated with TACs. (Other such sources, such as gas stations, dry cleaners, and industrial facilities, are not present in the Plan area). Because these recommendations, in general, call for establishing buffer zones between such uses and new residential buildings, and because such buffer zones are not feasible in a high-density neighborhood such as the Plan area, the aforementioned ventilation and filtration requirements are considered the most feasible approach to mitigating potential health risks to new residents and other sensitive receptors.

It is noted that application of Mitigation Measure M-AQ-2 could, in the future, be superseded by a City-prepared Community Risk Reduction Plan (see p. 385).

Mitigation Measure

● **M-AQ-2** **Implementation of Risk and Hazard Overlay Zone and Identification of Health Risk Reduction Policies:** To reduce the potential health risk resulting from exposure of new sensitive receptors to health risks from roadways, and stationary sources, and other non-permitted sources $PM_{2.5}$ and TACs, the Planning Department shall require analysis of potential site-specific health risks for all projects that would include sensitive receptors, based on criteria as established by the Planning Department, as such criteria may be amended from time to time. For purposes of this measure, sensitive receptors are considered to include dwelling units; child-care centers; schools (high school age and below); and inpatient health care facilities, including nursing or retirement homes and similar establishments. Parks and similar spaces are not considered sensitive receptors for purposes of this measure unless it is reasonably shown that a substantial number of persons are likely to spend three hours per day, on a daily basis, at such facilities.

● Development projects in the Plan area that would include sensitive receptors shall undergo, during the environmental review process and no later than the first project approval action, a screening-level health risk analysis, consistent with methodology approved by the Planning Department, to determine if health risks from pollutant concentrations would exceed BAAQMD thresholds or other applicable criteria as determined by the Environmental Review Officer. If one or more thresholds would be exceeded at the site of the subsequent project where sensitive receptors would be located, the project (or portion of the project containing sensitive receptors, in the case of a mixed-use project) shall be equipped with filtration systems with a Minimum Efficiency Reporting Value (MERV) rating of 13 or higher, as necessary to reduce the outdoor-to-indoor infiltration of air pollutants by 80 percent. The ventilation system shall be designed by an engineer certified by the American Society of Heating, Refrigeration and Air-

Conditioning Engineers, who shall provide a written report documenting that the system offers the best available technology to minimize outdoor to indoor transmission of air pollution. The project sponsor shall present a plan to ensure ongoing maintenance of ventilation and filtration systems and shall ensure the disclosure to buyers and/or renters regarding the findings of the analysis and inform occupants as to proper use of any installed air filtration.

Level of Significance After Mitigation

The above measure would require development projects in the Plan area to undergo site-specific evaluation and to incorporate the maximum feasible mitigation for impacts resulting from $PM_{2.5}$ or toxic air contaminant levels in excess of adopted thresholds. However, because it cannot be determined with certainty that this mitigation measure would reduce impacts to below BAAQMD's significance thresholds, this impact is considered **significant and unavoidable**. However, it is noted that, in the case of individual development projects in the Plan area, site- and project-specific equipment and other considerations may lead to a conclusion that the project-specific effect can be mitigated to a less-than-significant level.

Impact AQ-3: The draft Plan would expose existing and future sensitive receptors to substantial levels of $PM_{2.5}$ and toxic air contaminants from new vehicles and equipment. (Significant and Unavoidable with Mitigation)

Certain development projects in the Plan area would generate potential health risks for existing sensitive receptors (primarily residents) in or near the Plan area by the inclusion in these projects of sources of toxic air contaminants. Most commonly, these sources would be anticipated to be diesel-powered emergency generators and boilers, which, as noted in the Setting, are installed in most high-rise buildings, and also in mid-rise structures. Operation of these generators and other sources could expose nearby sensitive receptors to elevated concentrations of TACs.

Other potential sources of health risk could include dry cleaning establishments, gasoline stations, distribution centers (warehouses) or other commercial operations that accommodate more than 100 trucks or more than 40 refrigerator trucks per day, and industrial or light industrial uses such as auto body shops, metal plating shops; photo processing, furniture upholstery, appliance repair, printing, hospitals and clinics, biotechnology research, warehousing and distribution centers, and processing of textiles and leather. For the most part, the nature of land use in the Plan area and the area's high land costs mean that the great majority of these uses are unlikely to locate within the Plan area. As noted in the Setting, even dry cleaners in the Plan area do not generally operate on-site facilities that use cleaning chemicals, instead serving as storefronts for pickup and drop-off of items to be cleaned.

In addition to specific types of land uses, all development projects in the Plan area would generate car and truck traffic that would contribute to health risks from traffic-generated pollutants, including $PM_{2.5}$, DPM, and other organic gases.

Implementation of Mitigation Measure AQ-3, Siting of Uses that Emit DPM and Other TACs, would require that such uses, including standby generators, located within 1,000 feet of existing residential units and other sensitive receptors, including schools, day-care centers, hospitals, nursing and convalescent homes, and like uses be the subject of an analysis prior to approval that includes, at a minimum, a site survey to identify such sensitive uses within 1,000 feet of the project site and site-specific dispersion modeling of health risks. Implementation of this measure would reduce impacts of uses generating DPM and other TACs, but not necessarily to a less-than-significant level.

Mitigation Measure

● **M-AQ-3** **Siting of Uses that Emit DPM and Other TACs:** To minimize potential exposure of sensitive receptors to diesel particulate matter (DPM), for new development including warehousing and distribution centers, and for new development including commercial, industrial or other uses that would be expected to generate substantial levels of toxic air contaminants (TACs) as part of everyday operations, whether from stationary or mobile sources, the Planning Department shall require, during the environmental review process but no later than the first project approval action, the preparation of an analysis that includes, at a minimum, a site survey to identify residential or other sensitive uses within 1,000 feet of the project site, and an assessment of the health risk from potential stationary and mobile sources of TACs generated by the project. If risks to nearby receptors are found to exceed applicable significance thresholds, then emissions controls would be required prior to project approval to ensure that health risks would not be significant.

Level of Significance After Mitigation

The above measure would require development projects in the Plan area to undergo site-specific evaluation and to incorporate maximum feasible mitigation for impacts resulting from or toxic air contaminant levels in excess of adopted thresholds. Because it cannot be determined with certainty that mitigation would result in health risks that would be below applicable BAAMQD significance thresholds, this impact is considered **significant and unavoidable**. However, it is noted that, in the case of individual development projects in the Plan area, site- and project-specific equipment and other considerations may lead to a conclusion that the project-specific effect can be mitigated to a less-than-significant level.

Construction Impacts

Implementation of the Transit Center District Plan would allow for development of new office, residential, hotel, and retail space, including a greater amount of development than that currently permitted under existing land use controls. Additionally, the draft Plan proposes streetscape improvements such as bicycle and pedestrian circulation enhancements and reconfiguration of the travel lanes in certain streets. Most development projects in the Plan area would entail demolition and removal of existing structures or parking lots, excavation, and site preparation and construction of new buildings. Emissions generated during construction activities would include exhaust emissions from heavy duty construction equipment, trucks used to haul construction materials to and from sites, worker vehicle emissions, as well as fugitive dust[243] emissions associated with earth disturbing activities.

The BAAQMD *CEQA Air Quality Guidelines* do not include a threshold of significance for evaluating construction-related impacts at the plan level. Instead, subsequent individual development projects in the plan area would be required to meet thresholds of significance for criteria pollutant emissions associated with construction equipment exhaust. The project-specific construction thresholds are 54 lbs per day of reactive organic gases, nitrogen oxides, and $PM_{2.5}$ (exhaust only) and 82 pounds per day for PM_{10} (exhaust only). The BAAQMD Guidelines also contain health-based standards for exposure to toxic air contaminants that are the same as those for project operations, described above on page 388.

Impact AQ-4: Implementation of the draft Plan would result in construction-period emissions of criteria air pollutants, including ozone precursors, that would contribute to an existing or projected air quality violation or result in a cumulatively considerable increase in criteria pollutants, and could expose sensitive receptors to substantial levels of construction dust. (Significant and Unavoidable with Mitigation)

BAAQMD has identified screening thresholds that would allow specified projects to be deemed to have less-than-significant construction-generated emissions without a detailed air quality analysis, with respect to emissions of criteria air pollutants, and assuming that District-recommended "basic" emissions control measures are incorporated into project construction. Examples of projects that would be

243 "Fugitive dust" is dust that is generated during construction and that escapes from a construction site.

considered less than significant under BAAQMD's screening approach include an office building of no more than 277,000 square feet, a high-rise condominium project of no more than 252 dwelling units, and a hotel of no more than 554 rooms.[244] It is noted that the screening thresholds do not consider effects of demolition of existing structures or projects for which construction schedules call for overlapping construction phases (e.g., paving and building construction occurring simultaneously) that could result in greater emissions than assumed by default assumptions used by the so-called URBan EMISsions (URBEMIS) air quality model, nor do they account for mixed-use projects. Additionally, the screening thresholds were determined based on modeling for "typical" construction projects in the Bay Area, which primarily involve low- and mid-rise construction, and assume a larger construction size to accommodate the same square footage or number of residential units than would be the case for projects in downtown San Francisco. Therefore, some development projects in the Plan area, even if they do not exceed the development size screening thresholds set forth by BAAQMD, would require a detailed construction air quality analysis that demonstrates compliance with applicable guidelines at the time of development. On the other hand, such a detailed assessment might reveal that a project that does exceed the BAAQMD screening thresholds would result in less-than-significant construction impacts with respect to criteria air pollutants.

As noted, the BAAQMD has recommended that Basic Construction Mitigation (emissions control) Measures be applied to all construction projects.[245] These measures include the following:

1. All exposed surfaces (e.g., parking areas, staging areas, soil piles, graded areas, and unpaved access roads) shall be watered two times per day.
2. All haul trucks transporting soil, sand, or other loose material off-site shall be covered.
3. All visible mud or dirt track-out onto adjacent public roads shall be removed using wet power vacuum street sweepers at least once per day. The use of dry power sweeping is prohibited.
4. All vehicle speeds on unpaved roads shall be limited to 15 miles per hour.
5. All roadways, driveways, and sidewalks to be paved shall be completed as soon as possible. Building pads shall be laid as soon as possible after grading unless seeding or soil binders are used.
6. Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to 5 minutes (as required by the California airborne toxics control measure Title 13, Section 2485 of California Code of Regulations [CCR]). Clear signage shall be provided for construction workers at all access points.
7. All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified visible emissions evaluator.
8 Post a publicly visible sign with the telephone number and person to contact at the lead agency regarding dust complaints. This person shall respond and take corrective action within 48 hours. The Air District's phone number shall also be visible to ensure compliance with applicable regulations.

Measure No. 6 (minimized idling times) is required by regulation, and therefore need not normally be applied as a project-specific mitigation measure. Likewise, Measure No. 2 (covering haul trucks) is

[244] BAAQMD, *CEQA Air Quality Guidelines* (footnote 205, p. 373); Table 3-1, pp. 3-2 – 3-3.
[245] BAAQMD, *CEQA Air Quality Guidelines* (footnote 205, p. 373); Table 8-1, p. 8-3.

generally required by law.[246] In San Francisco, Measures No. 1 (exposed surfaces shall be watered twice daily) and No. 3 (wet sweeping of streets) are required of all construction projects by the City's Dust Control Ordinance (see p. 383). Measure No. 4 (limit speeds to 15 miles per hour on unpaved roads) is not applicable to most projects in San Francisco because few in-City projects are developed on sites large enough to have unpaved roads. However, this and Measures No. 5 (pave graded areas as soon as possible or use soil binders) and No. 8 (designate a contact person) are included in the suggested measures for a site-specific Dust Control Plan that the Ordinance requires for projects on sites larger than one-half acre.

Mitigation Measure

M-AQ-4a **Construction Vehicle Emissions Minimization:** To reduce construction vehicle emissions, the project sponsor shall incorporate the following into construction specifications:

- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.

Fugitive Dust

As explained above, any project that is subject to the City's Construction Dust Control Ordinance (discussed on p. 383) would be compliant with the BAAQMD Basic Construction Mitigation Measures with respect to construction dust. Moreover, the Dust Control Plan required for projects larger than one-half acre mandates that the project sponsor: submit a map to the Director of Public Health showing all sensitive receptors within 1,000 feet of the site; wet down areas of soil at least three times per day; provide an analysis of wind direction and install upwind and downwind particulate dust monitors; record particulate monitoring results; hire an independent, third party to conduct inspections and keep a record of those inspections; establish shut-down conditions based on wind, soil migration, etc.; establish a hotline for surrounding community members who may be potentially affected by project-related dust; limit the area subject to construction activities at any one time; install dust curtains and windbreaks on the property lines, as necessary; limit the amount of soil in hauling trucks to the size of the truck bed and secure soils with a tarpaulin; enforce a 15 mph speed limit for vehicles entering and exiting construction areas; sweep affected streets with water sweepers at the end of the day; install and utilize wheel washers to clean truck tires; terminate construction activities when winds exceed 25 miles per hour; apply soil stabilizers to inactive areas; and sweep adjacent streets to reduce particulate emissions. The project sponsor would be required to designate an individual to monitor compliance with dust control requirements.

As noted, the Construction Dust Control Ordinance requires preparation of Dust Control Plan only for projects on sites larger than one-half acre (21,780 square feet). Mitigation Measure M-AQ-4b would

[246] *California Vehicle Code* Sec. 23114(a) states that "…a vehicle shall not be driven or moved on any highway unless the vehicle is so constructed, covered, or loaded as to prevent any of its contents or load … from dropping, sifting, leaking, blowing, spilling, or otherwise escaping from the vehicle."

require that development projects in the Plan area that are not subject to the Construction Dust Control Ordinance requirement to prepare a site-specific Dust Control Plan but that would require more than 5,000 cubic yards of excavation and that would entail ground-disturbing activity lasting four weeks or longer, also prepare and implement a Dust Control Plan, to further minimize fugitive dust emissions from construction. The 5,000-cubic-yard threshold is based on the Dust Control Ordinance threshold of one-half acre, and on approximately 6 feet of excavation (assumed for a slab foundation) over a site of that size (21,780 sq. ft. x 6 feet ÷ 27 cu. ft./cu. yd. = approximately 5,000 cu. yd.). The 5,000-cubic-yard threshold would ensure that projects with excavation greater than the foregoing (e.g., 9 feet of excavation on a 15,000-square-foot site) would be subject to the same requirements and would thus result in lesser emissions of fugitive dust, compared to unmitigated excavation.

Mitigation Measure

M-AQ-4b **Dust Control Plan:** To reduce construction-related dust emissions, the project sponsor of each development project in the Plan area and each public infrastructure project (such as improvements to the public realm) in the Plan area on a site of one-half acre or less but that would require more than 5,000 cubic yards of excavation lasting four weeks or longer shall incorporate into construction specifications the requirement for development and implementation of a site-specific Dust Control Plan as set forth in Article 22B of the *San Francisco Health Code*. The Dust Control Plan shall require the project sponsor to: submit a map to the Director of Public Health showing all sensitive receptors within 1,000 feet of the site; wet down areas of soil at least three times per day; provide an analysis of wind direction and install upwind and downwind particulate dust monitors; record particulate monitoring results; hire an independent, third party to conduct inspections and keep a record of those inspections; establish shut-down conditions based on wind, soil migration, etc.; establish a hotline for surrounding community members who may be potentially affected by project-related dust; limit the area subject to construction activities at any one time; install dust curtains and windbreaks on the property lines, as necessary; limit the amount of soil in hauling trucks to the size of the truck bed and secure soils with a tarpaulin; enforce a 15 mph speed limit for vehicles entering and exiting construction areas; sweep affected streets with water sweepers at the end of the day; install and utilize wheel washers to clean truck tires; terminate construction activities when winds exceed 25 miles per hour; apply soil stabilizers to inactive areas; and sweep adjacent streets to reduce particulate emissions. The project sponsor would be required to designate an individual to monitor compliance with dust control requirements.

Detailed construction information, such as construction techniques and scheduling, that would be utilized for each individual development project is not currently known, and therefore estimation of emissions from individual development projects would be too speculative to warrant evaluation in this EIR. However, implementation of Mitigation Measure M-AQ-4b would require implementation of fugitive dust control measures. Along with compliance with the regulations and procedures set forth by the *San Francisco Building Code* and *San Francisco Health Code*, this measure would ensure that impacts from fugitive dust would be less than significant.

In addition to reducing fugitive dust, implementation of Mitigation Measure M-AQ-4b would also help reduce construction exhaust emissions from equipment to the maximum extent feasible.

<u>Level of Significance After Mitigation</u>

Notwithstanding implementation of Mitigation Measure M-AQ-4a, it is possible that one or more of the development projects in the Plan area could result in project-specific significant construction exhaust emissions impacts, even with this mitigation measure. Therefore, impacts associated with construction equipment exhaust emissions of criteria pollutants that would result from implementation of the draft Plan are considered **significant and unavoidable**. It should be noted that the identification of this program level potentially significant impact does not preclude the finding of future less-than-significant impacts for subsequent projects that comply with BAAQMD screening criteria or meet applicable thresholds of significance.

Even though implementation of Mitigation Measure M-AQ-4b would reduce construction dust emissions to less-than-significant levels, emissions of criteria pollutants from construction could exceed applicable thresholds for individual projects, despite implementation of Mitigation Measure M-AQ-4a. Therefore, as state above, this impact would be **significant and unavoidable**. As noted, identification of this program level potentially significant impact does not preclude the finding of future less-than-significant impacts for subsequent development projects in the Plan area that comply with BAAQMD screening criteria or meet applicable thresholds of significance.

Impact AQ-5: Implementation of the draft Plan could expose sensitive receptors to substantial levels of toxic air contaminants generated by construction equipment. (Significant and Unavoidable with Mitigation)

Diesel-powered construction equipment generates emissions of diesel particulate matter (DPM), which is identified as a carcinogen by CARB. The BAAQMD has published a guide for a screening-level analysis of construction health risk that has determined that a potentially significant impact related to health risk from DPM would be attributable to construction of virtually any project, other than a residential project of five or fewer units, that is within 100 meters (330 feet) of a sensitive receptor (e.g., residence, child-care center, hospital, and the like).[247] BAAQMD notes that its screening methodology incorporates "many worst-case and conservative assumptions," and states that a project-specific health risk assessment would likely produce more accurate results. Nevertheless, it is clear that the new BAAQMD CEQA guidance leads to a determination of at least a potential significant impact for construction of many potential

[247] BAAQMD, "Screening Tables for Air Toxics Evaluation During Construction," May 2010. On the internet at: http://www.baaqmd.gov/Home/Divisions/Planning%20and%20Research/CEQA%20GUIDELINES/Tools%20and%20Methodology.aspx. Reviewed September 1, 2010.

projects in San Francisco and other densely developed Bay Area communities. (It is noted that a typical South-of-Market block west of First Street measures 825 by 550 feet, while a typical North-of-Market block measures 412.5 by 275 feet; thus, a construction project north of Market Street would be within the 330-foot screening distance of most, and in some cases all, other parcels on its block, while a project south of Market Street would be within at least 25 percent of the other parcels on its block.) Project-specific screening-level health risk assessments for construction of individual projects in San Francisco have identified significant impacts resulting from construction in proximity to sensitive receptors, in the form of an incremental increase in lifetime cancer risk in excess of 10 in one million and/or incremental increase in concentration of $PM_{2.5}$ in excess of 0.3 micrograms per cubic meter, both of which are BAAQMD-recommended significance thresholds.

Modeling of construction equipment emissions has revealed that both cancer risk and concentration of $PM_{2.5}$ could be reduced to a less-than-significant level at many, and in some cases, all receptor locations near construction sites (that is, the greatest risk and the greatest concentration would both be less than the BAAQMD thresholds) if all diesel construction equipment were to meet the interim Tier 4 diesel engine standards. As described in the Regulatory Setting, under Toxic Air Contaminant Regulations, p. 384, new diesel engines meeting the interim Tier 4 emissions standards, and Tier 2 or Tier 3 engines retrofitted with a Level 3 Verified Diesel Emissions Control System, can reduce diesel particulate by approximately 85 percent, and would result in a cancer risk that would not exceed 10 chances in one million at many sensitive receptor locations near a particular construction site.

However, depending on the construction schedules for subsequent development projects, retrofitted Tier 2 and Tier 3 equipment/Tier 4 equipment may not readily available. Because the Interim Tier 4 standard only took effect in January 2011 for most diesel equipment, and because retrofits are not yet required by CARB, it will take some time—probably several years—for these new engines to become a large part of construction equipment fleets. And, as also noted in the Regulatory Setting, CARB has delayed implementation of standards for diesel-powered engines already in use by several years. Accordingly, Mitigation Measure M-AQ-5 is required to reduce construction-period emissions to the minimum practicable level.

Mitigation Measure

● **M-AQ-5** **Construction Vehicle Emissions Evaluation and Minimization:** To reduce the potential health risk resulting from project construction activities, the project sponsor of each development project in the Plan area shall undertake a project-specific health risk analysis, or other appropriate analysis as determined by the Environmental Planning Division of the Planning Department, for diesel-powered and other applicable construction equipment, using the methodology recommended by the Planning Department. If the analysis determines that construction emissions would exceed applicable health risk significance threshold(s) identified by the Planning Department, the project sponsor shall include in contract specifications a requirement that the contractor use the cleanest possible construction equipment and exercise best practices for limiting construction exhaust. Measures may include, but are not limited to,the following:

- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to two minutes;
- The project shall develop a Construction Emissions Minimization Plan demonstrating that the off-road equipment (more than 50 horsepower) to be used in the construction project (i.e., owned, leased, and subcontractor vehicles) would be reduced to the maximum extent feasible. Acceptable options for reducing emissions include, as the primary option, use of Interim Tier 4 equipment where such equipment is available and feasible for use, use of equipment meeting Tier 2/Tier 3 or higher emissions standards, the use of other late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, add-on devices such as particulate filters, and/or other options as such become available;
- All construction equipment, diesel trucks, and generators shall be equipped with Best Available Control Technology for emission reductions of NOx and PM, including Tier 2/3 or alternative fuel engines where such equipment is available and feasible for use;
- All contractors shall use equipment that meets ARB's most recent certification standard for off-road heavy duty diesel engines; and
- The project construction contractor shall not use diesel generators for construction purposes where feasible alternative sources of power are available.

During the environmental review process, the project sponsor shall submit a Construction Emissions Minimization Plan demonstrating compliance with the requirements of this mitigation measure.

Level of Significance After Mitigation

Implementation of the Mitigation Measure M-AQ-5 would result in the maximum feasible reduction of diesel emissions that would contribute to construction-period health risk, thereby lowering both lifetime cancer risk and the concentration of $PM_{2.5}$ to which sensitive receptors near certain subsequent development projects would be exposed. Although in many cases, the use of interim Tier 4 or Tier 2/ Tier 3 equipment with Level 3 VDECS diesel construction equipment would reduce the health risk to a level that would not exceed any of the significance thresholds identified by the BAAQMD, because it cannot be stated with certainty that either cancer risk or $PM_{2.5}$ concentration would be reduced to below the BAAQMD-recommended significance thresholds, and because of the uncertainty concerning the availability and feasibility of using construction equipment that meets the requirements of Mitigation Measure M-AQ-5, this impact is conservatively judged to be **significant and unavoidable**. However, identification of this program level potentially significant impact does not preclude the finding of future less-than-significant impacts for subsequent development projects in the Plan area that meet applicable thresholds of significance.

Transit Tower

Air quality impacts from the proposed Transit Tower would fall into two categories: short-term impacts due to construction, and long-term impacts due to project operation. These potential impacts are consistent with those described above for development in the Plan area as a whole. First, during project construction, the project would affect local particulate concentrations primarily due to fugitive dust sources, and would also generate emissions of both criteria air pollutants and toxic air contaminants in construction equipment exhaust. Over the long term, the project would result in an increase in emissions primarily due to increased motor vehicle trips, as well as from operation of on-site stationary sources—in this case, a backup generator. Area sources (such as landscaping and use of consumer products) would result in lesser quantities of pollutant emissions.

Construction Air Quality Impacts

Impact AQ-6: Construction of the Transit Tower would result in emissions of criteria air pollutants, including ozone precursors, that would contribute to an existing or projected air quality violation or result in a cumulatively considerable increase in criteria pollutants, and could expose sensitive receptors to construction dust. (Less than Significant)

Demolition, grading and new construction activities would temporarily affect local air quality during the project's proposed 3-year construction schedule, causing temporary increases in particulate dust and other pollutants. Emissions generated from construction activities include combustion emissions of criteria air pollutants (reactive organic gases [ROG], nitrogen oxides [NOx], carbon monoxide [CO], sulfur oxides [SOx], and PM_{10} and $PM_{2.5}$) primarily from operation of construction equipment and worker vehicles, evaporative criteria pollutant emissions (ROG) from asphalt paving and architectural coating applications, and dust (including PM_{10} and $PM_{2.5}$) primarily from "fugitive" sources; that is, dust generated by construction activities and that escapes from the construction site.

Criteria Air Pollutants

Criteria pollutant emissions of ROG, NOx, PM_{10}, and $PM_{2.5}$ from construction equipment would incrementally add to the regional atmospheric loading of these pollutants during project construction. The BAAQMD *CEQA Air Quality Guidelines* recommend the quantification of project related exhaust emissions and comparison of the emissions to its new significance thresholds. Therefore, daily project construction exhaust emissions that would be associated with the proposed project have been estimated and are presented in **Table 34**.

As indicated in Table 34, emissions from project construction would not exceed the BAAQMD's significance thresholds. Even though construction-related emissions would not exceed the BAAQMD's significance thresholds for criteria pollutants, Implementation of Improvement Measure I-AQ-6 would further reduce the less-than-significant emissions from construction vehicles, and would be consistent with the BAAQMD's basic emissions control measures for all projects.

Improvement Measure

I-AQ-6 **Construction Vehicle Emissions Minimization:** To reduce construction vehicle emissions, the project sponsor shall incorporate the following into construction specifications:

- All construction equipment shall be maintained and properly tuned in accordance with manufacturer's specifications. All equipment shall be checked by a certified mechanic and determined to be running in proper condition prior to operation.

TABLE 34
TRANSIT TOWER PROJECT CONSTRUCTION EXHAUST EMISSIONS ESTIMATES

	Estimated Daily Emissions (pounds per day)[a]			
Construction Phase and Year	**ROG**	**NOx**	**PM10**[b]	**PM2.5**[b]
2013	14.4	43.1	1.9	1.7
2014	2.9	12.1	0.6	0.6
2015	40.5	11.0	0.6	0.5
2016	37.18	0.0	0.0	0.0
BAAQMD Threshold	54	54	82	54
Significant?	No	No	No	No

[a] Project construction emissions estimates are based on output from URBEMIS 2007 v.9.2.4 air quality model, using the model's default assumptions. Assumes construction starts in mid-2013 and ends in mid-2016.
[b] Vehicle exhaust only.

SOURCE: Environmental Science Associates, 2011

Fugitive Dust

For fugitive dust, the BAAQMD recommends a "best management practices" approach for dust control. Project-related demolition, excavation, grading and other construction activities may cause wind-blown dust that could contribute particulate matter into the local atmosphere. Although there are federal standards for air pollutants and implementation of state and regional air quality control plans, air pollutants continue to have impacts on human health throughout the country. California has found that particulate matter exposure can cause health effects at lower levels than national standards. The current health burden of particulate matter demands that, where possible, public agencies take feasible available actions to reduce sources of particulate matter exposure. According to the California Air Resources Board, reducing ambient particulate matter from 1998 – 2000 levels to natural background concentrations in San Francisco would prevent over 200 premature deaths.

Dust can be an irritant causing watering eyes or irritation to the lungs, nose and throat. Demolition, excavation, grading and other construction activities can cause wind-blown dust to add to particulate matter in the local atmosphere. Depending on exposure, adverse health effects can occur due to this particulate matter in general and also due to specific contaminants such as lead or asbestos that may be constituents of soil.

In response, as noted under Regulatory Setting (p. 383), the San Francisco Board of Supervisors approved a series of amendments to the *San Francisco Building* and *Health Codes* generally referred hereto as the Construction Dust Control Ordinance (Ordinance 176-08, effective July 30, 2008) with the intent of reducing the quantity of dust generated during site preparation, demolition and construction work in order to protect the health of the general public and of onsite workers, minimize public nuisance complaints, and to avoid orders to stop work by the Department of Building Inspection (DBI).

Implementation of a Dust Control Plan as provided for in the Construction Dust Control Ordinance would be consistent with the BAAQMD *CEQA Air Quality Guidelines'* recommendation that all construction projects employ basic emissions control measures, including watering all exposed surfaces (e.g., staging areas, soil piles, graded areas) twice daily; covering all haul trucks transporting loose material; daily wet street sweeping of visible mud or dirt onto adjacent public streets; minimizing the time that soils are uncovered; and posting contact information for dust complaints.

At approximately 50,000 square feet, the proposed Transit Tower project site is approximately 1.1 acres in size, and therefore is subject to the Dust Control Plan requirement. Accordingly, the Transit Tower projects sponsor would be required to prepare a Dust Control Plan as called for in the Construction Dust Control Ordinance. The Dust Control Plan would require the project sponsor to: submit a map to the Director of Public Health showing all sensitive receptors within 1,000 feet of the site; wet down areas of soil at least three times per day; provide an analysis of wind direction and install upwind and downwind particulate dust monitors; record particulate monitoring results; hire an independent, third party to conduct inspections and keep a record of those inspections; establish shut-down conditions based on wind, soil migration, etc.; establish a hotline for surrounding community members who may be potentially affected by project-related dust; limit the area subject to construction activities at any one time; install dust curtains and windbreaks on the property lines, as necessary; limit the amount of soil in hauling trucks to the size of the truck bed and secure soils with a tarpaulin; enforce a 15 mph speed limit for vehicles entering and exiting construction areas; sweep affected streets with water sweepers at the end of the day; install and utilize wheel washers to clean truck tires; terminate construction activities when winds exceed 25 miles per hour; apply soil stabilizers to inactive areas; and sweep adjacent streets to reduce particulate emissions. The project sponsor would be required to designate an individual to monitor compliance with dust control requirements.

The regulations and procedures set forth by the *San Francisco Building Code* and *San Francisco Health Code*, including preparation of a Dust Control Plan, would ensure that potential dust-related air quality impacts would be less than significant.

Mitigation: None required.

Impact AQ-7: Construction of the Transit Tower would expose sensitive receptors to substantial levels of toxic air contaminants generated by construction equipment. (Significant and Unavoidable with Mitigation)

To determine if construction emissions could result in adverse health effects at nearby receptors, a screening-level health risk assessment and $PM_{2.5}$ analyses were conducted.[248] The analysis considered the nearest residential units to the Transit Tower site, which is the Millennium Tower, across Fremont Street, and the nearest child-care center, which is at 342 Howard Street (in the office building at 199 Fremont

[248] Health risk assessment calculations are included in Appendix B.

Street). The analysis calculated mass emissions of PM_{10}, which was used as a surrogate for diesel particulate matter, and $PM_{2.5}$ exhaust from on-site heavy-duty diesel-powered construction equipment.[249] The estimated mass emissions were entered into the AERMOD dispersion model to estimate ambient concentrations of PM_{10} (diesel particulate matter) and $PM_{2.5}$ associated with the project's construction activities. As recommended by BAAQMD, concentrations of the toxic air contaminant Acrolein were also estimated, because this chemical has the greatest non-cancer health risks for toxic air contaminants contained in diesel exhaust.

The analysis determined that the proposed project's construction-related emissions would generate a cancer risk of 17 in one million for child (infant) receptors at the nearest residential building, the Millennium tower.[250] At the child care center on Howard Street, the analysis identified an incremental lifetime cancer risk of 31 in one million as a result of project construction. Each class of calculated incremental lifetime cancer risk, other than the adult resident, exceeds the BAAQMD significance threshold of 10 in one million, and the impact would therefore be significant.[251]

The maximum concentration of $PM_{2.5}$ at any of the sensitive receptors associated with the project's construction activities would reach an annual average of 0.2 micrograms per cubic meter. This would not exceed the significance threshold of 0.3 micrograms per cubic meter, and would be less than significant.

The Hazard Indices associated with exposure to the toxic air contaminant Acrolein would be less than 1 (0.5 Chronic Hazard Index and 0.1 Acute Hazard Index), and would be less than significant.

It is noted that the foregoing discussion does not represent an impact unique to the proposed Transit Tower project. Rather, as noted, the assessment of construction emission health risk is part of the BAAQMD's 2010 CEQA guidance, and the resulting impacts would be similar for any comparably sized construction project in a densely developed area that contains a mix of land uses.

The project-specific screening-level health risk analysis for the proposed Transit Tower project includes a number of conservative assumptions. For example, for exposure of children at the child care center on Howard Street, the analysis assumes exposure for 10 hours per day, meaning that children are present and exposed to ambient outdoor air for 10 hours per day. In reality, children may spend perhaps half or

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249 Diesel-powered construction equipment was assumed to be used primarily during excavation, whereas tower crane(s) and other heavy equipment during building construction was assumed to be electrically powered.

250 For the child receptor, recommended BAAQMD assumptions concerning infants (up to two years of age) were used for purposes of a conservative analysis. These assumptions include a ten-fold "age sensitivity factor" that accounts for infants' greater sensitivity to toxic pollutants. The residential receptor are located on the third story of the adjacent tower as commercial uses occupy the first two stories.

251 According to BAAQMD, the estimated lifetime cancer risk from all toxic air contaminants in the Bay Area is approximately 400 in one million, while the total lifetime cancer risk for all causes is approximately 400,000 in one million (BAAQMD, *Bay Area 2010 Clean Air Plan* [see note 222, p. 382]; p. 1-17). (http://www.baaqmd.gov/Divisions/Planning-and-Research/Plans/Clean-Air-Plans.aspx.) Reviewed September 2, 2010.

more of the day indoors.[252] Depending on the source of the air inside the building—the building in which the child care center is located has fixed windows at all levels, meaning the building has a forced-air ventilation system—indoor air could be substantially cleaner. However, without detailed knowledge of the building or the operation of the child care center, the project health risk assessment defaulted to more conservative exposure assumptions.

The health risk assessment determined that both cancer risk and concentration of $PM_{2.5}$ could be reduced to a less-than-significant level at all receptor locations (that is, the greatest risk and the greatest concentration would both be less than the BAAQMD thresholds) if all diesel construction equipment were to meet the California Air Resources Board (ARB) and U.S. Environmental Protection Agency (EPA) Interim Tier 4 standards for Off-Road Compression-Ignition (Diesel) Engines. As described in the Regulatory Setting, under Toxic Air Contaminant Regulations, p. 384, new diesel engines meeting the interim Tier 4 emissions standards and Tier 2/Tier 3 engines with a CARB-certified Level 3 Verified Diesel Emissions Control System (VDECS) can reduce diesel particulate by approximately 85 percent. Use of these would result in a cancer risk that would not exceed 10 chances in one million at any of the nearby sensitive receptors. For child (infant) receptors at the Millennium tower, the lifetime cancer risk would be 2.6 in one million, compared to 17 in one million in the unmitigated condition. For an infant at the child care center, the risk would decrease to 4.5 in one million, from an unmitigated risk of 30 in one million. Use of Tier 4 diesel equipment or Tier 2/Tier 3 equipment with Level 3 VDECS would also reduce the $PM_{2.5}$ concentration at all receptors to 0.12 micrograms per cubic meter, which is less than the significance threshold of 0.3 micrograms per cubic meter.

However, Tier 4 equipment is not readily available at this time. Both federal (EPA) and CARB Interim Tier 4 standards take effect in 2011 for new equipment. Meanwhile, as also noted above under Toxic Air Contaminant Regulations, ARB has delayed implementation of emissions standards for existing off-road diesel engines, including requirements that construction equipment use so-called Best Available Control Technology or the each operator's fleet of equipment meet a specified average emissions standard, and retrofitting of off-road equipment with Level 3 VDECS is not yet required by CARB. Accordingly, Mitigation Measure M-AQ-7 is identified below to minimize construction emissions.

Mitigation Measure

M-AQ-7 **Construction Vehicle Emissions Minimization:** To reduce the potential health risk resulting from project construction activities, the project sponsor shall include in contract specifications a requirement for the following BAAQMD-recommended measures:

- Idling times shall be minimized either by shutting equipment off when not in use or reducing the maximum idling time to two minutes;

[252] The State of California requires that child care centers have outdoor play space, and that this space be "open to air and light," which the Child Care Licensing Division of the state Department of Social Services generally interprets as meaning that the outdoor space must be open to the sky (Mardi Lucich, Citywide Childcare Administrator, San Francisco Department of Children, Youth, and Their Families; personal communication, August 24, 2010).

- The project shall develop a Construction Emissions Minimization Plan demonstrating that emissions from the off-road equipment (more than 50 horsepower) to be used in the construction project (i.e., owned, leased, and subcontractor vehicles) would be reduced to a less-than-significant level, if feasible. Acceptable options for reducing emissions include, as the primary option, use of Interim Tier 4 equipment where such equipment is available and feasible for use, use of equipment meeting Tier 2/Tier 3 or higher emissions standards, the use of other late model engines, low-emission diesel products, alternative fuels, engine retrofit technology, after-treatment products, add-on devices such as particulate filters, and/or other options as such become available;
- All construction equipment, diesel trucks, and generators shall be equipped with Best Available Control Technology for emission reductions of NOx and PM, including Tier 2/3 or alternative fuel engines where such equipment is available and feasible for use;
- All contractors shall use equipment that meets ARB's most recent certification standard for off-road heavy duty diesel engines; and
- The project construction contractor shall not use diesel generators for construction purposes where feasible alternative sources of power are available. All diesel generators used for project construction shall meet Tier 4 emissions standards.

For the purposes of this mitigation measure, "feasibility" refers to the availability of newer equipment in the contractor's or a subcontractor's fleet that meets these standards, or the availability of older equipment in the contractor's or a subcontractor's fleet that can be feasibly retrofitted. It should be noted that for specialty equipment types (e.g. drill rigs, shoring rigs and concrete pumps) it may not be feasible for construction contractors to modify their current, older equipment to accommodate the particulate filters, or for them to provide newer models with these filters pre-installed. Therefore, this mitigation measure may be infeasible.

Should it be determined by the construction contractor or its subcontractor(s) that compliance with the emissions control requirements of this mitigation measure is infeasible for any one of the above listed construction equipment, the construction contractor must demonstrate an alternative method of compliance that achieves an equivalent reduction in the project's fleet-wide DPM and other TAC emissions. If alternative means of compliance with the emissions exhaust requirements are further determined to be infeasible, the construction contractor must document, to the satisfaction of the Environmental Review Officer, that the contractor has complied with this mitigation measure to the extent feasible and why full compliance with the mitigation measure is infeasible.

Level of Significance After Mitigation

Implementation of the above measure would result in the maximum feasible reduction of diesel emissions that would contribute to construction-period health risk, thereby lowering both lifetime cancer risk and the concentration of $PM_{2.5}$ to which receptors would be exposed. Furthermore, the above analysis indicates that use of interim Tier 4 diesel construction equipment or Tier 2/ Tier 3 equipment with Level 3 VDECS would reduce the health risk to a level that would not exceed any of the significance thresholds identified by the BAAQMD. It is also noted that construction emissions could be lower if newer equipment is employed or less powerful or smaller diesel equipment is used than assumed in the analysis. Emissions could also be higher if more or larger diesel equipment is used. Depending on the regulations in place at the time construction begins, and depending on the precise mix of diesel-powered construction equipment employed, it is possible that the impact would be reduced to a less-than-significant level. However, because it cannot be stated with certainty that either cancer risk or $PM_{2.5}$ concentration would be reduced to below the BAAQMD-recommended significance thresholds, and because of the uncertainty concerning the availability and feasibility of using construction equipment that meets the requirements of Mitigation Measure M-AQ-7, this impact is conservatively judged to be **significant and unavoidable**.

Operational Air Quality Impacts

Impact AQ-8: Operation of the proposed Transit Tower would not conflict with *2010 Clean Air Plan,* result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment, either individually or cumulatively. (Less than Significant)

Based on the project transportation analysis,[253] the proposed project would generate approximately 4,000 vehicle trips per day. Operational emissions from project traffic and from operation of the proposed building were calculated using the URBEMIS 2007 (version 9.2.4) model, and are presented in **Table 35**. As shown in Table 6, emission increases attributable to the proposed project would be substantially below the significance thresholds established by the BAAQMD. Therefore, the project's effects of regional criteria pollutant emissions would be less than significant.

The proposed project would be generally consistent with the San Francisco General Plan, as proposed for amendment by the draft Transit Center District Plan. Additionally, the General Plan, Planning Code, and City Charter implement various Transportation Control Measures identified in the 2010 Bay Area Clean Air Plan through the City's Transit First Program, bicycle parking requirements, transit development impact fees applicable to commercial uses, and other actions. The draft Plan would also be consistent with the Transportation Control Measures in the 2010 Clean Air Plan, as described in the analysis under Impact AQ-1, above, and the Transit Tower would be an integral part of the proposed Plan. In light of the above, the project would not make a considerable contribution to cumulative air quality impacts, nor

[253] AECOM, *Transit Tower Transportation Impact Study* (see footnote 155, p. 274).

TABLE 35
TRANSIT TOWER ESTIMATED DAILY REGIONAL EMISSIONS (2016)

	Projected Emissions (Pounds per Day)[1,2]			
	ROG	**NO_X**	**PM_{10}**	**$PM_{2.5}$**
Area-Source Emissions	1.1	7.4	0.02	0.02
Mobile-Source (Vehicle) Emissions	23.7	26.5	55.1	10.4
TOTAL	24.7	33.9	55.1	10.4
BAAQMD Threshold	54	54	82	54

NOTES:
1 Emission factors were generated by the URBEMIS 2007 (v. 9.2.4) model for San Francisco County, and assume a default vehicle mix. All daily estimates are the average of summer and winter conditions. Traffic generated emissions based on trip generation from the project transportation study.
2 Columns may not total due to rounding.

SOURCE: Environmental Science Associates, 2011.

would it interfere with implementation of the 2010 Clean Air Plan, which is the applicable regional air quality plan developed to improve air quality and to effectively meet the state and federal ambient air quality standards.

Mitigation: None required.

Local Air Quality Impacts

Impact AQ-9: Operation of the proposed Transit Tower would not result in emissions of carbon monoxide that would exceed state or federal standards, either individually or cumulatively. (Less than Significant)

The San Francisco Bay Area Air Basin is designated as "attainment" for carbon monoxide (CO). As stated in the 2010 update of the BAAQMD *CEQA Air Quality Guidelines*, "Emissions and ambient concentrations of CO have decreased dramatically in the Bay Area Air Basin with the introduction of the catalytic converter in 1975. No exceedances of the CAAQS or NAAQS for CO have been recorded at nearby monitoring stations since 1991."[254] Accordingly, as noted in the Significance Criteria, BAAQMD states that CO impacts may be determined to be less than significant if a project is consistent with the applicable congestion management plan and would not increase traffic volumes at local intersections to more than 24,000 vehicles per hour, for locations, such as the project site, in heavily urban areas, where "urban canyons" formed by buildings tend to reduce air circulation. The project would be consistent with applicable congestion management planning and, as described under Impact AQ-1, above, the greatest

254 BAAQMD *CEQA Air Quality Guidelines* (see footnote 205, p. 373); p. 6-1.

volume at any of the study intersections would be fewer than 6,500 vehicles per hour. Therefore, effects related to CO concentrations would be less than significant.

Mitigation: None required.

Impact AQ-10: Operation of the proposed Transit Tower would not expose sensitive receptors to substantial levels of toxic air contaminants. (Less than Significant)

As noted in the Setting, Article 38 of the *San Francisco Health Code* requires air quality modeling for new residential projects of 10 or more units located in proximity to high-traffic roadways. The proposed project would not include any such sensitive land uses, and because the proposed project would develop office and restaurant/retail uses, which are not considered sensitive receptors, the project would not be subject to Article 38, and the project would not result in adverse effects with regard to exposure of sensitive receptors to DPM or $PM_{2.5}$.

In terms of the effect of project traffic and stationary source (generator) emissions on existing sensitive receptors, as noted in the discussion of Sensitive Receptors, p. 375, the nearest residential building is the Millennium tower, located to the east across Fremont Street from the project site's planned Mission Square park, and the nearest licensed child care center is at 342 Howard Street.

The streets surrounding the Transit Tower site—First, Fremont, and Mission Streets—have all been identified by the San Francisco Department of Public Health as having traffic volumes that place them within "Potential Roadway Exposure Zones"; these zones are areas that, due to proximity to freeways and major roadways, may be subject to relatively high concentrations of $PM_{2.5}$ from local traffic.[255] (These are the locations at which new residential projects are subject to Article 38.) Based on the traffic analysis for the proposed project, project-generated traffic would add up to about 400 peak-hour vehicles on the streets closest to the Transit Tower site, such as First, Fremont, Mission, and Howard Streets. (There would be fewer project vehicles on streets farther away, as traffic is dispersed.) Based on project-generated traffic volumes from the transportation analysis, cancer risk and $PM_{2.5}$ concentrations were calculated for Transit Tower traffic at the Millennium residential tower, the closest sensitive receptor, using the BAAQMD roadway screening tables. The results are shown in **Table 36**.

As stated above, the proposed Transit Tower would include a diesel-powered standby generator to provide emergency electricity to the building in the event of a power outage. Consistent with BAAQMD permit requirements, the standby generator would be limited to 50 hours per year of operations for maintenance and reliability testing. BAAQMD would conduct a screening-level health risk assessment prior to granting a permit for the generator and would not issue the permit if the generator would result

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255 A map of "Potential Roadway Exposure Zones" is included in the recently published EIR for the *San Francisco General Plan* Housing Element, available as FigureV.H-1 in the DEIR Air Quality section, on the internet at: http://www.sf-planning.org/ftp/files/MEA/2007.1275E_SFHE_DEIR_SectionV.H.pdf, at p. V.H-45.

TABLE 36
HEALTH RISKS FROM TRANSIT TOWER OPERATIONAL EMISSIONS[1]

Project Traffic[2]						
Street	**Direction**	**Daily Volume**	**Distance**	**Cancer Risk[3]**	**$PM_{2.5}$ Conc.[4]**	**Exceeds Individual Threshold?**
First Street	North-South	2,555	365	0.11	0.004	No
Fremont Street	North-South	522	40	0.11	0.004	No
Beale Street	North-South	0	40	0.00	0.000	No
Main Street	North-South	0	350	0.00	0.000	No
Spear Street	North-South	0	700	0.00	0.000	No
Market Street	East-West	25	685	0.00	0.000	No
Mission Street	East-West	715	40	0.21	0.006	No
Howard Street	East-West	3,575	415	0.13	0.003	No
Folsom Street	East-West	700	1,000	0.02	0.001	No
Sum of Roadway Health Risks				**0.56**	**0.017**	

Project Stationary Source(s)[5]			Non-Cancer Risk		
Source	**Cancer Risk[3]**	**$PM_{2.5}$ Conc.[4]**	**Acute**	**Chronic**	**Exceeds Individual Threshold?**
Emergency Generator (diesel)	0.07	0.001	0.1	0.0003	No
Total of Project Risk	**0.63**	**0.018**	**0.1**	**0.0003**	
					Exceeds T'holds?
Thresholds	**10.0**	**0.3**	**1.0**	**1.0**	**No**

NOTES:
1 Risks calculated for residential (child) receptor at Millennium residential tower.
2 Roadway risk estimated using BAAQMD roadway screening tables.
3 Cancer risk in chances (cases) per one million
4 $PM_{2.5}$ concentration in micrograms per cubic meter
5 Generator risk modeled in AERMOD

SOURCE: Environmental Science Associates, Environ International

in a cancer risk greater than 10 chances in one million. As explained above, this is also the BAAQMD's project-specific significance threshold for toxic air contaminants. Because of this permit requirement, the standby generator would not result in adverse health effects. Nevertheless, a screening-level risk assessment was conducted for the proposed generator, and is included in Appendix D. The results, also provided in Table 36, indicated that the cancer risk due to the generator would be 0.07 in one million, or well below the threshold of 10 in one million. Non-cancer risk, as indicated by an Acute Hazard Index of 0.1 and a chronic Hazard Index of 0.0003, would also be well below the threshold of 1.0, and would be less than significant. The maximum concentration of $PM_{2.5}$, at 0.001 micrograms per cubic meter, would be below the threshold of 0.2 micrograms per cubic meter, and would be less than significant, as well. As shown in the table, total project risks to residential receptors at the Millennium residential tower would be: a lifetime cancer risk of 0.63 in one million; a 24-hour $PM_{2.5}$ concentration of 0.018 micrograms per cubic meter; and acute and chronic hazard indices of 0.1 and 0.0003, respectively. Based on these results, the project's contribution to any potential cumulative impact, on receptors that would also be affected by project generator emissions, would not be cumulatively considerable. Therefore, project effects related to new sources of toxic air contaminants would be less than significant, both individually and cumulatively.

Similar to the requirements of Article 38, the BAAQMD 2010 *CEQA Air Quality Guidelines* also recommend analysis of "local community risk and hazard impacts"; that is, assessment of effects related to toxic air contaminants (TACs) both from placement of a new sensitive receptor (for example, a residential project) proximate to source(s) of TACs, and from siting of a new source of TACs. As stated above, the proposed Transit Tower would not include any such sensitive land uses, and therefore would not expose new sensitive receptors to substantial concentrations of TACs, nor would the project generate sufficient traffic to newly expose existing sensitive receptors to substantial concentrations of TACs. Therefore, this impact would be less than significant

Mitigation: None required.

Cumulative Impacts

Impact C-AQ: The draft Plan and the proposed Transit Tower would contribute considerably to cumulative air quality impacts. (Significant and Unavoidable with Mitigation)

As stated on p. 386, the BAAQMD recommends evaluation of a plan, such as the draft Transit Center District Plan, with respect to whether the plan would be consistent with the regional air quality plan—as of this writing, the *2010 Bay Area Clean Air Plan*.

With regard to individual development projects, as stated on p. 387, the BAAQMD has established significance thresholds at the levels at which a project's individual emissions would result in a cumulatively considerable contribution to an existing air quality problem; therefore, if project impacts identified are significant, impacts would also be cumulatively considerable.[256] The proposed Transit Tower would result in significant, unavoidable impacts with respect to construction-generated emissions of toxic air contaminants, including diesel particulate matter, and of $PM_{2.5}$. As noted under Impact AQ-5, construction on multiple projects in the Plan area could result in emissions at sensitive receptors proximate to several future project sites that would exceed the BAAQMD's significance criteria for cumulative impacts, which are 100 in one million cancer risk, non-cancer hazard index of 10, and a $PM_{2.5}$ concentration of 0.8 micrograms per cubic meter.

Cumulative construction impacts would occur from other projects in the vicinity, most notably the new Transit Center itself, which is currently under construction immediately south of the Transit Tower site. There are several other projects for which the Planning Department has applications on file in proximity to the Transit Center and the proposed Transit Tower site, including a project approved in 2011 at 350 Mission Street, diagonally across the Fremont and Mission Streets intersection from the proposed

[256] BAAQMD *CEQA Air Quality Guidelines* (see footnote 205, p. 373); p. 2-1.

Mission Square park. Other development projects with applications on file include a high-rise project with three towers at the northwest corner of First and Mission Streets, a mixed-use tower at 181 Fremont Street, south of the new Transit Center, and a high-rise residential building at 41 Tehama Street, between First and Second Streets. Other potential projects identified on development sites assumed in the analysis of the draft Plan include towers on Mission Street between First and Second Street (Golden Gate University site) and on the north side of Howard Street between First and Second Streets. Each of these projects would result in emissions of diesel particulate matter and other TACs, as well as $PM_{2.5}$. Because concentrations of TACs and $PM_{2.5}$ tend to decrease rapidly with distance from the source, projects more than 100 meters (330 feet) from the sensitive receptors that would be affected by construction of the Transit Center and/or Transit Tower project would contribute substantially less to health risks at these receptors; likewise, the ongoing construction of the Transit Center and proposed construction of the Transit Tower project would make lesser contributions to health risks at receptors more than 330 feet distant. However, particularly given the adjacency of the new Transit Center, where construction will be ongoing until 2017, there is the potential that cumulative construction emissions at sensitive receptors proximate to several future project sites would exceed the BAAQMD's significance criteria for cumulative impacts, which are 100 in one million cancer risk, non-cancer hazard index of 10, and a $PM_{2.5}$ concentration of 0.8 micrograms per cubic meter. For example, the Millennium residential project at Fremont and Mission Street is within 330 feet of the Transit Center, the proposed Transit Tower, the approved building site at 350 Mission Street, and the proposed project at 181 Fremont Street. The Millennium is also within 500 feet of the proposed project at First and Mission Streets, and within 1,000 feet of the proposed project at 41 Tehama Street, an approved building at 535 Mission Street, and potential developments at the Golden Gate University site and on the north side of Howard Street between First and Second Streets. Implementation by the Transbay Joint Powers Authority or a subsequent developer of controls comparable to those identified in Mitigation Measure M-AQ-7 for the proposed Transit Tower project, and implementation of Mitigation Measures M-AQ-4a, M-AQ-4b, and M-AQ-5 for the Transit Center District Plan, would likewise result in the maximum feasible reduction of construction emissions and health risk for these other projects. However, as with the proposed project, because it cannot be stated with certainty that either cancer risk or $PM_{2.5}$ concentration would be reduced to below the BAAQMD-recommended significance thresholds, the cumulative impact is likewise conservatively judged to be **significant and unavoidable**.

Mitigation Measures

Implement Mitigation Measures M-AQ-2, M-AQ-3, M-AQ-4a, M-AQ-4b, M-AQ-5, and M-AQ-7.

Even with implementation of all identified mitigation measures, cumulative impacts with respect to both the draft Plan and the proposed Transit Tower would be **significant and unavoidable**.

H. Greenhouse Gas Emissions

Setting

Greenhouse Gases

Gases that trap heat in the atmosphere are referred to as greenhouse gases (GHGs) because they capture heat radiated from the sun as it is reflected back into the atmosphere, much like a greenhouse does. The accumulation of GHGs has been implicated as a driving force for global climate change. The primary GHGs are carbon dioxide, methane, nitrous oxide, ozone, and water vapor.

While the primary GHGs in the atmosphere are naturally occurring, carbon dioxide (CO_2), methane, and nitrous oxide are largely emitted from human activities, accelerating the rate at which these compounds occur within the earth's atmosphere. Emissions of carbon dioxide are largely by-products of fossil fuel combustion, whereas methane results from off-gassing associated with agricultural practices and landfills. Other GHGs include hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride, and are generated in certain industrial processes. Emissions of GHGs are typically reported in "carbon dioxide-equivalent" (CO_2E) measures.[257]

There is international scientific consensus that human-caused increases in GHGs have and will continue to contribute to global warming. Potential global warming impacts in California may include, but are not limited to, loss in snow pack, sea level rise, more extreme heat days per year, more high ozone days, more large forest fires, and more drought years.[258] Secondary effects are likely to include global rise in sea level, impacts to agriculture, changes in disease vectors, and changes in habitat and biodiversity.

The California Air Resources Board (ARB) estimated that in 2008 California produced about 478 million gross metric tons ($MMTCO_2E$; about 525 million U.S. tons) of CO_2E GHG emissions.[259] The ARB found that transportation is the source of 37 percent of the State's GHG emissions, followed by electricity generation (both in-state and out-of-state) at 24 percent and industrial sources at 19 percent. Commercial and residential fuel use (primarily for heating) accounted for 9 percent of GHG emissions.[260] In the Bay Area, fossil fuel consumption in the transportation sector (on-road motor vehicles, off-highway mobile sources, and aircraft) and the industrial/ commercial sector were the two largest sources of GHG emissions, each accounting for about 36 percent of the Bay Area's 95.8 $MMTCO_2E$ (105.4 million U.S. tons) of GHG emissions in 2007. Industrial and commercial sources (including office and retail uses) were

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257 Because of the differential heat absorption potential of various GHGs, GHG emissions are frequently measured in "carbon dioxide-equivalents," which present a weighted average based on each gas's heat absorption (or "global warming") potential.

258 California Climate Change Portal. Frequently Asked Questions About Global Climate Change. Available online at: http://www.climatechange.ca.gov/publications/faqs.html. Accessed January 1, 2011.

259 The abbreviation for "million metric tons" is MMT; thus, "million metric tons of CO_2 equivalents is written as $MMTCO_2E$.

260 California Air Resources Board, "California Greenhouse Gas Inventory for 2000-2008—by Category as Defined in the Scoping Plan." http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_00-08_2010-05-12.pdf. January 1, 2011.

the second largest contributors of GHG emissions with about 34 percent of total emissions. Electricity production accounts approximately 16 percent of the Bay Area's GHG emissions, followed by residential fuel usage (e.g., home water heaters, furnaces, etc.) at 7 percent, off-road equipment at 3 percent, and agriculture at 12 percent. Among industrial sources, oil refining currently accounts for more than 40 percent of GHG emissions, or approximately 15 percent of the total Bay Area GHG emissions.[261]

California has taken a leadership role in addressing the trend of increasing GHG emissions, with the passage in 2006 of California Assembly Bill 32 (AB 32), the Global Warming Solutions Act. This legislation is discussed below, under Regulatory Setting.

Regulatory Setting

Federal Actions

Currently, there is no federal legislation requiring reductions in GHG emissions. Rather, the United States Environmental Protection Agency (EPA) administers a variety of voluntary programs and partnerships with GHG emitters in which the EPA partners with industries producing and utilizing synthetic GHGs to reduce emissions of particularly potent GHGs. There are federal actions requiring increasing automobile efficiency, an endangerment finding for CO_2, and a recently finalized regulation requiring large sources of GHG emissions to report their emissions to the EPA. In addition, there are several bills pending in Congress that are attempting to regulate GHG emissions in the United States; most of these bills require a cap and trade program in which GHG emissions would be reduced overall through a market-driven approach.

In December 2009, in response to a U.S. Supreme Court ruling, the EPA made a finding under the Clean Air Act that current and projected atmospheric concentrations of the six generally recognized GHGs—CO_2, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride—"threaten the public health and welfare of current and future generations," and that emissions of these gases from new cars and trucks "contribute to the greenhouse gas pollution which threatens public health and welfare."[262] While not in itself imposing any regulatory requirements, this "endangerment finding" under the Clean Air Act was required before EPA could issue regulations, and allowed the agency to adopt GHG emissions standards that it proposed in September 2009, in conjunction with new fuel economy standards simultaneously proposed by the National Highway Traffic Safety Administration (NHTSA) of U.S. Department of Transportation. The standards, published in the Federal Register in May 2010, and effective in July 2010, apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016, and require automakers to improve fleet-wide fuel economy and reduce fleet-wide greenhouse gas emissions by approximately five percent each year. They require these vehicles to meet an estimated combined average emissions level of 250 grams of

261 BAAQMD, *Source Inventory of Bay Area Greenhouse Gas Emissions: Base Year 2007*, December 2008. Available on the internet at: http://www.baaqmd.gov/~/media/Files/Planning%20and%20Research/Emission%20Inventory/regionalinventory2007_003_000_000_000.ashx.

262 EPA website: http://www.epa.gov/climatechange/endangerment.html. Reviewed January 2, 2011.

carbon dioxide (CO_2) per mile in model year 2016, equivalent to 35.5 miles per gallon (mpg) if the automotive industry were to meet this CO_2 level entirely through fuel economy improvements.[263]

In May 2010, EPA issued a final rule that establishes thresholds for GHG emissions that define when permits are required for new and existing industrial facilities. Facilities responsible for nearly 70 percent of the national GHG emissions from stationary sources will be subject to permitting requirements under this rule. This includes the nation's largest GHG emitters—power plants, refineries, and cement production facilities. The rule took effect in 2011.

In September 2010, EPH and NHTSA published a Notice of Intent for the development of new GHG and fuel economy standards for model year 2017-2025 vehicles. The agencies published a Supplemental Notice of Intent in December 2010. Draft regulations are anticipated in 2011, with a final rule due to be adopted in 2012.[264]

In a related action, in June 2009, EPA granted California a waiver under the federal Clean Air Act, allowing the state to impose its own, stricter GHG regulations for vehicles beginning in 2009 (see below).

Statewide Actions

As early as 2002, with the passage of Assembly Bill 1493, the California legislature directed ARB to adopt regulations to reduce greenhouse gas (GHG) emissions from cars and light trucks beginning in 2009. Because the so-called Pavley standards (named for the bill's author, current state Senator Fran Pavley) would impose stricter standards than those under the federal Clean Air Act, California applied to the EPA for a waiver under the Clean Air Act; this waiver was denied by the Bush Administration in 2008. As noted above, in 2009, EPA granted the waiver. California has now agreed to cooperate with the federal GHG and Corporate Average Fuel Economy standards under development so that there will be a single national standard.

In 2005, in recognition of California's vulnerability to the effects of climate change, Governor Schwarzenegger established Executive Order S-3-05, which sets forth a series of target dates by which statewide emissions of GHGs would be progressively reduced, as follows: by 2010, reduce GHG emissions to 2000 levels (approximately 458 $MMTCO_2E$); by 2020, reduce GHG emissions to 1990 levels

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263 National Highway Traffic Safety Administration, "NHTSA and EPA Establish New National Program to Improve Fuel Economy and Reduce Greenhouse Gas Emissions and for Passenger Cars and Light Trucks," fact sheet, May 2010. Available on the internet at:http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/CAFE-GHG_Fact_Sheet.pdf. Reviewed June 12, 2010.

264 75 Federal Register 76337, December 8, 2010. Available on the internet at: http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/Supplemental_Notice_FR_12082010.pdf; Fact Sheet, "NHTSA and EPA Issue a Supplemental Notice in the Process for Setting Future Greenhouse Gas and Fuel Economy Standards for Passenger Cars and Light Trucks, November 2010. Available on the internet at: http://www.nhtsa.gov/staticfiles/rulemaking/pdf/cafe/Supplemental_NOI_CAFE_2017_Fact_Sheet.pdf. Reviewed January 2, 2011.

(an estimated 427 $MMTCO_2E$); and by 2050, reduce GHG emissions to 80 percent below 1990 levels (approximately 85 $MMTCO_2E$).[265]

In 2006, California passed the California Global Warming Solutions Act of 2006 (Assembly Bill No. 32; California Health and Safety Code Division 25.5, Sections 38500, et seq., or AB 32), which requires the California Air Resources Board (ARB) to design and implement emission limits, regulations, and other measures, such that feasible and cost-effective statewide GHG emissions are reduced to 1990 levels by 2020 (representing a 25 percent reduction in emissions).

Pursuant to AB 32, ARB adopted a Scoping Plan in December 2008, outlining measures to meet the 2020 GHG reduction limits. In order to meet these goals, California must reduce its GHG emissions by almost 30 percent below projected 2020 business as usual emissions levels, or about 11 percent from today's levels. The Scoping Plan estimates a reduction of 174 MMT (about 191 million U.S. tons) of CO_2E. Approximately one-third of the emissions reductions strategies fall within the transportation sector and include the following: California Light-Duty Vehicle GHG standards, the Low Carbon Fuel Standard, Heavy-Duty Vehicle GHG emission reductions and energy efficiency, and medium and heavy-duty vehicle hybridization, high speed rail, and efficiency improvements in goods movement. These measures are expected to reduce GHG emissions by 57.3 MMT (63 million U.S. tons) of CO_2E. Emissions from the electricity sector are expected to reduce another 49.7 MMT (55 million U.S. tons) of CO_2E. Reductions from the electricity sector include building and appliance energy efficiency and conservation, increased combined heat and power, solar water heating (AB 1470), the renewable energy portfolio standard (33 percent renewable energy by 2020), and the existing million solar roofs program. Other reductions are expected from industrial sources, agriculture, forestry, recycling and waste, water, and emissions reductions from cap-and-trade programs. Regional GHG targets are also expected to yield a reduction of 5 MMT (5.5 million U.S. tons) of CO_2E.[266] Measures that could become effective during implementation of projects in the Transit Center District Plan area, including the proposed Transit Tower, pertain to construction-related equipment and building and appliance energy efficiency. Some proposed measures will require new legislation to implement, some will require subsidies, some have already been developed, and some will require additional effort to evaluate and quantify. Additionally, some emissions reductions strategies may require their own environmental review under CEQA or the National Environmental Policy Act (NEPA). Some applicable measures that are ultimately adopted will become effective during construction and operation of the proposed project and the proposed project would be subject to these requirements.

Most of the Scoping Plan's GHG reduction measures (excepting those for Agriculture, Forestry, and Industry, which would not be applicable to the proposed project) are set forth in **Table 37**. While ARB has identified a GHG reduction target of 15 percent from current levels for actions by local governments

[265] California Air Resources Board, Climate Change Scoping Plan: A Framework for Change, December 2008. Available on the internet at: http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm. Accessed January 2, 2011.

[266] Ibid.

TABLE 37
GHG REDUCTION MEASURES IN ARB SCOPING PLAN[1]

Measure No.	Measure Description	GHG Reductions (Annual MMT CO_2e)
Transportation		
T-1	Pavley I and II – Light Duty Vehicle Greenhouse Gas Standards	31.7
T-2	Low Carbon Fuel Standard (Discrete Early Action)	15.0
T-3[2]	Regional Transportation-Related Greenhouse Gas Targets	5.0
T-4	Vehicle Efficiency Measures	4.5
T-5	Ship Electrification at Ports (Discrete Early Action)	0.2
T-6	Goods Movement Efficiency Measures. • Ship Electrification at Ports • System-Wide Efficiency Improvements	3.5
T-7, 8	Medium- and Heavy-Duty Vehicle Measures • Aerodynamic Efficiency (Discrete Early Action) • Hybridization	1.4
T-9	High Speed Rail	1.0
		62.3
Electricity and Natural Gas		
E-1	Energy Efficiency (32,000 GWh of Reduced Demand) • Increased Utility Energy Efficiency Programs • More Stringent Building & Appliance Standards Additional Efficiency and Conservation Programs	15.2
E-2	Increase Combined Heat and Power Use by 30,000 GWh (Net reductions include avoided transmission line loss)	6.7
E-3	Renewables Portfolio Standard (33% by 2020)	21.3
E-4	Million Solar Roofs (including California Solar Initiative, New Solar Homes Partnership and solar programs of publicly owned utilities) • Target of 3000 MW Total Installation by 2020	2.1
CR-1	Energy Efficiency (800 Million Therms Reduced Consumptions) • Utility Energy Efficiency Programs • Building and Appliance Standards • Additional Efficiency and Conservation Programs	4.3
CR-2	Solar Water Heating (AB 1470 goal)	0.1
		49.7
Green Buildings		
GB-1	Green Buildings	26
Recycling and Waste		
RW-1	Landfill Methane Control (Discrete Early Action)	1
RW-2	Additional Reductions in Landfill Methane	TBD†
RW-3	High Recycling/Zero Waste	9†
Water		
W-1	Water Use Efficiency	1.4†
W-2	Water Recycling	0.3†
W-3	Water System Energy Efficiency	2.0†
W-4	Reuse Urban Runoff	0.2†
W-5	Increase Renewable Energy Production	0.9†
W-6	Public Goods Charge (Water)	TBD†

1 Table excludes GHG reduction measures for Agriculture, Forestry, and Industry (including high-global warming potential gases).
2 This is not the SB 375 regional target. ARB will establish regional targets for each Metropolitan Planning Organization (MPO) region following the input of the regional targets advisory committee and a consultation process with MPOs and other stakeholders per SB 375.
† GHG emission reduction estimates are not included in calculating the total reductions needed to meet the 2020 target.

SOURCE: ARB, 2008

themselves, it has not yet determined what amount of GHG emissions reductions it recommends from local government land use decisions. However, the Scoping Plan does state that successful implementation of the plan relies on local governments' land use planning and urban growth decisions because local governments have primary authority to plan, zone, approve, and permit land development to accommodate population growth and the changing needs of their jurisdictions. ARB further acknowledges that decisions on how land is used will have large effects on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. As can be seen in Table 37, many of the measures in the Scoping Plan—such as implementation of increased fuel efficiency for vehicles (the "Pavley" standards), increased efficiency in utility operations, and development of more renewable energy sources—require statewide action by government, industry, or both. Some of the measures are at least partially applicable to development projects, such as increasing energy efficiency in new construction, installation of solar panels on individual building roofs, and a "green building" strategy. The City has already implemented several of these measures that require local government action, such as implementing a Green Building Ordinance, a Zero Waste strategy, a Construction and Demolition Debris Recovery Ordinance, and a solar energy generation subsidy program, to realize meaningful reductions in GHG emissions. (See discussion under Local Actions, below.)

In addition to policy directly guided by AB 32, the legislature in 2008 passed Senate Bill (SB) 375, which provides for regional coordination in land use and transportation planning and funding to help meet the AB 32 GHG reduction goals. SB 375 requires regional transportation plans developed by the state's 18 Metropolitan Planning Organizations (in the Bay Area, the Metropolitan Transportation Commission (MTC)), to incorporate a "sustainable communities strategy" in their regional transportation plans that will achieve GHG emission reduction targets set by ARB. SB 375 also includes provisions for streamlined CEQA review for some infill projects such as transit-oriented development. MTC's 2013 RTP will be its first plan subject to SB 375.

SB 375 requires ARB to establish regional GHG reduction targets. ARB appointed a 21-member Regional Targets Advisory Committee to recommend factors to be considered and methodologies used in setting the regional goals; this committee provided its recommendations to ARB in September 2009.

In addition, the state establishes energy standards for new construction. First adopted in June and most recently revised in 2008, these standards are part of the California Building Standards Code (Title 24 of the California Code of Regulations). In general, Title 24 standards require the design of building shells and building components to conserve energy. The standards are updated periodically to allow for consideration and possible incorporation of new energy efficiency technologies and methods. The state Building Code and other standards for appliances and other consumer products apply throughout California, and they limit GHG emissions in California by reducing energy demand.

CEQA Guidelines

Senate Bill 97 (SB 97) required the Office of Planning and Research (OPR) to amend the state CEQA Guidelines to address the feasible mitigation of GHG emissions or the effects of GHGs. In response, OPR amended the CEQA Guidelines to provide guidance for analyzing GHG emissions. Among other changes to the CEQA Guidelines, the amendments add a new section to the CEQA Checklist (CEQA Guidelines Appendix G) to address questions regarding the project's potential to emit GHGs.

These revisions include a new section (Sec. 15064.4) specifically addressing the significance of GHG emissions. Section 15064.4 calls for a "good-faith effort" to "describe, calculate or estimate" GHG emissions; Section 15064.4 further states that the significance of GHG impacts should include consideration of the extent to which the project would increase or reduce greenhouse gas emissions; exceed a locally applicable threshold of significance; and comply with "regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions." The revisions also state that a project may be found to have a less-than-significant impact if it complies with an adopted plan that includes specific measures to sufficiently reduce GHG emissions (Sec. 15064(h)(3)).

Regional Actions

The Bay Area Air Quality Management District (BAAQMD) is the regional air district with jurisdiction over the nine-county region located in the Bay Area Air Basin. BAAQMD is responsible for attaining and/or maintaining air quality in the Air Basin within federal and State air quality standards. BAAQMD has established a Climate Protection Program with the goal of integrating climate protection activities into the district's existing programs. The BAAQMD provides recommendations for lead agencies to follow in protecting air quality, including reducing GHG emissions, through implementation of CEQA review. Notably, in June 2010, the District adopted revised *CEQA Air Quality Guidelines* that include quantitative thresholds for determining significance of GHG emissions and provides an extensive list of mitigation measures that can be applied to reduce operational emissions, including of GHGs. The District recommends that local agencies adopt a Greenhouse Reduction Strategy consistent with AB32 goals.

Specifically, the BAAQMD 2010 *CEQA Air Quality Guidelines* set forth the requirements for a GHG Reduction Strategy to be considered consistent with the State's GHG reduction goals as codified through AB 32. Projects that are consistent with such qualified GHG Reduction Strategies can be found to have a less-than-significant impact in terms of GHG emissions and climate change. BAAQMD standards for a qualified GHG Reduction Strategy include:

a) Quantification of GHGs for existing (baseline) and future years (2020 or other forecast year) that includes future emissions under a "business-as-usual" scenario;

b) An adopted GHG reduction goal of (i) 1990 GHG emission levels, (ii) 15 percent below baseline (2008 or earlier) emission levels, or (iii) a per-service-population emissions rate of 6.6 $MMTCO_2E$, the specified general plan significance criterion in the BAAQMD *CEQA Air Quality Guidelines*;

c) Analysis of anticipated GHG emissions resulting from local and state policies and regulations that may be planned or adopted but not implemented;

d) Identification of specific feasible reduction measures to meet the identified target on a project-by-project basis, including quantification of each measure's effectiveness in GHG reduction;

e) Establishment of a monitoring program, including identification of which measures apply to different types of new development projects, a mechanism for reviewing and determining if all applicable mandatory measures are being applied, implementation steps and parties responsible for ensuring implementation of each action and a schedule for implementation, procedures for monitoring and updating the GHG inventory and reduction measures at three- to five-year intervals, and annual review and reporting on the progress of implementation; and

f) Adoption through a public process following environmental review.

Because few local agencies have completed all of these steps, BAAQMD recognizes that a local agency can demonstrate equivalency with a qualified GHG Reduction Strategy if its climate change ordinances, policies, and programs are consistent with AB 32 and include requirements or feasible measures to reduce GHG emissions to 1990 levels, 15 percent below 2008 levels, or 6.6 $MMTCO_2E$.

Local Actions

In August 2010, the San Francisco Planning Department submitted to the BAAQMD a draft of the City and County of San Francisco's *Strategies to Address Greenhouse Gas Emissions*. This document presents a comprehensive assessment of policies, programs and ordinances that collectively represent San Francisco's Qualified Greenhouse Gas Reduction Strategy. The BAAQMD reviewed San Francisco's GHG reduction strategy and concluded that the strategy meets the criteria for a Qualified GHG Reduction Strategy as outlined in BAAQMD's CEQA Guidelines (2010).[267] Therefore, projects that are consistent with San Francisco's GHG reduction strategy would result in less than significant GHG emissions.

The City's *Strategies to Address Greenhouse Gas Emissions* ("GHG Reduction Strategy") includes, following an introduction, chapters that address each of the requirements, a through f, noted above. Chapter II of the GHG Reduction Strategy sets forth the City's GHG inventory as contained in the City's *Climate Action Plan: Local Strategies to Reduce Greenhouse Gas Emissions* (*Climate Action Plan*), published in 2004 by the City's Department of the Environment and Public Utilities Commission.[268] The *Climate Action Plan* was called for in the City's 2002 Greenhouse Gas Emissions Reduction Resolution. The Plan provides the context of climate change in San Francisco and examines strategies to meet the 20 percent GHG reduction target.

The *Climate Action Plan* estimated that in 1990 San Francisco's GHG emissions were approximately 8.26 MMT of CO_2 equivalent (about 9.1 million U.S. tons). Just over half of these emissions in 1990 were from motor vehicles, with the remainder generated by building energy use. The Plan estimated year 2000 GHG emissions at 8.8 MMT of CO_2E (about 9.7 million U.S. tons) and projected 2012 GHG emissions at 9.8 MMT of CO_2E (about 10.8 million U.S. tons) based on a business-as-usual scenario (without citywide actions to reduce GHG emissions). The *Climate Action Plan* estimated that GHG emissions are projected to rise approximately 9 percent from 2000 levels in the transportation sector, and 14 percent from 2000 levels

[267] San Francisco's *Strategies to Address Greenhouse Gas Emissions* and BAAQMD's letter are available online at: http://www.sfplanning.org/index.aspx?page=1570.

[268] San Francisco Department of the Environment and San Francisco Public Utilities Commission, Climate Action Plan for San Francisco, Local Actions to Reduce Greenhouse Emissions, September 2004.

in the building energy sector. In 2008, San Francisco commissioned an independent third party to conduct a review the City's baseline community-wide GHG emissions for years 1990, 2000 and 2005. The independent report generally confirmed the Plan's 1990 and 2000 emissions estimates and found that 2005 GHG emissions were approximately 7.8 MMT of CO_2e (about 8.6 million U.S. tons), a decrease of about 5 percent from 1990.[269]

Chapter II of the GHG Reduction Strategy also sets forth the City's GHG reduction targets, established by the 2008 Greenhouse Gas Reduction Ordinance:

- Reduce greenhouse gas emissions by 25 percent below 1990 levels by 2017;
- Reduce greenhouse gas emissions by 40 percent below 1990 levels by 2025; and
- Reduce greenhouse gas emissions by 80 percent below 1990 levels by 2050.

Chapter III of the GHG Reduction Strategy lists objectives and policies within the *San Francisco General Plan* that address climate change, categorizing the policy language into one or more of five GHG emission sectors: Transportation, Energy Efficiency, Renewable Energy, Waste, and Environment/Conservation. Policies from both plan elements and area plans are included.

Chapter IV of the Strategy describes "actions or categories of actions that, when implemented, will achieve a specified GHG emissions level." This includes the four categories of actions set forth in the *Climate Action Plan*, which are the same as the first four sectors identified in the preceding paragraph, and the added category of Environment/Conservation, which includes "other climate change-related policies, such as street planting and landscaping, policies that increase carbon sequestration, and those that encourage conservation of the natural environment."

Chapter IV identifies six main Transportation-related actions to reduce GHG emissions by more than 874,000 metric tons of CO_2e (963,000 U.S. tons) per year, including increasing the use of public transit; increasing ridesharing; increasing bicycling and walking; support of employer-based trip-reductions programs; "discourage driving"; and increasing the use of clean air vehicles and improving fleet efficiency. In Chapter VI, Progress Towards Emissions Reductions, the Strategy recognizes declines in per-capita vehicle ownership and vehicles per household, as well as decreases in driving and small increases in transit use and bicycling and a greater increase in persons working at home.

Energy Efficiency Actions include increasing incentives, direct installation, and technical assistance for improvements to residential, commercial, and municipal buildings; expanding education and outreach; and strengthening legislation, codes, and standards (estimated reduction of 727,000 metric tons (800,000 U.S. tons) CO_2e per year). The Strategy notes that the Department of the Environment's Energy Watch Program, in 2009, saved 27,000,000 gross kWh and 53,000 therms of gas.

Renewable Energy Actions include development of renewable solar, wind, and biomass projects; conducting pilot projects for emerging technologies; and supporting and developing green power

[269] Contained in Appendix C to the GHG Reduction Strategy; http://www.sfplanning.org/index.aspx?page=1570.

projects (estimated reduction of 500,000 metric tons (550,000 U.S. tons) of CO_2e per year). Accomplishments noted in Chapter VI include progress in the development of solar power and biodiesel; closure of the Hunters Point Power Plant in 2006 (the Potrero Power Plan closed in 2011); installation of more than 1,600 photovoltaic systems (capacity of 8.5 megawatts); installation of solar panels at the Sunset Reservoir to generate 5 megawatts of electricity; the use and development of biofuels, including the SFGreasecycle program in which the City picks up used cooking oil and grease from local establishments and converts the oil into biodiesel; and biodiesel use by City fleets.

Solid Waste Actions include increasing residential recycling and composting; increasing commercial recycling and composting; and expansion of construction and demolition debris recycling (estimated reduction of 270,000 metric tons (300,000 U.S. tons) of CO_2e per year). Chapter VI notes that the City has recently mandated recycling and composting program for all residents and businesses.

In the area of Environment/Conservation, Chapter VI states, "The City's efforts to design a more sustainable streetscape have culminated in the Better Streets Plan [that] provides design guidelines for streetscape improvement projects, including guidelines for the number and placement of street trees and guidelines for increasing the City's permeable surfaces."

Additional GHG reduction strategies are set forth in Chapter V. These include the 2008 GHG ordinance noted above, which calls upon the San Francisco Department of the Environment to coordinate GHG reduction efforts; implementation of various City departments' climate action plans; specific actions by the Planning Department, Department of Building Inspection, and Department of Public Works with respect to project review; City Administrator and San Francisco Public Utilities Commission efforts to reduce municipal GHG emissions; and consideration of future legislation to develop or utilize available market-based compliance mechanism. In 2008, the Department of the Environment released *SForward*, an environmental plan for the City that identifies eight policy areas to be developed: climate action, renewable and efficient energy, clean transportation, green buildings, urban forest, zero waste, environmental justice, and toxics reduction. The San Francisco Carbon Fund, created in response to Executive Directive 07-13 and codified in Chapter 52 of the City *Administrative Code*, will fund carbon-offset activities exclusively within San Francisco. Programs funded have included a waste grease biodiesel facility in the Dogpatch neighborhood, the planting of fruit trees in, among other places, one of San Francisco's larger public housing developments, and kiosks at San Francisco International Airport that the calculation of a flight's carbon footprint and the purchase carbon offsets to support local projects.

Other key GHG reduction strategies described in Chapter V include San Francisco's Transit First Policy (Section 16.102 of the City Charter), instituted in 1973 with the goal of reducing the City's reliance on freeways and meeting transportation needs by emphasizing mass transportation (the Transit First Policy gives priority to public transit investments; adopts street capacity and parking policies to discourage increased automobile traffic; and encourages the use of transit, bicycling and walking rather than use of single-occupant vehicles); the Green Taxi Fleet (the Taxi Commission passed a resolution in 2007 calling for the San Francisco taxi industry to reduce GHG emissions by 20 percent from 1990 levels and 50 percent from current levels by 2012, as well as to work to offset remaining emissions with investments in renewable energy or energy efficiency by 2015, and to move to a Zero Emissions taxi fleet by 2020); the Municipal Transportation Agency (MTA) Zero Emissions 2020 (hybrid diesel-electric buses have replaced older diesel buses, newer diesel vehicles have been retrofitted, and certain vehicles are using a blend of 20 percent biodiesel with regular diesel) and draft MTA Climate Action Plan.

Chapter V of the GHG Reduction Strategy also discusses the contribution of the City's denser-than-typical land use pattern to reducing vehicle travel and vehicular GHG emissions; other environmental policies and programs such as tree planting and protection, and business programs such as the City's Green Business Program that helps San Francisco businesses adopt environmental practices that are sustainable and profitable.

Chapter VI of the GHG Reduction Strategy discusses progress made to date, including the 5 percent reduction in community-wide GHG emissions from 1990 to 2005 discussed above. Also discussed are increases in bicycling, walking, and transit ridership, energy savings, and reductions in waste disposed of at landfills.

Chapter VII sets forth a future GHG emissions monitoring strategy.

Chapter VIII of the Strategy identifies other ongoing GHG reduction efforts, including the Department of the Environment 2010-2012 Strategic Plan and the Climate Action Plans of San Francisco International Airport and the Public Utilities Commission, while Chapter IX describes a large number of regulations that are applicable to new development and renovations that are expected to yield greenhouse gas (GHG) reductions. These include, among others, the Transit Impact Development Fee, Commuter Benefits Ordinance, Transportation Management Program requirement for larger projects, bicycle parking and car-sharing requirements, limitations on vehicle parking, the City's Green Building Ordinance, newly enacted stormwater controls, and mandatory recycling and composting.

As stated previously, the BAAQMD has determined that the GHG Reduction Strategy is a Qualified GHG Reduction Strategy as set forth in the BAAQMD 2010 *CEQA Air Quality Guidelines*. The District found that, in some areas, "the City has surpassed the minimum standard elements of a Qualified GHG Reduction Strategy," and concluded that "Aggressive GHG reduction targets and comprehensive strategies like San Francisco's help the Bay Area move toward reaching the State's AB 32 goals, and also serve as a model from which other communities can learn."[270]

To evaluate whether a project is consistent with the City's GHG Reduction Strategy, the Planning Department has prepared a Greenhouse Gas Analysis Compliance Checklist that is used to compare a project's attributes with various components of the Strategy. This compliance checklist is discussed further in the Impacts Analysis, below.

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270 BAAQMD letter contained in Appendix A of the GHG Reduction Strategy. Available on the internet at: http://www.sf-planning.org/index.aspx?page=1570.

Impacts

Significance Criteria

The proposed project would have a significant air quality impact if it were to:

- Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment; or
- Conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

Methodology

Quantification of greenhouse gas (GHG) emissions was conducted using a combination of the URBEMIS 2007 model (version 9.2.4), the BAAQMD Greenhouse Gas Model, and other emissions factors.

Impact Analysis

Transit Center District Plan

Impact GG-1: Implementation of the proposed Plan would not generate greenhouse gas emissions, either directly or indirectly, that would have a significant impact on the environment, nor would the project conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases. (Less than Significant)

Adoption and implementation of the draft Plan would not directly result in GHG emissions; however, implementation of development projects in the Plan area, including the proposed Transit Tower, would result in GHG emissions (see separate analysis of Transit Tower under Impact GG-2, below). The draft Plan includes goals and policies that would apply to development within the Plan area, including any potential future combined heat and power facility (although no such facility is currently proposed). These policies are generally consistent with the City's *Strategies to Address Greenhouse Gas Emissions*. The draft Plan would support reductions in GHG emissions by providing for additional high-density mixed-use development in an area with the most extensive array of transit service in the Bay Area, and by improving pedestrian and bicycle access within and to and from the Plan area. Of the GHG reduction sectors listed in the City's *Strategies to Address Greenhouse Gas Emissions* (i.e., Transportation, Energy Efficiency, Renewable Energy, Waste, and Environment/Conservation), many of the draft Plan policies relate to improving transportation through improved transit, pedestrian, and bicycle accessibility and connections. In particular, the following objectives and policies from the draft Plan would serve to reduce potential GHG emissions by concentrating growth near transit, discouraging use of single-occupancy vehicles for commuter travel and encouraging alternative forms of travel.

> **Objective 1.1:** Maintain downtown San Francisco as the region's premier location for transit-oriented job growth within the Bay Area.
>
> **Objective 1.2:** Reinforce the role of downtown within the city as its major job center by protecting and enhancing the central district's remaining capacity, principally for employment growth.

Policy 1.4: Prevent long-term under-building in the area by requiring minimum building intensities for new development on major sites.

Policy 2.6: Establish a minimum height requirement for the Transit Tower site, as well as other adjacent sites zoned for a height limit of 750 feet or greater.

Policy 2.7: Do not limit the floor plate or dimensions of the lower tower for buildings taller than 550 feet.

Policy 2.23: Eliminate the Floor Area Ratio penalty for tall floors. Section 102.11 of the *Planning Code* currently requires creating and counting "phantom floors" in square footage calculations when average floor-to-floor height exceeds 15 feet. This discourages tall ground floor spaces that add variety and grandeur to a streetscape.

Policy 2.26: Maximize daylight on streets and open spaces and reduce heat-island effect, by using materials with high light reflectance, without producing glare.

Policy 2.27: Encourage the use of green, or "living," walls as part of a building design in order to reduce solar heat gain as well as to add interest and lushness to the pedestrian realm.

Objective 3.1: Make walking a safe, pleasant, and convenient means of moving about throughout the district.

Objective 3.2: Create a high-quality pedestrian environment in the district consistent with the vision for the central district of a world-class city.

Objective 3.4: Emphasize the importance of streets and sidewalks as the largest component of public open space in the Transit Center District.

Policy 3.1: Create and implement a district streetscape plan to ensure consistent corridor-length streetscape treatments.

Policy 3.2: Widen sidewalks to improve the pedestrian environment by providing space for necessary infrastructure, amenities and streetscape improvements.

Policy 3.3: Facilitate pedestrian circulation by providing sidewalk widths that meet the needs of projected pedestrian volumes and provide a comfortable and safe walking environment.

Policy 3.5: Create additional pedestrian capacity and shorten pedestrian crossing distances by narrowing roadways and creating corner curb bulb-outs.

Policy 3.6: Enhance pedestrian crossings with special treatments (e.g. paving, lighting, raised crossings) to enhance pedestrian safety and comfort, especially where bulb-outs cannot be installed.

Objective 3.6: Enhance the pedestrian network with new linkages to provide direct and varied pathways, to shorten walking distances, and to relieve congestion at major street corners,

Objective 3.8: Ensure that new development enhances the pedestrian network and reduces the scale of long blocks by maintaining and improving public access along existing alleys and creating new through block pedestrian connections where non e exist.

Objective 3.9: Ensure that mid-block crosswalks and through-block passageways are convenient, safe, and inviting.

Policy 3.9: Create convenient pedestrian access by providing signalized mid-block crosswalks, especially on blocks longer than 300 feet.

Policy 3.10: Prohibit the elimination of existing alleys within the District. Consider the benefits of shifting or re-configuring alley alignments if the proposal provides an equivalent or greater degree of public circulation.

Policy 3.11: Design new and improved through-block pedestrian passages to make them attractive and functional parts of the public pedestrian network.

Objective 4.1: The district's transportation system will prioritize and incentivize the use of transit. public transportation will be the main, non-pedestrian mode for moving into and between destinations in the Transit Center District.

Objective 4.2: The district's transportation system will implement and require transportation demand management strategies to minimize growth in auto trips and reduce volumes as necessary. actively manage the transportation system to optimize person-carrying capacity.

Objective 4.3: The district's transportation system will meet changing transit needs, particularly to support the new Transbay Transit Center and accommodate increased densities. make changes in the circulation network that ensure delivery of reliable and convenient transit service to the Transbay Transit Center and for district residents, employees, and visitors.

Objective 4.4: The district's transportation system will prioritize pedestrian amenity and safety. Invest in circulation modifications and urban design measures that support the creation of an attractive and memorable public realm.

Objective 4.7: The district's transportation system will further sustainability goals. Advance the goals of the city's climate action plan, by reducing greenhouse gas emissions generated by vehicular transportation.

Objective 4.9: Prioritize transit movements through and within the district over all other transportation modes.

Objective 4.10: Design transit facilities to improve the reliability and function of transit movements and to enhance the rider experience.

Objective 4.11: Ensure that changes to the circulation network, including pedestrian and streetscape improvements, are designed to support and enhance the operation of transit.

Objective 4.13: Support enhanced funding and capacity for regional transit service to support increases in population and employment growth as well as shifts from auto to public transit travel.

Policy 4.5: Support funding and construction of the Transbay Transit Center project to further goals of the District Plan, including completion of the Downtown Extension for Caltrain and High Speed Rail.

Policy 4.6: Ensure that regional transit carriers operating on city streets are prioritized along with local transit by implementing the surface transit priority improvements proposed in this plan.

Policy 4.7: Work with BART to identify and fund measures to increase capacity as necessary to serve the District, particularly at the Montgomery and Embarcadero stations.

Objective 4.14: Support enhanced funding and capacity for local transit service to support increases in population and employment growth as well as shifts from auto to public transit travel.

Policy 4.8: Support revenue measures and investments essential to enhancing Muni's capacity, reliability and operational efficiency in providing service to and within the District.

Objective 4.15: Use demand management strategies to reduce overall levels of auto traffic in the plan area and downtown, particularly in the peak hours, in order to reduce auto impacts on other transportation modes and enable the creation of a high quality public realm.

Objective 4.17: Create and ensure compliance with mechanisms that provide workers and residents with incentives to take transit and use modes of transportation other than single-occupant autos.

Objective 4.18: Encourage the use of non-auto modes of transportation by requiring participation in a transportation demand management program in new buildings throughout the district.

Policy 4.15: Expand the TMA [Transportation Management Association] requirement to include non-office uses, including hotels, large retail, cultural, and institutional uses.

Policy 4.18: Expand the purview and funding of the existing downtown Transportation Management Association (TMA) or create a district-specific TMA.

Objective 4.29: Make cycling a safe, pleasant, and convenient means of transportation throughout the district.

Objective 4.30: Ensure high-quality on-street bicycle connections to the Transbay Transit Center.

Objective 4.31: Enhance facilities for intra-district bicycle travel.

Objective 4.32: Ensure local connections to regional bicycle facilities.

Objective 4.33: Ensure the provision of adequate secure, on- and off-street bicycle parking facilities to accommodate and encourage employees to cycle for commuting and daily needs.

Policy 4.44: Do not compromise pedestrian, bicycle, or transit amenity or service within the District to accommodate or maintain levels of service for regional auto trips.

Policy 4.50: Establish an absolute maximum cap on number of parking spaces in the district and adjacent areas based on the established targets for traffic reduction and goals for transit usage.[271]

Policy 4.51: Scrutinize and restrict new accessory and non-accessory parking in the Plan area until a comprehensive cap on new parking is adopted.

Policy 4.58: Make all non-residential parking, including accessory parking, subject to the City's Parking Tax, regardless of whether such parking is made available to the public for a fee.

Policy 4.60: Develop a local parking cash-out ordinance to apply to all parking accessory to commercial development.

Objective 4.47: Ensure that adequate space is provided for car sharing services throughout the district accessible to residents, employees, and visitors.

Objective 6.1: Increase energy efficiency, reduce carbon intensiveness of energy production, and enhance energy reliability in the district.

Policy 6.1: Create efficient, shared district-scale energy systems in the district.

Policy 6.2: Pursue a Combined Heat and Power (CHP) system or series of systems for the Transit Center District and the Transbay Redevelopment Area (Zone 1).[272]

Policy 6.3: Require all new buildings to be designed to plug into such a system in the future.

Policy 6.6: Require all major development to demonstrate that proposed heating and cooling systems have been designed in accordance with the following order of diminishing preference:

- Connection to sources of waste heat or underutilized boiler or CHP plant within the Transit Center District or adjacent areas
- Connection to existing district heating, cooling, and/or power plant or distribution networks with excess capacity
- Site-wide CHP powered by renewable energy

271 No numerical parking limit is proposed for adoption as part of the draft Plan, but could be evaluated and subject to CEQA review at such time as a specific proposal is developed and presented for review.

272 No physical improvements have been defined to implement a district-wide heat and power system in the Plan area, and any district-wide energy system proposed in the future would be subject to subsequent CEQA review at such time as a specific proposal is developed and presented for review.

- Site-wide CHP powered by natural gas
- Building level communal heating and cooling powered by renewable energy
- Building level communal heating and cooling powered by natural gas

Objective 6.4: All new buildings developed in the plan area will be of leading edge design in terms of sustainability, both high performance for their inhabitants and low impact for the environment.

Policy 6.9: Take maximum advantage of San Francisco's moderate year-round climate by integrating passive solar features into building design.

Policy 6.10: Reduce the need for mechanical air conditioning through the use of natural ventilation.

Policy 6.11: Use on-site renewable energy systems to reduce the use of fossil fuel generated energy.

Policy 6.12: Require all major buildings in the Plan Area to achieve the minimum LEED levels established in the SF Green Building Ordinance, not including credits for the given inherent factors of location, density, and existing City parking controls, in order to achieve high-performance buildings.

Objective 6.6: Reduce stormwater runoff from the district into the sewer system to improve bay water quality and reduce strain on treatment plants during wet weather events.

Objective 6.7: Take advantage of significant concentrated development and infrastructure reconstruction in the district and adjacent areas to create district-scale water efficiency and reuse measures.

Policy 6.14: Create a reliable supply of non-potable water that can be used throughout the plan area to reduce potable water demand.

Policy 6.15: Pursue a variety of potential sources of non-potable water, including municipally-supplied recycled water and district-based graywater, blackwater, stormwater, and foundation drainage water.

Policy 6.16: Create infrastructure in the Transit Center District and immediately adjacent areas for non-potable water use, including treatment and distribution.[273]

Policy 6.17: Include distribution pipes and other necessary infrastructure for non-potable water when undertaking any major streetscape or other infrastructure work in the right-of-ways in the Transit Center District and immediately vicinity.

Policy 6.18: Identify and protect suitable sites within the Plan Area or immediate vicinity for locating a treatment facility for creating a local non-potable supply.

Policy 6.19: All new and large redevelopment projects in the city should adhere to the following hierarchical approach to maximize resources and minimize use of potable water:

- Reduce demands by installing efficient water fixtures and behaviors;
- Identify all on-site sources (rainwater, cooling tower blow down, fog, graywater, blackwater, stormwater, and foundation drainage water);
- Install appropriate on-site collection, treatment, storage and conveyance systems for toilet flushing, irrigation and additional identified nonpotable applications;

[273] No defined recycled water system is proposed for development as part of the draft Plan. Such a system would be evaluated and subject to CEQA review at such time as a specific proposal is developed and presented for review.

- Meet surplus non-potable demands using district non-potable water or municipal recycled water; and
- Meet all other remaining demands using potable water.

Policy 6.20: Ensure projects use Low Impact Design (L.I.D.) techniques in all streetscape, public space, and development projects to reduce the quantity of stormwater runoff and slow its flow into the sewer system, and to harvest this water for on-site uses.

The foregoing policies in the draft Plan would, if implemented, ensure that development projects in the Plan area would not generate greenhouse gas emissions, either directly or indirectly, that would have a significant impact on the environment, nor would these projects conflict with the City's GHG Reduction Strategy. Therefore, the draft Plan would be consistent with the GHG Reduction Strategy, and effects of Plan implementation related to GHG emissions would be less than significant.

Mitigation: None required.

Transit Tower

The proposed project would be required to comply with the local ordinances and regulations discussed above, including the Green Building Ordinance and Mandatory Recycling and Composting Ordinance and employer provision of transit benefits to employees, as well as the *Planning Code* limitation on the amount of on-site parking and *Planning Code* requirements for the provision of bicycle parking and showers and lockers; transportation management and transportation brokerage services; and planting of street trees; as well as transit development impact fees under Article 38 of the *Administrative Code*. In addition, as noted in the Project Description, the Transit Tower is proposed for LEED Gold (Version 2.2) certification, which would reduce energy consumption and water use (and thereby reduce emissions from electricity production and consumption of natural gas for heating) to levels below what would otherwise be used with traditional construction.

Impact GG-2: The proposed Transit Tower would not generate greenhouse gas emissions, either directly or indirectly, that would have a significant impact on the environment, nor would the project conflict with any applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases. (Less than Significant)

In its *CEQA Air Quality Guidelines*, the BAAQMD recommends that the determination of the significance of a project's contribution to climate change be evaluated by comparing the project to the applicable jurisdiction's Climate Action Plan or equivalent policy framework; where the project is found consistent, the project would have a less-than-significant impact. In the absence of such a conclusion, the BAAQMD recommends a quantitative threshold of 1,100 metric tons per year or a "service population" (residents plus employees) threshold of 4.6 metric tons per year per person.[274]

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[274] BAAQMD, CEQA Guidelines, May 2011 (see footnote 205, p. 373).

This evaluation relies on the proposed BAAQMD approach to determining significance, and also follows the State CEQA Guidelines, as revised in 2010, which provide general direction with regard to analysis of GHG emissions. These revisions include a new section (Sec. 15064.4) specifically addressing the significance of GHG emissions. Section 15064.4 calls for a "good-faith effort" to "describe, calculate or estimate" GHG emissions; Section 15064.4 further states that the significance of GHG impacts should include consideration of the extent to which the project would increase or reduce greenhouse gas emissions; exceed a locally applicable threshold of significance; and comply with "regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions." The revisions also state that a project may be found to have a less-than-significant impact if it complies with an adopted plan that includes specific measures to sufficiently reduce GHG emissions (Sec. 15064(h)(3)).

The following analysis evaluates the proposed Transit Tower for consistency with the City's GHG Reduction Strategy and also presents a quantification of estimated project GHG emissions.

As noted above under Regulatory Setting, p. 435, the Planning Department has developed a Greenhouse Gas Analysis Compliance Checklist for use in evaluating a project's consistency with the City's GHG Reduction Strategy, which the BAAQMD has determined is a "Qualified GHG Reduction Strategy" for purposes of assessing the significance of GHG emissions in the context of the BAAQMD's *CEQA Air Quality Guidelines*.

Table 38 presents City regulations and programs that are referenced in the GHG Reduction Strategy and that are applicable to the proposed Transit Tower project. Because the proposed Transit Tower would be consistent with these requirements and programs, the project would be consistent with the City's GHG Reduction Strategy, and thus GHG emissions from the proposed project would be less than significant.

Moreover, as infill development, the proposed project would be constructed in an urban area with good transit access, reducing regional vehicle trips and vehicle miles traveled, and therefore the project's transportation-related GHG emissions would tend to be less relative to the same amount of population and employment growth elsewhere in the Bay Area, where transit service is generally less available than in the central city of San Francisco.[275] Additionally, through the process of LEED® Certification under the Gold category and the project's "green" building components and compliance with the City's regulations discussed above, GHG emissions produced by the proposed project would be reduced compared to what would otherwise be the case for conventional construction. Moreover, the project would generate 3.7 metric tons of CO_2E/year per service population (employee). Given that San Francisco has implemented binding and enforceable programs to reduce GHG emissions applicable to the proposed project and that San Francisco's sustainable policies have resulted in the measured success of reduced GHG emissions levels, the proposed project's GHG emissions would result in a less than significant impact.

275 The California Air Pollution Control Officers' CEQA and Climate Change (January 2008) white paper identifies infill development as yielding a "high" emissions reduction score (between 3-30%). This paper is available online at: http://www.capcoa.org/ceqa/CAPCOA%20White%20Paper%20-%20CEQA%20and%20Climate%20Change.pdf. Accessed April 15, 2008.

TABLE 38
CITY GHG REGULATIONS APPLICABLE TO THE PROPOSED TRANSIT TOWER PROJECT

Regulation or Program	Requirement	Project Consistency
Commuter Benefits Ordinance (*Environment Code*, Section 421)	Employers in the proposed new building with more than 20 employees in San Francisco would be required to provide at least one of the following programs: 1. A Pre-Tax Election consistent with 26 U.S.C. § 132(f), allowing employees to elect to exclude from taxable wages and compensation, employee commuting costs incurred for transit passes or vanpool charges, or (2) Employer Paid Benefit whereby the employer supplies a transit pass for the public transit system requested by each Covered Employee or reimbursement for equivalent vanpool charges at least equal in value to the purchase price of the appropriate benefit, or (3) Employer Provided Transit furnished by the employer at no cost to the employee in a vanpool or bus, or similar multi-passenger vehicle operated by or for the employer.	Applies to individual employers, not a project (building) as a whole. All employers in the Transit Tower with more than 20 employees would be required by law to participate. Therefore, the project would be consistent with this requirement.
Emergency Ride Home Program	Administered by the San Francisco Department of the Environment, this program allows participating employers to be reimbursed by the Department for the cost to reimburse employees who travel to work by transit, carpool, bicycle, or other method other than single-occupancy auto and who are unable to return home by their normal travel means due to unexpected circumstances.	Applies to individual employers, not a project (building) as a whole. Employers located in the Transit Tower could participate voluntarily. Therefore, the project would be consistent with this program.
Transportation Management Programs (*Planning Code*, Section 163)	Requires new buildings or additions of greater than 100,000 square feet in the C-3 Use District, including the proposed project, to implement a Transportation Management Program and provide on-site transportation management brokerage services for the life of the building. The program must be designed to promote transit and ridesharing, reduce parking demand, and allow for flexible work schedules.	The Transit Tower would be required by law to implement a Transportation Management Program. Therefore, the project would be consistent with this requirement. [COA-CO]
Transit Impact Development Fee (*Administrative Code*, Chapter 38)	Establishes a fee of $5.00 per square foot for downtown office space and $10.00 per square foot for retail space, paid to the Municipal Transportation Agency to improve local transit services.	The Transit Tower would be required by law to pay this fee. Therefore, the project would be consistent with this requirement.
Jobs-Housing Linkage Program (*Planning Code* Section 413)	The Jobs-Housing Linkage Program is designed to provide housing for those new uses within San Francisco, thereby allowing employees to live close to their place of employment. The program requires a developer to pay a fee or contribute land suitable for housing to a housing developer or pay an in-lieu fee.	The Transit Tower would be required by law to comply with this section of the *Planning Code*. Therefore, the project would be consistent with this requirement. [COA-BP]
Bicycle Parking (*Planning Code*, Section 155.4)	For <u>office</u> uses of 10,000 – 20,000 square feet, 3 bicycle spaces are required; for 20,000– 50,000 square feet, 6 bicycle spaces are required. For floor area in excess of 50,000 square feet, 12 bicycle spaces are required. For <u>retail</u> uses of 25,000– 50,000 feet, 3 bicycle spaces are required. For 50,000 – 100,000 feet, 6 bicycle spaces are required. For floor area in excess 100,000 square feet, 12 bicycle spaces are required. The draft Transit Center District Plan would increase required bicycle parking for office buildings larger than 50,000 square feet to one space for every 6,000 square feet.	The Transit Tower would provide approximately 225 bicycle spaces, which would exceed the requirement of Planning Code Section 155.4(d), and would meet the proposed requirement of the draft Transit Center District Plan. [COA-CO]
Bicycle parking in parking garages (*Planning Code*, Section 155.2)	Every garage must provide at least 6 bicycle spaces. Garages with 120 – 500 automobile spaces must provide 1 bicycle space for every 20 auto spaces. Garages with more than 500 auto spaces must provide 25 bicycle spaces plus 1 space for every 40 auto spaces in excess of 500, up to a maximum of 50 bicycle spaces.	No parking garages are proposed within the Plan area, with the possible exception of some portion of the Transit Tower parking garage, which may be classified as a Major Parking Garage. Any parking garages proposed must comply with this requirement. (Parking proposed in new buildings would typically be accessory parking.)

TABLE 38 (continued)
CITY GHG REGULATIONS APPLICABLE TO THE PROPOSED TRANSIT TOWER PROJECT

Regulation or Program	Requirement	Project Consistency
Bicycle parking in Residential Buildings (*Planning Code*, Section 155.5)	For projects up to 50 dwelling units, one Class 1 space for every 2 dwelling units. For projects over 50 dwelling units, 25 Class 1 spaces plus one Class 1 space for every 4 dwelling units over 50.	Not applicable to the proposed Transit Tower, which would contain no residential units.
Car Sharing Requirements (*Planning Code*, Section 166)	New residential projects or renovation of buildings being converted to residential uses and new non-residential buildings are required to provide car share parking spaces if parking is provided.	The proposed Transit Tower would be required to provide a minimum of 6 car-share spaces for its 300 parking spaces, to comply with this section of the *Code*.
San Francisco Green Building Requirements for Energy Efficiency (*Building Code*, Chapter 13C)	Projects such as the proposed Transit Tower that are registered under LEED v2.2 must use the published LEED v2.2 rules to demonstrate the proposed building has an annual energy cost at least 14.0% less than a LEED baseline building.	The Transit Tower would be required by law to comply with the *Building Code*. Therefore, the project would be consistent with this requirement. As a LEED Gold building, the proposed Transit Tower would comply with this requirement.
San Francisco Green Building Requirements for Stormwater Management (*Building Code*, Chapter 13C)	All projects in San Francisco are required to comply with the SFPUC's stormwater design guidelines, which emphasize low impact development using a variety of Best Management Practices for managing stormwater runoff and reducing impervious surfaces, thereby reducing the volume of combined stormwater and sanitary sewage requiring treatment. The proposed project would comply with this requirement.	The Transit Tower would be required by law to comply with the *Building Code*. Therefore, the project would be consistent with this requirement. As a LEED Gold building, the proposed Transit Tower would comply with this requirement.
San Francisco Green Building Requirements for water reduction (*Building Code*, Chapter 13C)	New large commercial buildings (over 25,000 square feet), such as the proposed project, are required to reduce the amount of potable water used for landscaping by 50% and reduce the amount of potable water used for the building by 20% (increasing to 30% in 2011), compared to conventional construction (baseline fixture performance requirements of the federal Energy Policy Act of 1992).	The Transit Tower would be required by law to comply with the *Building Code*. Therefore, the project would be consistent with this requirement. As a LEED Gold building, the proposed Transit Tower would comply with these requirements.
San Francisco Green Building Requirements for renewable energy (*Building Code*, Chapter 13C)	These provisions require that a LEED version 2.2 certified building be documented to use 14% less energy than a convention building.	The Transit Tower would be required by law to comply with the *Building Code*. Therefore, the project would be consistent with this requirement. As a LEED Gold building, the proposed Transit Tower would comply with this requirement.
Commercial and Residential Water Conservation Ordinances (*Building Code*, Chapters 13A and Housing Code, Chapter 12A)	Requires projects to meet minimum standards for water conservation, including use of low-flow (2.5 gallons per minute [gpm]) showerheads, use of no more than one showerhead per valve, use of low-flow (2.2 gpm) faucets, use of low-flow toilets (1.6 gal./flush) and urinals (1 gal./flush), and repair of all water leaks.	The Transit Tower would be required by law to comply with the *Building Code*. Therefore, the project would be consistent with this requirement. As a LEED Gold building, the proposed Transit Tower would comply with these requirements.
San Francisco Green Building Requirements for solid waste (*Building Code*, Chapter 13C)	Pursuant to Section 1304C.0.4 of the Green Building Ordinance, all new construction, renovation and alterations subject to the ordinance are required to provide recycling, composting and trash storage, collection, and loading that is convenient for all users of the building.	The Transit Tower would be required by law to comply with the *Building Code*. Therefore, the project would be consistent with this requirement. As a LEED Gold building, the proposed Transit Tower would comply with this requirement.
Mandatory Recycling and Composting Ordinance (*Environment Code*, Chapter 19)	All persons in San Francisco must separate their refuse into recyclables, compostables, and trash, and place each type of refuse in a separate container designated for that type of refuse.	The Transit Tower would be required by law to comply with the *Environment Code*. Therefore, the project would be consistent with this requirement.

TABLE 38 (continued)
CITY GHG REGULATIONS APPLICABLE TO THE PROPOSED TRANSIT TOWER PROJECT

Regulation or Program	Requirement	Project Consistency
San Francisco Green Building Requirements for construction and demolition debris recycling (*Building Code*, Chapter 13C)	Large buildings (over 25,000 square feet), such as the proposed project, must divert at least 75% of construction debris from landfills.	The Transit Tower would be required by law to comply with the *Building Code*. Therefore, the project would be consistent with this requirement.
Construction Demolition and Debris Recovery Ordinance (*Environment Code*, Chapter 14)	This ordinance requires that at least 65 percent of all construction and demolition material to be diverted from landfills.	The Transit Tower would be required by law to comply with the *Environment Code*. As noted above, the proposed Transit Tower would be subject to the more stringent Green Building requirements of the *Building Code*, and so would also comply with this requirement.
Street Tree Planting Requirements for New Construction (*Planning Code* Section 138.1(c)(1))	New construction, significant alterations or relocation of buildings within many of San Francisco's zoning districts requires planting one 24-inch box tree for every 20 feet along the property street frontage.	The Transit Tower would be required by law to comply with the *Planning Code*. The proposed project would include planting of new street trees on the First and Mission Street project frontages, consistent with *Planning Code* requirements, and would also include street trees on the Fremont Street frontage of the proposed Mission Square open space. Therefore, the project would be consistent with this requirement.
Regulation of Diesel Backup Generators (*Health Code*, Article 30)	Requires (among other things) that all diesel generators to be registered with the Department of Public Health and be equipped with the best available air emissions control technology.	The Transit Tower would be required by law to comply with the *Health Code*. Therefore, the project would be consistent with this requirement.

NOTES:
COA-BP – This requirement would be made a Condition of Approval by the Planning Commission if the project is approved, and the condition would have to be met prior to issuance of a Building or Site Permit, or Final Addendum thereto.
COA-CO – This requirement would be made a Condition of Approval by the Planning Commission if the project is approved, and the condition would have to be met prior to issuance of a Certificate of Occupancy.

As noted above, this analysis also quantifies estimated GHG emissions. The calculation presented below includes CO_2E GHG emissions from the construction period, as well as annual CO_2E GHG emissions from increased vehicular traffic and energy consumption, including both natural gas and electricity, from electricity used to transport water and treat wastewater, and from solid waste generation.

The proposed project would increase the activity onsite by developing a new 61-story building containing approximately 1.35 million square feet of office space and about 16,500 square feet of retail space. Therefore, the proposed project would contribute to annual long-term increases in GHGs as a result of traffic increases (mobile sources) and commercial operations associated with heating, energy use, water usage and wastewater treatment, and solid waste disposal (area sources). Construction of the proposed project would emit approximately 3,634 metric tons (4,005 U.S. tons) of CO_2E.[276] Annualized over a 40-

[276] Construction emissions and annual emissions are not intended to be additive as they occur at different points in the project's lifecycle. Construction emissions are one-time emissions that occur prior to building occupancy. Annual emissions are incurred only after construction of the proposed project and are expected to occur annually for the life of the project.

year lifespan of the proposed building (a conservative assumption, as many buildings last far longer), construction emissions would total approximately 91 metric tons per year.

Direct project CO_2E emissions (including CO_2, methane, and nitrous oxide emissions) would include approximately 4,522 metric tons (4,983 U.S. tons) of CO_2E/year from transportation and about 1,339 metric tons (1,476 U.S. tons) of CO_2E/year from heating, for a total of about 5,861 metric tons (6,459 U.S. tons) of CO_2E/year of project-emitted GHGs. The project would also indirectly result in GHG emissions from off-site electricity generation at power plants (approximately 6,140 metric tons, or 6,776 U.S. tons, of CO_2E/year, including electricity associated with water transport and treatment) and about 4,713 metric tons (5,194 U.S. tons) of CO_2E from anaerobic decomposition at landfills, for a GHG operational emissions total of approximately 16,714 metric tons (about 18,419 U.S. tons of CO_2E/year. Annual emissions would represent two-tenths of one percent (0.02 percent) of total Bay Area GHGs emitted in 2007.[277] GHG emissions are shown in **Table 39**.

TABLE 39
TRANSIT TOWER TOTAL CO_2-EQUIVALENT EMISSIONS (METRIC TONS/YEAR)[1]

Transportation	4,522
Heating	1,339
Water and Wastewater	58
Electricity Generation	6,082
Solid Waste[2]	4,713
Total Operation Emissions (CO_2E) (annual)	**16,714**
Annual Operational Emissions per Service Population[3]	**3.4**
Total Construction Emissions (CO_2E) (one-time)	**3,634**
Annualized Construction Emissions[4]	**90.9**

[1] Emissions are unmitigated.
[2] Solid waste emissions conservatively assume 50 percent diversion from landfill.
[3] Service population emissions based on total project employment of approximately 4,938.
[4] Based on assumed 40-year lifetime of proposed building.

SOURCE: Environmental Science Associates, 2011

As noted in Table 39, project emissions of GHGs would exceed the 1,100 metric tons per year threshold, but would fall below 4.6 metric tons per year per service population. Therefore, the proposed project would not exceed the BAAQMD's proposed significance threshold. This is indicative of the fact that development in San Francisco, with its extensive transit network, limited parking, mix of uses, and proximity of services is, in general, inherently more likely to generate a reduced volume of GHG emissions than development of a comparable project elsewhere in the Bay Area, where the foregoing factors are less prevalent or lacking.

To the extent feasible, the emissions presented above incorporate assumptions regarding emission reductions due to compliance with the City's regulations that would reduce project GHG emissions.

[277] The Bay Area Air Quality Management District reported regional Bay Area GHGs emissions in 2007 at approximately 95.8 MMT (105.3 million U.S. tons) CO2E.

Specifically, the proposed project would include the features described in Table 38, which would result in a reduction in GHG emissions.

As noted above in the discussion of the Regulatory Setting, the AB 32 Scoping Plan states that successful implementation of the plan relies on local governments' land use planning and urban growth decisions because local governments have primary authority to plan, zone, approve, and permit land development to accommodate population growth and the changing needs of their jurisdictions. The Air Resources Board acknowledges that decisions on how land is used will have large effects on the GHG emissions that will result from the transportation, housing, industry, forestry, water, agriculture, electricity, and natural gas emission sectors. While some of the GHG reduction measures contained in the Scoping Plan, such as increasing energy efficiency in new construction, installation of solar panels on individual building roofs, and a "green building" strategy, are at least partially applicable to development projects, many measures in the Scoping Plan (increased fuel efficiency, increased efficiency by utilities, increased use of renewable energy) require statewide action by government, industry, or both, that is outside the purview of the City and individual developers.

As described above, the City has developed its own strategy to address greenhouse gas emissions on a local level. The vision of the strategy is expressed in the City's Climate Action Plan, however implementation of the strategy is appropriately articulated within other citywide plans (*General Plan*, Sustainability Plan, etc.), policies (Transit-First Policy, Precautionary Principle Policy), and regulations (Green Building Ordinance, *Building Code*, *Planning Code*), and other provisions as well.

The proposed project would be required to comply with all San Francisco ordinances and regulations that are aimed at reducing GHG emissions (see Table 38). The project would also be required to comply with other GHG reduction regulations, such as applicable AB 32 Scoping Plan measures that are ultimately adopted and become effective during implementation of proposed project. Given that the City has adopted an extensive array of GHG reduction strategies recommended in the AB 32 Scoping Plan, that the City's GHG reduction strategy includes binding, enforceable measures to be applied to development projects, such as the proposed project, and that the City's GHG reduction strategy has produced measurable reductions in GHG emissions, the proposed project would not conflict with either the state or local GHG reduction strategies. In addition, the proposed project would not conflict with any plans, policies, or regulations adopted for the purpose of reducing GHG emissions. Therefore, the proposed project would have a less than significant impact with respect to plans for reduction of GHG emissions.

Mitigation: None required.

I. Wind

This section describes potential wind effects of the proposed project, based upon wind-tunnel testing and computational analysis of the potential changes in building massing in the Plan area.[278]

Setting

Tall buildings and structures can strongly affect the wind environment for pedestrians. Groups of structures tend to slow the winds near ground level, due to the friction and drag of the structures themselves on winds. Buildings that are much taller than their surrounding buildings intercept and redirect winds that might otherwise flow overhead, and bring them down the vertical face of the building to ground level, where they create ground-level wind and turbulence. These redirected winds can be relatively strong and also relatively turbulent, and can be incompatible with the intended uses of nearby ground-level spaces. In addition, building designs that present tall flat surfaces square to strong winds can create ground-level winds that can prove to be hazardous to pedestrians in the vicinity.

The comfort of pedestrians varies under different conditions of sun exposure, temperature, clothing, and wind speed. Winds up to 4 miles per hour (mph) have no noticeable effect on pedestrian comfort. With velocity from 4 to 8 mph, wind is felt on the face. Winds from 8 to 13 mph will disturb hair, cause clothing to flap, and extend a light flag mounted on a pole, while winds from 13 to 19 mph will raise loose paper, dust and dry soil, and will disarrange hair. For wind velocities from 19 to 26 mph, the force of the wind will be felt on the body. At 26 to 34 mph, umbrellas are used with difficulty; hair is blown straight; there is difficulty in walking steadily; and wind noise is unpleasant. Winds over 34 mph increase difficulty with balance and gusts can blow people over.

Regulatory Framework

In order to provide a comfortable wind environment for people in San Francisco, the City has established comfort criteria to be used in the evaluation of proposed buildings. Section 148 of the *Planning Code* specifically outlines these criteria for the Downtown Commercial (C-3) Districts, including the project site.[279] The comfort criteria are based on pedestrian-level wind speeds that include the effects of turbulence; these are referred to as "equivalent wind speeds" (defined in the *Planning Code* as "an hourly mean wind speed adjusted to incorporate the effects of gustiness or turbulence on pedestrians").

Planning Code Section 148 establishes equivalent wind speeds of 7 mph as the comfort criterion for seating areas and 11 mph as the comfort criterion for areas of substantial pedestrian use, and states that new buildings and additions to buildings may not cause ground-level winds to exceed these levels more

278 Rowan Williams Davies & Irwin, Inc., *Pedestrian Wind Study: Transit Tower*, June 24, 2011. This report is presented in Appendix E.

279 Additional *Planning Code* sections apply the same criteria to the Rincon Hill, Van Ness Avenue, and South of Market areas.

than 10 percent of the time year round between 7:00 a.m. and 6:00 p.m.[280] If existing wind speeds exceed the comfort level, or when a project would result in exceedances of the comfort criteria, an exception may be granted, pursuant to Section 309, if the building or addition cannot be designed to meet the criteria "without creating an unattractive and ungainly building form and without unduly restricting the development potential" of the site, and it is concluded that the exceedance(s) of the criteria would be insubstantial "because of the limited amount by which the comfort level is exceeded, the limited location in which the comfort level is exceeded, or the limited time during which the comfort level is exceeded." Section 148 also establishes a hazard criterion, which is a 26 mph equivalent wind speed for a single full hour, or approximately 0.0114% of the time. Under Section 148, new buildings and additions may not cause wind speeds that meet or exceed this hazard criterion.[281] Under Section 148, no exception may be granted for buildings that result in winds that exceed the hazard criterion.[282]

Section 148 applies to approval of individual development projects, but not to areawide plans such as the draft Plan. Because wind conditions in the Plan area will be affected by the combination of building forms resulting from existing and future buildings, a planning-level study, using computational fluid dynamics, supplemented by knowledge gleaned from wind-tunnel analysis of certain projects in the Plan area (including the proposed Transit Tower), is considered an appropriate methodology for evaluation of areawide wind impacts.

Project-specific wind-tunnel test results are provided for the Transit Tower, which this EIR evaluates at a project level of detail. This wind-tunnel test included a cumulative scenario that is used to evaluate effects of the draft Plan in the portion of the Plan area within about one block of the Transit Tower site, consistent with accepted wind-tunnel testing methodology.

It is also noted that individual building projects that are subsequently considered for approval will be required to comply with Section 148, and that subsequent high-rise buildings will undergo project-specific wind-tunnel testing.

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280 The *Planning Code* specifies the hours of 7:00 a.m. to 6:00 p.m. In contrast, the available weather data, as aggregated, cover the hours of 6:00 a.m. to 8:00 p.m. Thus, observations from two additional evening hours and one additional morning hour are included in the wind speed distribution data.

281 Because the hazard criterion is stated in terms of 1 hour of exceedance, it is most appropriate to report exceedances of this criterion in terms of the number of hours per year that the excess occurs, rather than the accompanying wind speeds. Thus, for each wind analysis, the number of locations and the total sum of the durations of exceedances of the hazard criterion are important measures of effect. This differs from reporting of both comfort criteria, for which wind speeds exceeded 10% of the time are examined and presented, but statistics other than the number of locations are not detailed.

282 The comfort criteria are based on wind speeds that are measured for one minute and averaged. In contrast, the hazard criterion is based on winds that are measured for one hour and averaged; when stated on the same basis as the comfort criteria winds, the hazard criterion speed is a one-minute average of 36 mph, to distinguish between the wind comfort conditions and hazardous winds. Therefore, the hazard criterion is reported here as 36 mph, because the results are therefore consistent across test scenarios.

Existing Wind Conditions

For purposes this analysis, the new Transit Center, which is currently under construction, is considered part of the "existing setting" in order that the wind analysis most accurately represent the changes that would occur as a result of implementation of the proposed Plan and the Transit Tower.

Transit Center District Plan Area

In general, based on the wind-tunnel testing for the Transit Tower and previous tests for other projects in the vicinity, the northern portion of the Plan area is windier than the southern portion: areas along Market Street and on the blocks of streets perpendicular to and just south of Market Street have higher winds than areas south of the new Transit Center site. This is a common phenomenon along Market Street, where the street grids north and south of Market Street join together. The offsetting street grids result in downwind buildings south of Market Street facing directly into northerly and westerly winds that are channeled along north-of-Market streets; when these winds reach the facades of tall south-of-Market buildings, the winds tend to accelerate as they move down the building walls, resulting in relatively higher winds at pedestrian level in this part of the Plan area. Moreover, winds tend to be accelerated along Market Street by the tall towers that line both sides of the street. Winds are somewhat less strong in the center portion of the block of Market Street between First and Second Streets, where closely spaced buildings block some of the oncoming wind flow. This blockage, however, results in relatively high turbulence between the buildings within this area, and relatively stronger winds around the perimeter.

In contrast to the northern part of the Plan area, the southern part of the Plan area has relatively fewer tall buildings to intercept the winds and bring them down to ground level. Accordingly, pedestrian wind speeds are lower south of the new Transit Center site. Some areas of the western edge of the Plan area also experience relatively stronger winds because southwesterly winds, in particular, are first intercepted by tall buildings just west of the Plan area, along Third Street (buildings southwest of Third Street are considerably shorter, for the most part), resulting in turbulence and sometimes strong winds, particularly around the base of the most western tall buildings, such as the two residential/hotel towers at Third and Mission Streets, the W Hotel at Third and Howard Street, and the former Pacific Telephone Building on New Montgomery Street.

Additional information about existing wind conditions is provided in the following discussion of the area around the Transit Tower project site.

Transit Tower Project Site

Wind-tunnel testing was conducted for the proposed Transit Tower. Under the existing setting, the vicinity of the Transit Tower project site is moderately windy; the average wind speed for the 172 points tested for existing conditions is 9.3 mph.[283] Wind speeds in pedestrian areas range from 5 to 24 mph, and

[283] "Wind speed" refers to equivalent wind speed (including the effects of turbulence) that is exceeded 10 percent of the time.

in seating areas, from 6 to 20 mph.[284] Wind speeds in excess of the 11-mph pedestrian comfort criterion currently occur at 18 of the 102 locations tested (17 percent of sidewalk locations tested) and exceedances of the 7-mph seating comfort criterion currently occur at 90 percent (62 of 69) of the seating locations tested (winds at five of these locations also exceed the 11-mph pedestrian criterion), for a total of 80 exceedances of the Section 148 wind speed criteria (47 percent of all points tested under existing conditions). Of 50 test points in the City Park, wind speeds exceed the 7-mph seating criterion at 45, or 90 percent of the test points. The highest wind speed in the vicinity (24 mph) occurs on the south sidewalk of Mission Street east of Second Street, between the existing high-rise buildings at 101 Second Street and 555 Mission Street, and across the street from 560 Mission Street [test point #149]. Test points are shown on Figure 58, p. 455, in the impacts section.

The Code's wind hazard criterion of 26 mph (reported as 36 mph in the test results)[285] is exceeded at a single test location under existing conditions—the location on Mission Street east of Second Street.

Impacts

Significance Criteria

Wind impacts of the draft Plan would be considered significant if development pursuant to the Plan would cause large increases in pedestrian wind speeds or wind speeds in publicly accessible open spaces over a substantial portion of the Plan area.

The Transit Tower project would have a significant wind impact if it would cause the 26-miles-per-hour wind hazard criterion to be exceeded for more than one hour per year. A project that would cause exceedances of the comfort criteria, but not the wind hazard criterion, would not be considered to have a significant impact.

Methodology

As noted in the Setting, two separate analyses were conducted to evaluate wind conditions in the Plan area and potential wind effects of implementation of the draft Plan and development of the proposed Transit Tower. For the Transit Tower, the analysis used the same approach as is used in analyses routinely conducted for tall structures in San Francisco. This methodology involves testing of the proposed project in a wind tunnel. To undertake the test, a scale model of the proposed building is created, in this instance at a scale of 1 inch equals approximately 33 feet. (The resulting Transit Tower model is therefore approximately 32 inches tall.) A scale model is also created for each surrounding building and, where applicable, topography, for a circular area within a radius of approximately

[284] For purposes of this analysis, all privately owned, publicly accessible open spaces are considered seating areas, even if they are effectively passageways between buildings, with no provision for formal seating. Pedestrian areas include all sidewalks. Thus, the analysis is conservative. Because the existing condition includes the new Transit Center, there are 50 test points in the City Park open space atop the Transit Center, covering the entire park except the western edge, which was deemed too close to the edge of the test model to attain accurate results.

[285] See footnote 282, p. 450.

1,500 feet of the project site. The model is fitted with sensors that measure wind speeds and placed inside a device known as a wind tunnel, where fan-generated air flow is used to simulate actual winds. As noted above, the sensors are placed at distances representing locations no further than about one block (about 800 feet) from the center of the model. This is because locations closer to the edges of the model, and particularly locations near the upwind edges, can report wind speeds with less accuracy, since they are not adequately “protected” by upwind building masses that exist beyond the edge of the model. Because actual winds blow from variable directions and the wind tunnel can test only one direction at a time, a series of tests is run to simulate winds blowing from different directions, and the sensor readings are then run through a computer program to generate the ultimate results.

To satisfy the criteria of *San Francisco Planning Code* Section 148, two sets of results are produced: one that indicates, for each test location, the wind speed that is exceeded 10 percent of the time, year-round, and the second, that indicates whether a wind speed of 26 miles per hour is exceeded for one full hour of the year. The former results determine whether the project would meet the *Planning Code's* “comfort criteria,” while the latter results determine whether the project would cause an exceedance of the *Code's* “hazard criterion.” As stated above, a significant impact would occur if the hazard criterion is exceeded.

The wind-tunnel test built upon testing that was conducted of the new Transit Center in 2010 for the Transbay Joint Powers Authority, which is building the new terminal. As noted above in the Setting, the new Transit Center is considered part of the “existing setting” in the wind analysis in this EIR. This is consistent with the approach to wind-tunnel testing in San Francisco, which includes buildings that are under construction as part of the existing condition, because those buildings can normally be assumed to have been completed by the time that a project under analysis will be built. Therefore, and in order that the wind analysis most accurately represent the effect of the Transit Tower and other growth pursuant to the draft Plan, the Transit Center is included in the existing conditions scenario.

Under the existing conditions scenario, 171 individual locations were tested on sidewalks and in publicly accessible, primarily privately owned, open spaces in the vicinity of the Transit Tower site, including 50 locations in the City Park that will be developed atop the Transit Center. For the project (Transit Tower) and cumulative (Transit Center District Plan) scenarios, an additional 35 test locations were included. Ten of these locations were around the base of the Transit Tower and, when added to the 14 points also tested in the existing condition, allow for a detailed characterization of anticipated winds around the base of the tower. Most of the other added test points are at locations north of Mission Street that are generally upwind or “crosswind” of the Transit Tower site but within the Plan area. Additionally, a few additional points were added in publicly accessible open spaces to evaluate winds in those locations.

For the Plan area as a whole, the wind-tunnel analysis also provided information with respect to wind conditions in the central portion of the area, in the vicinity of the Transit Tower site, relying on the cumulative scenario from the wind-tunnel test. This cumulative scenario includes generalized massing models of all buildings currently proposed within the Plan area; generalized massing models on other Plan area sites assumed to be developed; and massing models of projects near the Plan area that are either proposed or anticipated to be developed (i.e., are considered "reasonably foreseeable"). The wind-tunnel analysis was supplemented, for the outlying portions of the Plan area, by a planning-level, computational (i.e., computer-based, as opposed to measurement-based) wind study. This analysis results in qualitative, rather than quantitative, results (i.e., winds are described in relative terms, with areas characterized as having "low," "moderate," or "high" winds, but without actual wind speeds calculated). This analysis considers factors including regional meteorological data, previous wind tunnel studies undertaken in the vicinity, and the analysts' engineering judgment and knowledge of wind flows around buildings, and makes use of specialized computer software developed for estimating the potential wind conditions around generalized building forms and a Computational Fluid Dynamics software for visualizing wind flow patterns.[286] For this analysis, generalized building massing models were studied.

It is noted that the results of this planning-level study do not, and are not intended to, satisfy the criteria of *Planning Code* Section 148. Pedestrian-level wind speeds are dependent on specific building designs and surrounding conditions at the time of development, so the programmatic analysis does not lend itself to wind speed computation. This EIR is not intended to analyze the impacts of specific development proposals (other than the Transit Tower), including building form, but rather to assess the effects of adoption and implementation of the draft Plan. Each individual building proposed for development in the Plan area that is tall enough to result in potential adverse wind impacts will be required to undergo project-specific (and design-specific) wind-tunnel testing, just as was undertaken for the proposed Transit Tower. Nevertheless, it is anticipated that cumulative conditions in the vicinity of a particular project will be able to be derived from this analysis.

Because the wind-tunnel test is the basis for this analysis, in this section, unlike the remainder of this EIR, the project-specific analysis of the proposed Transit Tower is presented first.

Wind-Tunnel Analysis

Transit Tower Project Analysis

Impact WI-1: The proposed Transit Tower would not result in a new exceedance of the wind hazard criterion. (Less than Significant)

Wind tunnel testing was performed for the proposed project, the results of which are summarized in the following discussion.[287] **Table 40** presents a summary of the test results. **Figure 58**, p. 455, depicts the wind test point locations. The complete report describing the wind-tunnel test results is included in Appendix E.

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286 Rowan Williams Davies & Irwin, Inc., *Transit Center District Plan Final Report: Pedestrian Wind Assessment*, April 29, 2011. This report is available for review at the Planning Department, 1650 Mission Street, Suite 400, in Case File No. 2007.0558E.

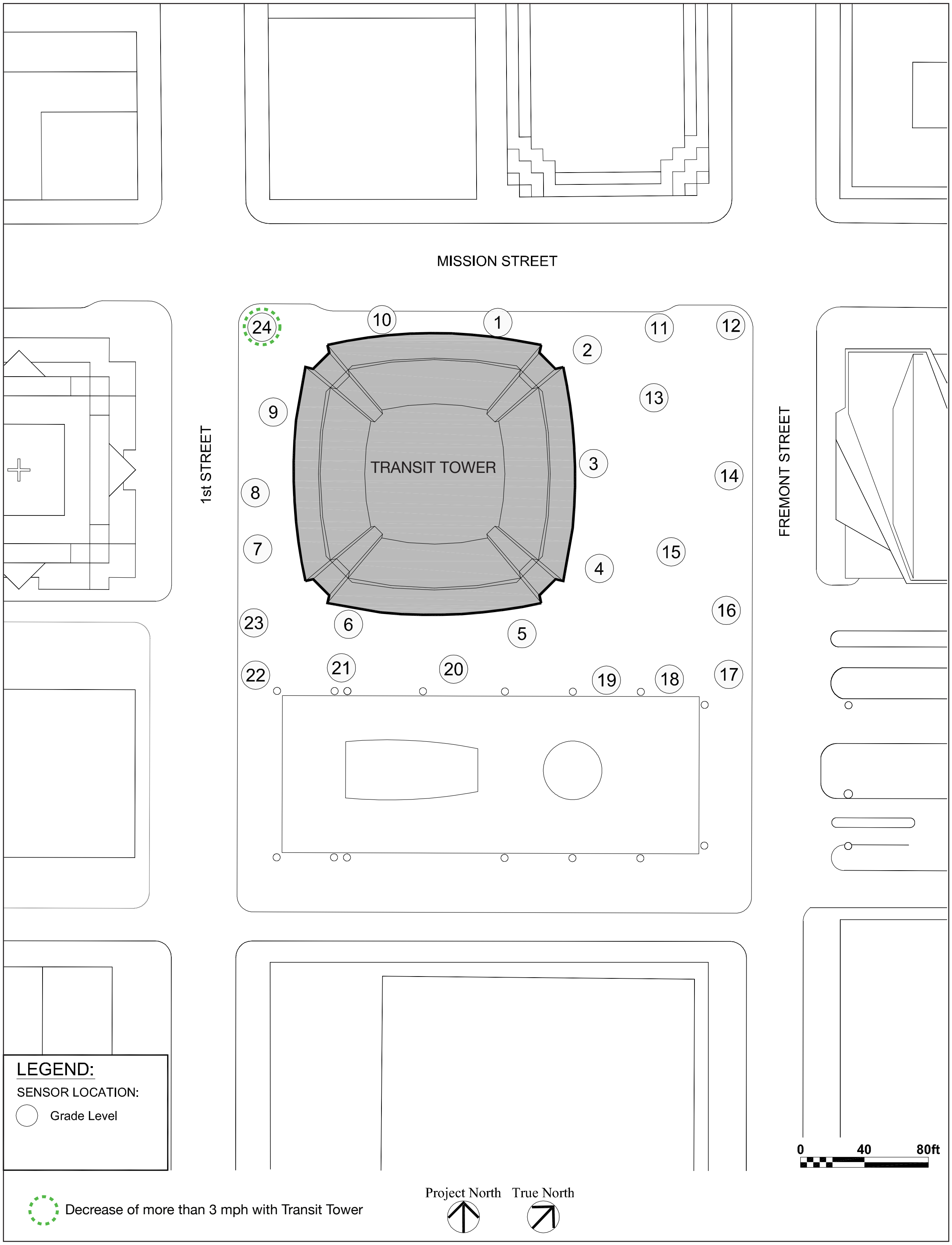
287 Rowan Williams Davies & Irwin, Inc., *Pedestrian Wind Study: Transit Tower,* June 24, 2011. This report is presented in Appendix E.

TABLE 40
SUMMARY OF WIND-TUNNEL TEST RESULTS

	Existing		Existing plus Transit Tower							Existing plus Transit Tower plus Cumulative (Draft Plan)											
		Exceed-		Exceed-	Change from Existing[3]						Exceed-	Change from Existing[3]					Change from Tower Only[3]				
	Speed[1]	ances[2]	Speed[1]	ances[2]	Speed[1]	+	-	0	>3	Speed[1]	ances[2]	Speed[1]	+	-	0	>3	Speed[1]	+	-	0	>3
All Test Points																					89
	9.3	80	9.8	101	0.5	84	56	32	7	10.9	117	1.5	95	59	18	42	1.0	89	76	42	39
No. of pts.	172	47%	207	49%						207	57%										
Max. Spd.	24		19							20											
Min. Spd.	5		4							4											
City Park Test Points																					
	8.7	45	9.9	37	1.1	34	13	3	5	12.5	45	3.8	40	5	5	22	2.6	26	14	10	20
No. of pts.	50	90%	50	74%						50	90%										
Max. Spd.	12		14							20											
Min. Spd.	6		4							5											
Other Open Space Test Points																					
	11.8	17	11.7	34	-0.1	10	7	3	0	11.3	32	-0.6	7	11	2	1	-0.5	7	17	12	0
	20	85%	36	94%						36	89%										
Max. Spd.	24		19							18											
Min. Spd.	7		7							6											
Sidewalk Points																					
	9.3	18	9.4	30	<0.1	59	37	26	21	10.2	40	0.8	67	44	11	38	0.8	56	46	20	19
No. of pts.	103	17%	122	25%						122	33%										
Max. Spd.	24		19							19											
Min. Spd.	5		4							4											

[1] Speed refers to wind speed exceeded 10 percent of the time; in miles per hour
[2] Exceedances indicates number of exceedances of applicable Planning Code Section 148 comfort criteria, and percentage of test points that exceed the criteria.
[3] + / - / 0 indicate number of points where speed increases / decreases / does not change from previous scenario. >3 indicates number of points where speed increase by more than 3 mph.

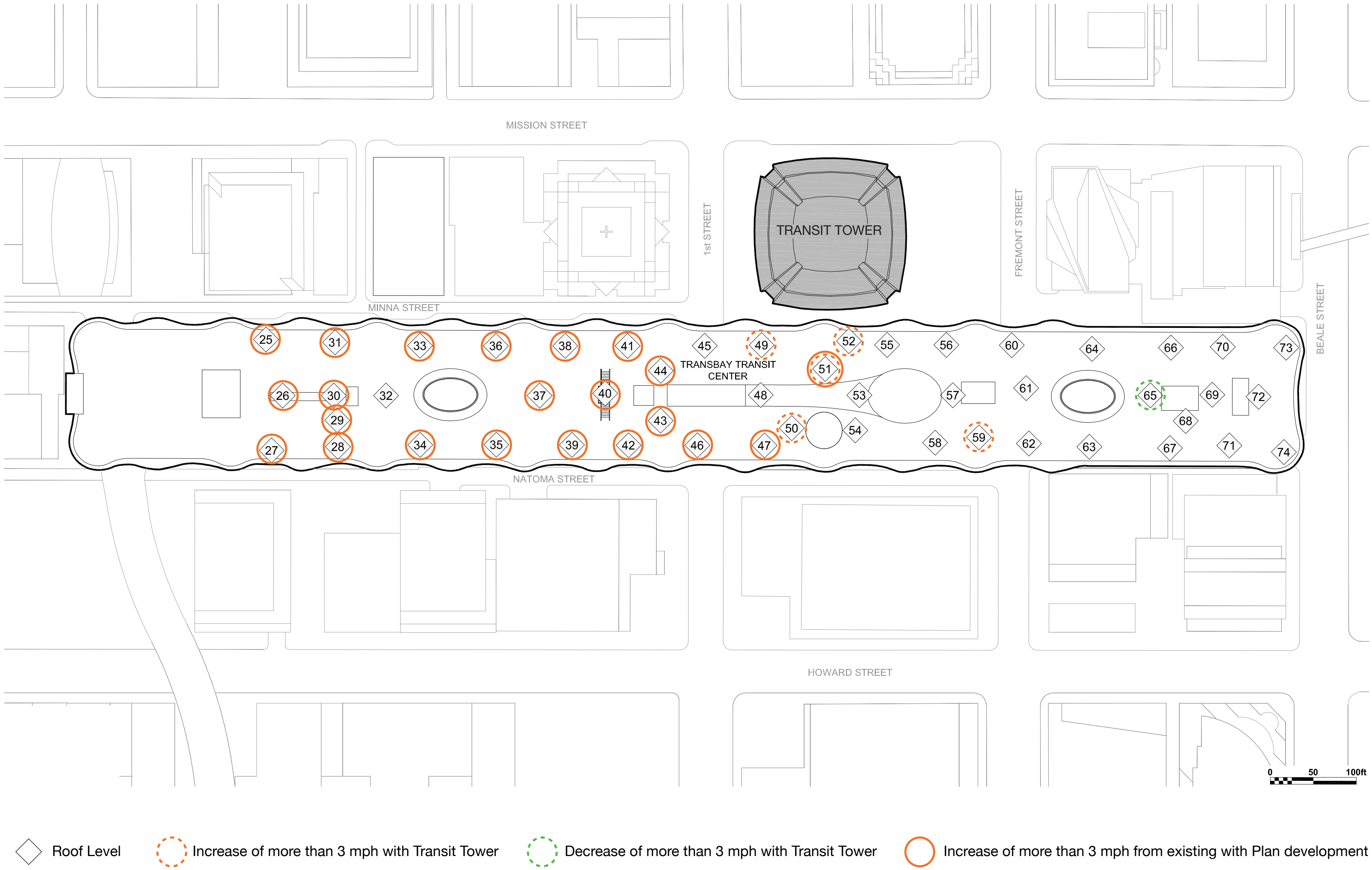
SOURCE: RWDI, Environmental Science Associates



SOURCE: RWDI

Case Nos. 2007.0558E and 2008.0789E: Transit Center District Plan and Transit Tower . 207439

Figure 58A
Wind Tunnel Test Points - Mission Square

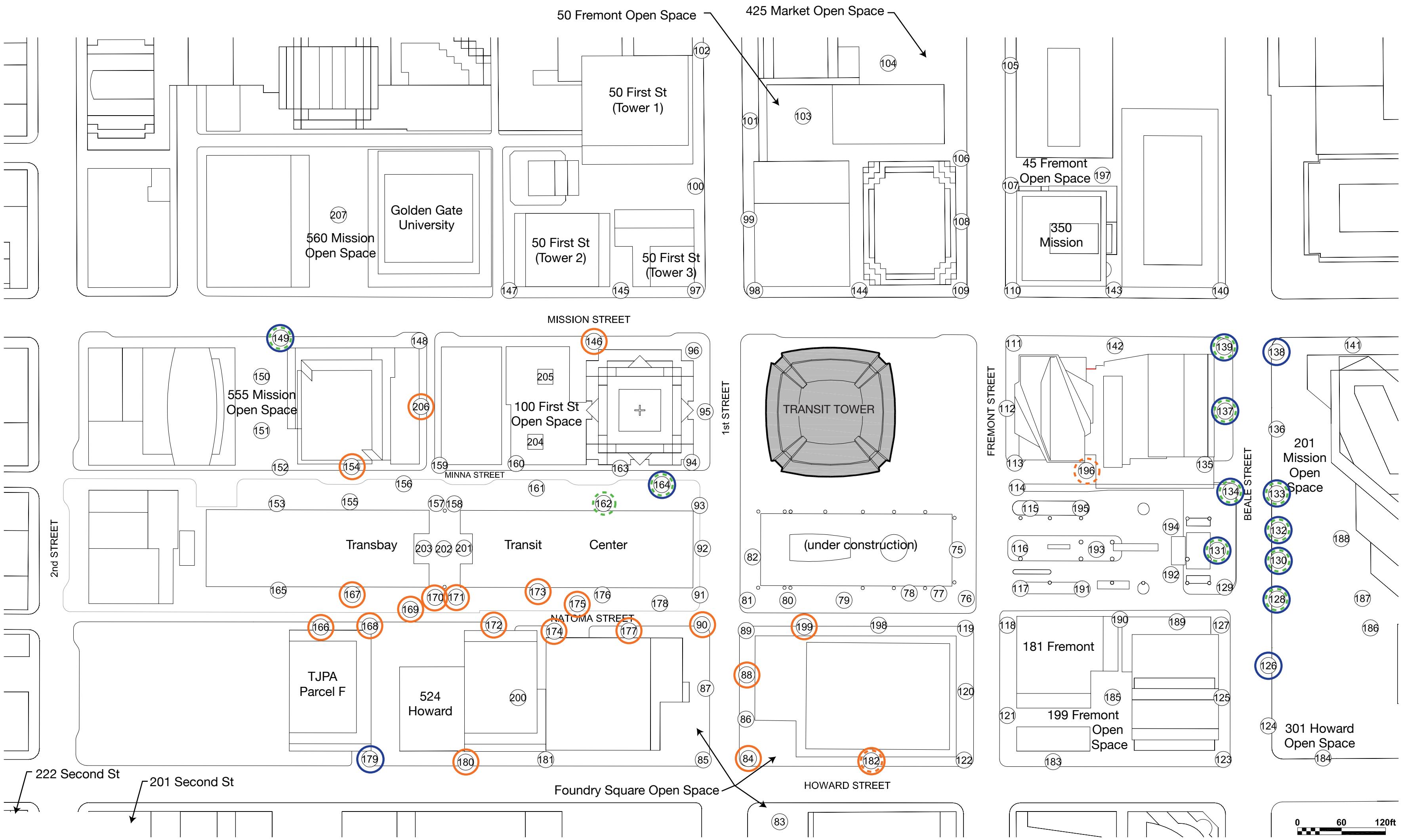


SOURCE: RWDI

Case Nos. 2007.0558E and 2008.0789E: Transit Center District Plan and Transit Tower . 207439

Figure 58B

Wind Tunnel Test Points - Transit Center Roof (City Park)



Grade Level

Podium Level

Increase of more than 3 mph with Transit Tower

Decrease of more than 3 mph with Transit Tower

Increase of more than 3 mph from existing with Plan development

Decrease of more than 3 mph from existing with Plan development

Note:
Labeled sites denote Plan-Area development sites in Transit Tower vicinity

SOURCE: RWDI

Case Nos. 2007.0558E and 2008.0789E: Transit Center District Plan and Transit Tower . 207439

Figure 58C
Wind Tunnel Test Points - Transit Tower Vicinity

The wind-tunnel testing demonstrated that the project would result in relatively modest changes in ground-level winds. Wind conditions would continue to be moderately windy; the average wind speed would increase from 9.3 mph to 9.8 mph; this degree of change generally would not be noticeable at any given location, although the change would be greater at certain spots, and would be apparent. Wind speeds at the 207 test points would range from 4 to 19 mph, with the highest speed continuing to be the location on Mission Street east of Second Street. A wind speed of 19 mph would also be exceeded 10 percent of the time at two locations in the privately owned, publicly accessible open space at 555 Mission Street.

Wind speeds with the Transit Tower in place would increase at 84 locations where winds were also tested in the existing condition, and would decrease at 56 locations. At 32 locations, there would be no change in the average wind speed. The increase in wind speeds would be small—1 to 3 mph—at a large majority of points. At seven of 172 locations, the increase in average wind speed would be greater than 3 mph: five of these locations are in the City Park atop the Transbay Terminal, proximate to the Transit Tower, where the average wind speed would increase by 4 mph at each location. At two pedestrian locations east and south of the Transit Tower (points 182 and 196), wind speeds would also increase by 4 mph. Around the base of the Transit Tower itself, wind speeds would change little, with increases or decreases of 2 mph to 3 mph at most locations except at the southeast corner of First and Mission Streets, where the wind speed exceeded 10 percent of the time would decrease by 5 mph, from 16 mph to 11 mph. Locations east of the Tower, in the planned Mission Square park, would increase or decrease by 2 mph or 3 mph. Wind speeds at all test points in Mission Square would exceed the seating comfort criterion of 7 mph, as is the case for all points tested there under existing conditions.

City Park

The Transit Tower would incrementally increase winds in the City Park atop the Transit Center, although not to a substantial degree that is considered significant. As noted above, five locations in City Park would experience increases of 4 mph with the addition of the Transit Tower. At these locations, winds accelerating down the façade of the tower would be most noticeable. Wind speeds exceeded 10 percent of the time in these locations would be 12 to 14 mph, up from 8 to 10 mph without the Tower. The higher speeds would be comparable to recent wind-tunnel test results for locations on New Montgomery Street between Market and Mission Streets, and would exceed not only the seating criterion but also the 11-mph pedestrian comfort criterion. The average wind speed in City Park would increase from 8.7 mph to 9.9 mph, and winds would increase at 34 of 50 test locations. Wind speeds would decrease at 13 locations (mostly in the western half of the park, upwind from the Transit Tower) and would remain unchanged at three locations. However, the number of locations in City Park at which the 7-mph *Planning Code* comfort criterion for seating areas would be exceeded would decline from 45 of the 50 test points (90 percent) under existing conditions, to 37 of 50 points (74 percent) with the Transit Tower in place. With the Transit Tower, wind speeds in City Park would range from 4 to 14 mph, compared to 6 to 12 mph under existing conditions.

Other Open Spaces

In other seating locations (open spaces) tested and depicted on Figure 58C, wind speeds would increase incrementally. Of 19 locations tested under both existing and Transit Tower (project) conditions, wind speeds would increase at 10 locations (by up to 3 mph), and would decrease at six locations (also by up to 3 mph); there would be no change at three locations. Wind speeds at these locations would range from 7 to 19 mph, compared to 7 to 20 mph under existing conditions. The 7-mph Section 148 seating criterion would be exceeded at 34 of 35 test locations (97 percent), compared to 17 of 19 locations (89 percent) tested under existing conditions.[288] The average wind speed at open space locations (other than City Park) would increase slightly under conditions with the Transit Tower, to 11.5 mph, from 11.2 mph for open space points tested under existing conditions.

All Test Points, Including Sidewalk Locations

With implementation of the Transit Tower project, there would be 101 exceedances of the Section 148 wind-speed criteria at 207 test locations (49 percent); this compares to exceedances at 80 of 172 locations (47 percent) under existing conditions. Of the 101 total exceedances, 37 would exceed the 7-mph seating criterion in City Park and 34 would exceed the 7-mph seating criterion in other publicly accessible open spaces. Of 122 sidewalk locations, 30 (25 percent) would exceed the 11-mph pedestrian criterion, compared to 18 of 103 sidewalk locations (17 percent) under existing conditions.

Wind speeds would generally decrease along Beale Street between Mission and Howard Streets.

The Transit Tower project would result in no exceedances of the *Planning Code* wind hazard criterion, and therefore would have no significant effect related to wind. The one hazard exceedance found under existing conditions—on Mission Street east of Second Street—would experience a decrease in average wind speed, from 24 mph to 19 mph, which would be sufficient to eliminate the existing hazard criterion exceedance.

Although the Transit Tower would not result in a significant effect with respect to wind, the project sponsor would seek, and would be required to obtain, an exception to the requirements of *Planning Code* Section 148 because the project would result in a net increase in the number of increase of the pedestrian and seating comfort criteria and would not eliminate all existing wind speed exceedances of the comfort criteria.

Mitigation: None required.

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288 As noted in the discussion of Methodology, additional points in publicly accessible open spaces were tested in the project (Transit Tower) and cumulative (Transit Center District Plan) scenarios.

Transit Tower Cumulative Analysis and Transit Center District Plan

Impact WI-2: Implementation of the draft Plan would not cause large increases in pedestrian wind speeds or wind speeds in publicly accessible open spaces over a substantial portion of the Plan area. (Less than Significant with Mitigation)

The cumulative scenario tested in the wind tunnel represents a cumulative condition for the Transit Tower and also represents assumed buildout under the draft Plan, in that this test scenario included massing models of all projects in the Plan area within the Transit Tower test area (within about one block) for which plans are currently on file with the Planning Department, as well as massing models on sites in the Plan area assumed for ultimate development, and massing models of projects in Zone 1 of the approved Transbay Redevelopment Plan, primarily along the southern edge of the Plan area. This cumulative test scenario included the following potential future developments in the vicinity of the Transit Tower project site: an approved 360-foot-tall building at 350 Mission Street, diagonally across the Mission/Fremont Streets intersection from the Transit Tower site;[289] two towers on a site a the northwest corner of First and Mission Streets (915 feet [including sculptural elements] and 605 feet); a 700-foot tower on the Golden Gate University site; a 700-foot tower at 181 Fremont Street; a 400-foot building at 41 Tehama Street, an approved 350-foot building at 222 Second Street, a 350-foot building at 201 Second Street, two towers on the north side of Howard Street between First and Second Streets (750 feet and 400 feet), a 600-foot tower addition to the southwest corner of the Palace Hotel on New Montgomery Street, and six towers in Zone 1 of the Redevelopment Plan. As stated previously, the actual building designs proposed were not included in this analysis; instead, models used simulated the anticipated generalized massing. (Because of physical limitations on the size of the wind-tunnel test equipment, other potential development in the far western portion of the Plan area, west of New Montgomery Street, and cumulative projects farther west, were not included because their locations are too far from the center of the test area.)

Under this cumulative scenario, the average wind speed would increase by about 1 mph, compared to with-Tower conditions, and by 1.5 mph, compared to existing conditions, to 10.9 mph. Compared to the Tower-only scenario, wind speeds would increase at 89 of 207 test locations and decrease at 76 locations, while remaining unchanged at 42 locations. Compared to existing conditions, wind speeds would increase under cumulative conditions at 95 locations, decrease at 59 locations, and remain unchanged at 18 locations. Under the cumulative scenario, wind speeds would exceed the comfort criteria at 117 of the 207 test points (57 percent), an increase of 16 exceedance locations compared to existing-plus-Tower conditions. The wind speeds exceeded 10 percent of the time at the 207 test points would range from 4 to 20 mph, similar to the range of 4 to 19 mph under Tower-only conditions, and a lesser maximum wind speed than the range of 5 to 24 mph under existing conditions. The highest winds speed would be at a location along the southern edge of City Park atop the Transit Terminal (point #28), proximate to two development sites immediately south of the Transit Center: a site known as Parcel F, a site owned by the

[289] It is noted that the Transit Center District Plan calls for a 700-foot-tall building on the 350 Mission Street project site. However, because a shorter building was approved by the Planning Commission in February 2011, that approved project was included in the cumulative wind-tunnel analysis.

Transbay Joint Powers Authority that is proposed under the draft Plan for a height limit of 750 feet, and a site referred to as 524 Howard Street. At these locations, winds would exceed 20 mph 10 percent of the time. Winds at these locations would increase by the greatest amount—up to a 12 mph increase—and would range between 12 mph and 20 mph, compared to 8 mph to 11 mph under existing conditions. Winds at three of these locations would approach the hazard criterion. However, there would be no exceedances of the hazard criterion at any location in City Park, under any of the three test scenarios.

The models of these buildings were regular, rectilinear shapes and did not incorporate façade articulation or setbacks called for in the draft Plan, and therefore the wind-tunnel test results likely present a conservative picture of potential future wind conditions. It is likely that actual building designs, when proposed, could be sculpted to reduce wind speeds, compared to those reported here.

City Park

In City Park, wind speeds would range from 5 to 20 mph, compared to 4 to 14 mph with the Transit Tower alone and 6 to 12 mph under existing conditions. Wind speeds would increase, compare to Tower-only conditions, at 40 of 50 points, and at 26 of 40 points, compared to existing conditions. The 7-mph seating comfort criterion would be exceeded at 90 percent (45 of 50) of the test locations in City Park. The wind speed exceeded 10 percent of the time would increase by more than 3 mph, compared to existing conditions, at almost all of the points from the Transit Center to the west. In particular, wind speeds would increase by more than 5 mph at 16 locations in City Park, compared both to conditions with the Transit Tower, and to existing conditions. All of these increases would be at locations upwind of the Transit Tower and near TJPA Parcel F and 524 Howard Street. As noted above, the cumulative scenario was analyzed using massing models (i.e., rectilinear shapes to represent the height and bulk of potential future building) that do not reflect specific design or sculpting that may be proposed for specific projects. In the case of Parcel F and 524 Howard Street, there is neither a project sponsor nor an actual design on file with the Planning Department. Therefore, the analysis is considered conservative, and it is possible that specific building designs, especially if they were to include a podium, setbacks, and/or substantial articulation of the facades, could perform substantially better, in terms of effects on wind speeds in City Park, than the results here indicate. This analysis does indicate, however, that the design of buildings on these two sites should carefully consider potential wind effects in City Park and incorporate wind-tunnel testing as part of design development.

Other Open Spaces

Concerning wind speeds at other seating (open space) locations, the cumulative scenario found that the average wind speed at these locations would decrease slightly (by less than 1 mph), compared to both the Tower-only condition (with the Transit Tower only) and existing conditions. Wind speeds would decrease at more locations than where speeds would increase, and the number of exceedances of the comfort criterion would drop, compared to the Tower-only scenario, from 34 to 32. (Compared to existing conditions, the number of exceedances would increase from 17 to 32 because of the increased number test points, but the percentage would be similar—91 percent, compared to 89 percent under the existing scenario.)

Sidewalk Locations

At sidewalk locations, compared to conditions with the Transit Tower, wind speeds would increase by more than 3 mph at 19 locations, and by more than 5 mph, at five locations. Compared to existing conditions, wind speeds would increase by more than 3 mph at 19 sidewalk locations, and by more than 5 mph, at nine locations. All but one of the nine largest increases, like the greatest increases in City Park, were identified adjacent to the Parcel F and 524 Howard Street sites. At these eight locations, average wind speeds would increase by as much as 10 mph, compared to the Tower-only scenario, and by up to 12 mph, compared to existing conditions. As stated above, these results can be considered conservative, given the massing of the models tested in the wind tunnel, but are indicative of the potential for strong winds near these sites. The ninth location with an increase of more than 5 mph was on Howard Street between First and Fremont Streets, where the increase was 3 mph, compared to Tower-only conditions, and 7 mph, compared to existing conditions. No hazard criterion exceedances were identified at any of these nine locations.

As with the Transit Tower scenario, under the cumulative (Plan) scenario, wind speeds would generally decrease along Beale Street between Mission and Howard Streets.

Under the cumulative scenario, one exceedances of the wind hazard criterion was identified. This location is on the east side of First Street between Mission and Market Streets (point #101), where the *Planning Code* 26-mph hazard criterion would be exceeded for three hours per year. However, wind-tunnel testing undertaken for the 50 First Street project (Case No. 2006.1523E) shortly after the Transit Tower wind-tunnel test was conducted—and using a scale model of the actual project proposed at 50 First Street, which features a sculpted form and not the rectilinear design included in the cumulative scenario test for this analysis—identified no hazard exceedance at either of two test points within approximately 50 feet of the location where a hazard exceedance was identified in this cumulative analysis. Additionally, the 50 First Street test consistently identified average wind speeds some 3 mph or more lower along both sides of First Street than were identified in this cumulative scenario. Such a finding is consistent with the design of the 50 First Street project as proposed, which does not comprise rectilinear shapes but instead has irregular, curved facades, and would thus be expected to perform better, in terms of its effects on ground-level winds, than the massing model included in the cumulative scenario tested for this analysis. Accordingly, although the cumulative test indicates that the Plan could result in a new exceedance of the *Planning Code* hazard criterion, this effect is judged to be avoidable through design of subsequent projects, in compliance with Section 148 of the *Planning Code* and with implementation of Mitigation Measure M-WI-2.

Mitigation Measure

M-WI-2: **Tower Design to Minimize Pedestrian Wind Speeds:** As part of the design development for buildings on Parcel F and at the 524 Howard Street, 50 First Street, 181 Fremont Street and Golden Gate University sites, the project sponsor(s) shall consider the potential effect of these buildings on pedestrian-level winds and on winds in the City Park atop the Transit Center. If wind-tunnel testing identifies adverse impacts, the project sponsor(s) shall conduct additional mitigation testing to resolve impacts to the maximum degree possible and to the satisfaction of Planning Department staff. Design features could include, but not be limited to, setting a tower atop a podium, which can interfere with "downwash" of winds from higher elevations toward the ground; the use of setbacks on tower facades, particularly those facades facing into prevailing winds, which can have similar results; using chamfered and/or rounded corners to minimize the acceleration of upper-level winds as they round corners; façade articulation; and avoiding the placement of large, unbroken facades into prevailing winds.

Level of Significance After Mitigation

Implementation of the above measure, along with compliance, as required, with Section 148 of the *Planning Code*, would reduce potential wind impacts of the draft Plan to a less-than-significant level.

Cumulative Plan Area Analysis

Impact C-WI: Implementation of the draft Plan and the proposed Transit Tower, along with cumulative development, would neither cause large increases in ground-level wind speeds over a substantial portion of the Plan area, nor result in a new exceedance of the wind hazard criterion. (Less than Significant with Mitigation)

Concerning portions of the Plan area outside the area covered by the wind-tunnel test, the qualitative analysis found that wind conditions would not be expected to change substantially in the northwest portion of the Plan area, except in the immediate vicinity of a project that would add a residential tower to the southwest corner of the existing Palace Hotel; however, while pedestrian wind speeds would increase on Jessie and Annie Streets at the base of the proposed tower, no new exceedances of the *Planning Code* hazard criterion are anticipated, based on preliminary wind-tunnel analysis for a proposed project at 706 Mission Street at Third Street, just west of the Plan area (Case No. 2008.1084).

The qualitative analysis found that wind speeds could increase, compared to existing conditions, in the southwestern part of the Plan area, in the area between Howard and Folsom Streets and west of New Montgomery Street. These increases would largely result from potential cumulative development outside the Plan area, including a potential project at Third and Folsom Streets that might include three mixed-use towers in conjunction with expansion of Moscone Convention Center. However, wind-tunnel testing undertaken in connection with the proposed expansion of the Museum of Modern Art (Case Nos. 2009.0291E and 2010.0275E), to a site on Howard Street east of Third Street, indicates that no significant effects would ensue on Howard Street or elsewhere from cumulative development. Testing did not extend as far south as Folsom Street; however, the mixed-use project proposed in connection with Moscone Center expansion would be subject to project-specific wind-tunnel testing and compliance with Section 148 to ensure that no significant impacts would occur.

The qualitative analysis found that northeast portion of the Plan area, east of Beale Street, could experience increased wind speeds, compared to existing conditions, as a result of development north of the new Transit Center, between Fremont and Second Streets. However, the more detailed results of the wind-tunnel test undertaken for this analysis, as well as detailed project-specific wind-tunnel testing for the approved 350 Mission Street project, reveal a less-than-significant overall anticipated increase in wind speeds proximate to the anticipated new development, including the Transit Tower. Farther east, along Main and Spear Streets, the Plan area is largely built out, and no new towers exceeding prevailing building heights are anticipated. Therefore, no significant wind impacts are expected.

The southeast portion of the Plan area could also experience increased wind speeds, compared to existing conditions, particularly from development approved in Zone 1 of the Transbay Redevelopment Area. However, wind-tunnel testing conducted for the EIR for the redevelopment plan (Case No. 2000.0048E) found that wind speeds in Zone 1 were anticipated to increase by 3 to 4 mph at most, and would not result in any exceedances of the *Planning Code* hazard criterion. Accordingly, no significant impacts were identified in that EIR.

It is noted that fog plays a major role in San Francisco's weather, and in the comfort that pedestrians experience on the sidewalk and in seating areas. Wind-tunnel testing is performed based on actual wind-speed data collected over a five-year period at the Old Federal Building in the Civic Center. The correlation between fog and wind speed is implicit in the actual wind speed – frequency distributions used in the analysis methodology; that is, fog is more likely to be present during the summer, when westerly winds prevail, whereas there is less chance of fog during strong winter storm winds. However, because the wind test results represent conditions over a full year, it is not possible to confirm the presence or absence of fog at a given time during the year.

Mitigation Measure

M-C-WI: Implement Mitigation Measure M-WI-2.

Level of Significance After Mitigation

Implementation of the above measure, along with compliance, as required, with Section 148 of the *Planning Code*, would reduce potential wind impacts of the draft Plan to a less-than-significant level.

Summary

In summary, neither the proposed Transit Tower project nor the Transit Center District Plan would significantly affect ground–level winds such that mitigation would not be feasible. Although both average wind speeds and the number of exceedances of the pedestrian comfort criteria would increase from existing conditions to and existing-plus-project and cumulative conditions, the increases would not be large and would not be expected to affect the use of sidewalks or publicly accessible open spaces, with the possible exception of areas proximate to Parcel F and the 524 Howard Street site. As stated above, implementation of the Mitigation Measure M-WI-2, along with compliance, as required, with Section 148 of the *Planning Code*, would reduce potential wind impacts of the draft Plan to a less-than-significant level.

Under existing, project (Transit Tower), and cumulative (draft Plan) conditions, the Plan area would be moderately windy. Under existing and project conditions, just over one-half of the test points meet the applicable *Planning Code* comfort criterion; this figure would decrease to 44 percent under cumulative (Plan) conditions. Under existing conditions, 90 percent of the test points in City Park on the roof of the Transit Center exceed the 7-mph seating criterion. The Transit Tower (project) scenario would increase the average wind speed in City Park by about 1.2 mph but, because wind speeds would decrease at about several locations where the existing speed is just above 7 mph, the Transit Tower (project) scenario would have fewer exceedances of the seating comfort criterion—37 of 50 locations, compared to 45 of 50 under existing conditions. In the cumulative (Plan) scenario, 45 of 50 points in City Park would exceed the 7-mph seating criterion, the same number as under existing conditions, but the average wind speed would be nearly 4 mph greater than under existing conditions and 2.6 mph greater than with the Transit Tower. There would be no exceedances of the hazard criterion at any location in City Park, under any of the three test scenarios.

Other publicly accessible open spaces would be windier under the project (Transit Tower) scenario than under the cumulative scenario; in both cases, more than 90 percent of points tested would exceed the 7-mph seating criterion, compared to 89 percent under existing conditions. The average wind speed at these points would increase from 11.2 mph under existing conditions to 11.5 mph with the proposed Transit Tower, and would decrease to 11.1 mph with Plan area development. Concerning pedestrian locations where the applicable comfort criterion is 11 mph, the percentage of test points where the 11-mph criterion is exceeded would increase from 17 percent under existing conditions to 25 percent with the Transit Tower and 33 percent with Plan area development. The average wind speed at the sidewalk test points would increase from 9.3 mph under existing conditions to 9.4 mph with the proposed Transit Tower, and to 10.1 mph with Plan area development.

The Transit Tower project would not result in any new exceedances of the wind hazard criterion. Under cumulative conditions, one hazard exceedance was identified, which appears to be avoidable through design of subsequent towers, notably a proposed project at 50 First Street.

As explained in the discussion of Methodology, above, the cumulative (Plan) scenario tested in the wind tunnel was based on simplified massing models of potential development on specified sites in the Plan area. These models were regular, rectilinear shapes and did not incorporate façade articulation of setbacks called for in the draft Plan, and therefore the wind-tunnel test results likely present a conservative picture of potential future wind conditions. It is likely that actual building designs, when proposed, could be sculpted to reduce wind speeds, compared to those reported here.

Based on the foregoing, effects related to wind would be less than significant with incorporation of mitigation identified in this EIR.

J. Shadow

This section describes shadow effects on publicly accessible areas, including public parks, publicly-accessible private open spaces, and sidewalks.

Setting

Open space in the Plan area is limited. Generally, the open space that exists nearby is in the form of publicly accessible, privately owned open space developed, in accordance with the Downtown Plan and *Planning Code*, in conjunction with newer office buildings. **Figure 59** depicts open spaces in the Plan area. There are no public parks or other public open spaces in the immediate project vicinity. The nearest public open space is Yerba Buena Gardens, a San Francisco Redevelopment Agency property, at Third and Howard Streets, one block west of the project site. Across Mission Street to the north of Yerba Buena Gardens is Jessie Square, an open space south of the Contemporary Jewish Museum. The new Transit Center will include a public park ("City Park") located on the roof of the terminal, approximately 70 feet above grade level. Rincon Park, a Redevelopment Agency property, is located along the Embarcadero between Mission and Harrison Streets.[290] Ferry Plaza is a Port-owned public open space on the Bay side of the Ferry Building. Smaller public open spaces include Hallidie Plaza at Powell and Market Streets and the Mechanics Plaza at Battery, Bush, and Market Streets. The Plan area and vicinity also contains numerous privately owned publicly accessible open spaces (sometimes known as POPOS) that have been developed in conjunction with office towers built over approximately the last 40 years. These open spaces are shown on Figure 59.

Regulatory Framework

Sunlight Ordinance

Section 295 of the Planning Code, the Sunlight Ordinance, was adopted through voter approval of Proposition K in November 1984 to protect certain public open spaces from shadowing by new structures. Section 295 generally prohibits the issuance of building permits for structures or additions to structures greater than 40 feet in height that would shade property under the jurisdiction of or designated to be acquired by the Recreation and Park Commission, during the period from one hour after sunrise to one hour before sunset. Section 295(b) states that the Planning Commission, following a public hearing, "shall disapprove" any project governed by this section that would have an "adverse effect" due to shading of a park subject to Section 295, "unless it is determined that the impact would be insignificant." The Planning Commission's decision under Section 295 cannot be made "until the general manager of the Recreation and Park Department in consultation with the Recreation and Park Commission has had an opportunity to review and comment to the City Planning Commission upon the proposed project." None of the open spaces in the Plan area identified above is subject to Section 295.

[290] This park contains two buildings housing restaurants that occupy much of the park south of Folsom Street.

NOTE: Open Spaces Not to Scale and Locations May not be Exact

1 595 Market Street
2 555 – 575 Market Street (former Chevron buildings)
3 525 Market Street
4 55 Second Street
5 71 Stevenson Street
6 49 Stevenson Street
7 560 Mission Street
8 Golden Gate University
9 25 Ecker Street
10 425 Market Street
11 50 Fremont Street (Fremont Center Plaza)
12 333 Market Street
13 45 Fremont Street
14 50 Beale Street (Bechtel Plaza)
15 PG&E (77 Beale Street)
16 One Market Plaza
17 101 Second Street
18 555 Mission Street
19 100 First Street Plaza
20 Foundry Square
21 199 Fremont Street
22 201 Mission Street
23 301 Howard Street
24 135 Main Street
25 123 Mission Street
26 Spear Street
27 180 Howard Street
28 Rincon Center
29 235 Second Street (CNet/CBS Interactive)
30 211 Main Street
31 221 Main Street
32 201 Spear Street (Gap Building)

SOURCE: San Francisco Planning Department; ESA

Case Nos. 2007.0558E and 2008.0789E: Transit Center District Plan and Transit Tower . 207439

Figure 59
Open Space in Plan Area

In 1989, the two Commissions adopted shadow criteria for 14 downtown parks, including an Absolute Cumulative Limit for new shadow for each open space and qualitative criteria for assessing new shadow. The sunlight on a park is measured in terms of "square-foot-hours" of sunlight, while the shadow load is measured in terms of "shadow-foot-hours." A square-foot-hour of sunlight is one hour of sunlight on one square foot of ground, while a shadow-foot-hour represents one hour of shade on one square foot of ground. For projects that would affect parks for which a quantitative limit was established, shadow impacts have typically been judged less than significant if the project would not exceed the Absolute Cumulative Limit. In establishing the Absolute Cumulative Limits for the downtown parks, the commissions generally relied upon the following guidelines: for smaller parks (of less than two acres) on which more than 20 percent of the potential "Prop. K" sunlight was in shadow under then-existing conditions, no additional shadow was to be permitted. (This standard was applied to nine downtown parks.) For larger parks (of two acres or more) with between 20 percent and 40 percent existing shadow, the Absolute Cumulative Limit was to be set at 0.1 percent; that is, an additional 0.1 percent new shadow, measured in shadow-foot-hours, would be permitted beyond existing conditions.[291] The increment permitted as the Absolute Cumulative Limit—0.1 percent, in this case—is measured as a percentage of the theoretical annual available sunlight.[292] For larger parks shadowed less than 20 percent of the time,[293] an additional 1.0 percent new shadow was to be permitted.[294] No guideline was provided for parks of less than two acres that have less than 20 percent existing shadow.[295]

There are no parks subject to Section 295 within the Plan area. Yerba Buena Gardens, just west of the Plan area, is under the jurisdiction of the San Francisco Redevelopment Agency and is not subject to Section 295. The nearest parks subject to Section 295 are Union Square; Justin Herman Plaza, at the foot of Market Street; St. Mary's Square, on Pine Street near Kearny Street; Portsmouth Square, at Clay and Kearny Streets; Willie "Woo Woo" Wong Playground (formerly Chinese Playground), between Sacramento and Clay Streets and Stockton Street and Grant Avenue; Chinese Recreation Center, a partially indoor facility at Washington and Mason Streets (under renovation and scheduled to reopen in 2012); Woh Hei Yuen Recreation Center and Park, on Powell Street between Jackson Street and Pacific Avenue; Maritime Plaza, an elevated park between Battery and Davis Streets and Clay and Washington Streets; Sue Bierman Park, between the Embarcadero and Drumm Streets at Clay Street; Boeddeker Park, on the block bounded by Ellis, Eddy, Jones, and Taylor Streets; Huntington Park, between California and

291 This criterion applied to Union Square and Embarcadero Plaza II (Justin Herman Plaza). Two other parks, Washington Square and North Beach Playground, were not permitted new shadow because height limits precluded the possibility of new shadow on those parks.

292 The theoretical annual available sunlight is the amount of sunlight, measured in square-foot-hours, that would fall on a given park during the hours covered by Section 295. It is computed by multiplying the area of the park by 3,721.4, which is the number of hours in the year subject to Section 295. Thus, this quantity is not affected by shadow cast by existing buildings, but instead represents the amount of sunlight that would be available with no buildings in place. Theoretical annual available sunlight calculations for each downtown park were used by the Planning and Recreation and Park Commissions in establishing the allowable Absolute Cumulative Limit for downtown parks in 1989.

293 Civic Center Plaza was the only park in this category.

294 The guidelines for new shadow were presented in a memorandum to the Planning and Recreation and Parks Commissions, from their staffs, dated February 3, 1989, and referred to in Joint Resolution 11595 of the two commissions, adopted February 7, 1989.

295 None of the 14 downtown parks for which Absolute Cumulative Limits were established met these criteria.

Sacramento Streets and Taylor and Mason Streets; Gene Friend Recreation Center, at Sixth and Folsom Street; and South Park, in the center of the block bounded by Second, Third, Bryant, and Brannan Streets. The latter two parks, because they are well south of the Plan area, would not be affected by shadows from development in the Plan area.

Other Planning Code Regulations

Planning Code Section 146(a), applicable to certain streets in the C-3 zoning districts, requires that buildings and additions fit within an envelope defined by a plane sloping away from the street at a prescribed angle above a prescribed height "in order to maintain direct sunlight on public sidewalks in certain downtown areas during critical periods of use." In the Plan area, Section 146(a) applies to the west side of New Montgomery Street and the west side of Second Street (to a point 300 feet south of Folsom Street), specifying that buildings be within an envelope that slopes away from the street at an angle of 62 degrees from horizontal beginning at 132 feet above grade. Section 146(a) also applies to portions of Bush, Sutter, Post, Geary, O'Farrell, Ellis, Powell, Stockton, and Kearny Streets and Grant Avenue. Under Section 146(b), an exception to the foregoing may be granted, pursuant to the procedures of Section 309, Permit Review in C-3 Districts, if no new shadow is created, or if "the shadow created by the penetration of the plane is deemed insignificant because of the limited extent or duration of the shadow or because of the limited public use of the shadowed space." Section 146(c) states that, on other streets in the C-3 districts, "New buildings and additions to existing buildings shall be shaped, if it can be done without creating an unattractive design and without unduly restricting the development potential of the site in question, so as to reduce substantial shadow impacts on public sidewalks." A determination of compliance with Section 146(c) is made as part of the Section 309 project consideration process.

Planning Code Section 147, applicable to the C-3, RSD, SLR, SLI, or SSO zoning districts, where height limits are greater than 40 feet, requires that all new development and additions to existing structures where the height exceeds 50 feet must be shaped to minimize shadow on public plazas or other publicly accessible open spaces other than those protected by Section 295, "in accordance with the guidelines of good design and without unduly restricting the development potential of the property." The following factors must be taken into account in determining compliance with this criterion: the amount of area shadowed, the duration of the shadow, and the importance of sunlight to the type of open space being shadowed. A determination of compliance with Section 147 is made as part of the Section 309 project consideration process.

Impacts

Significance Criteria

The proposed project would have a significant shadow impact if it were to create new shadow in a manner that would:

- Affect, in an adverse manner, the use of any park or open space under the jurisdiction of the Recreation and Park Department; or

- Substantially affect the usability of other existing publicly accessible open space or outdoor recreation facilities or other public areas.

Plan Analysis

Impact SH-1: The draft Plan would adversely affect the use of various parks under the jurisdiction of the Recreation and Park Department and, potentially, other open spaces. (Significant and Unavoidable)

Shadow effects of the draft Plan were analyzed by computer generation of shadows that would be cast by the proposed Transit Tower as well as shadows that would be cast by other buildings that could be built with implementation of the draft Plan, as described in the discussion of Analysis Assumptions at the start of Chapter IV (p. 72). For potential future buildings other than the Transit Tower, shadows analyzed are based on massing models representative of potential future development in the Plan area. Each individual development project that is proposed in the Plan area would be subject to *Planning Code* Sections 295, 146, and 147, and therefore project-specific shadow impacts would be analyzed at such a time as a subsequent project is being reviewed by the Planning Department.

As described below and depicted in **Figures 60 – 62**, shadow from several potential future Plan area buildings at 500 feet in height or greater would reach a number of parks subject to Section 295 controls, including Union Square, Justin Herman Plaza, Portsmouth Square, St. Mary's Square, Maritime Plaza, and Boeddeker Park. Figures 60 through 62 depict shadow from the proposed project for representative times of day during the four seasons: in December, on the winter solstice, the midday sun is at its lowest and shadows are at their longest, while on the summer solstice in June, the midday sun is at its highest and shadows are at their shortest. Shadows are also shown at the spring equinox, when shadows are midway through a period of shortening, and at the fall equinox, when shadows are midway through a period of lengthening. Shadows on any other day of the year would be within the range of shadows presented in Figures 60 through 62. In some cases, new shadow would fall on parks during times not portrayed in the figures. **Table 41**, p. 523, summarizes shadow impacts on the affected parks.

With one exception, shadow from any given potential building would cover part of any affected Section 295 park for less than 90 minutes per day over a period of time ranging from 2 to 16 weeks (one-half to almost four months) per year; the exception would be that Union Square would be newly shaded by up to about one hour per day, over a period of six months, by a 600-foot tower addition to the southwest corner of the Palace Hotel on New Montgomery Street.[296] Most new shadow on Section 295 parks would be in the early morning hours, except that Justin Herman Plaza would be newly shaded in the early afternoon in late fall and early winter.

[296] A project on file at this location (Case No. 2005.1101E) proposes a 710-foot-tall residential tower at this location. This project is discussed under Alternative C, Developer-Proposed Scenario, in Chapter VI, p. 665.

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 60-A

June 21 - Sunrise + 1 Hour

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 60-B
June 21 - 7AM

0 1000 Feet

Net New Shadow

Shadow Outline from New Buildings

Existing Shadow

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 60-C
June 21 - 8AM

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 60-D

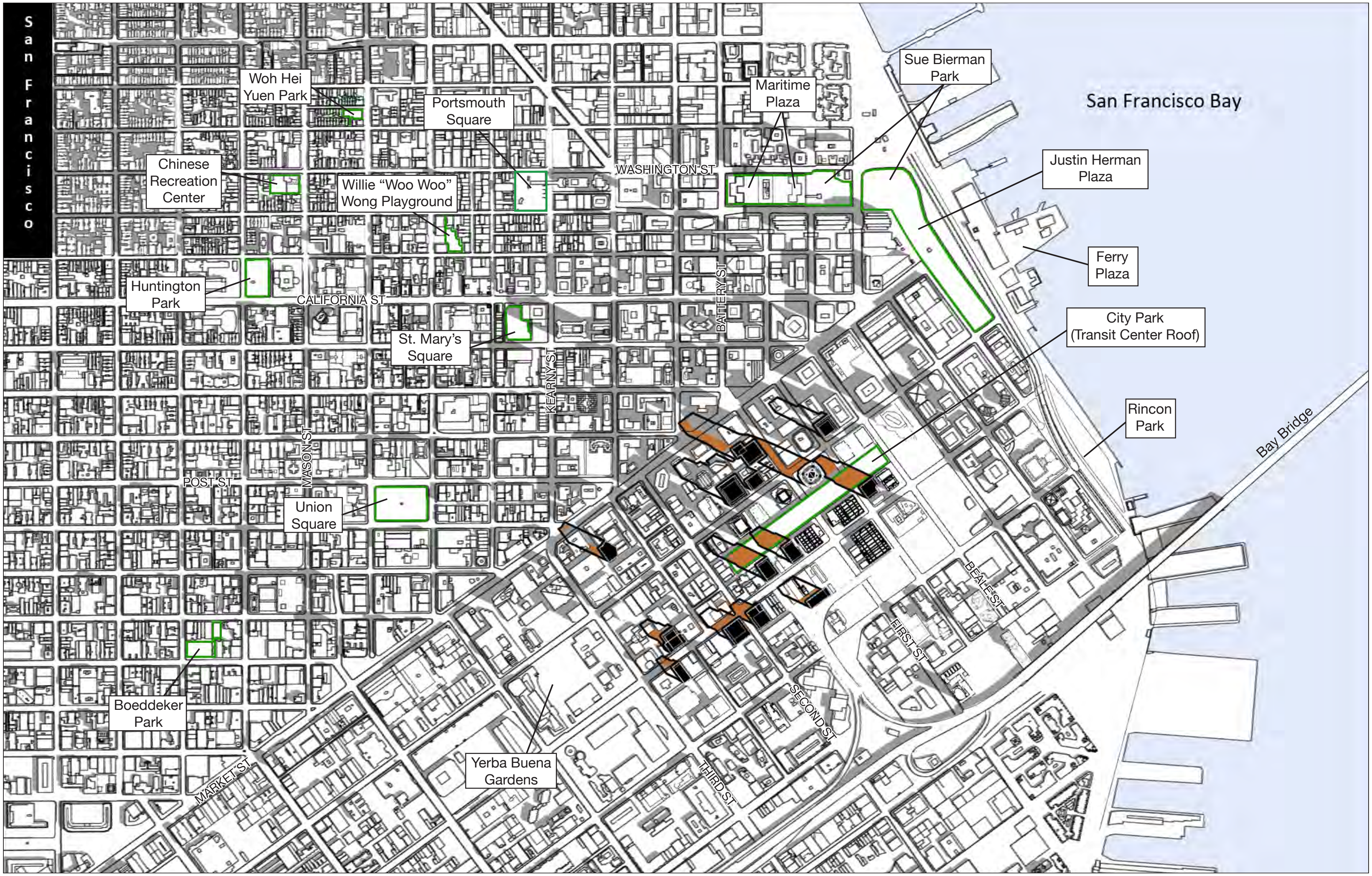
June 21 - 9AM

475

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 60-E
June 21 - 10AM



0 1000 Feet

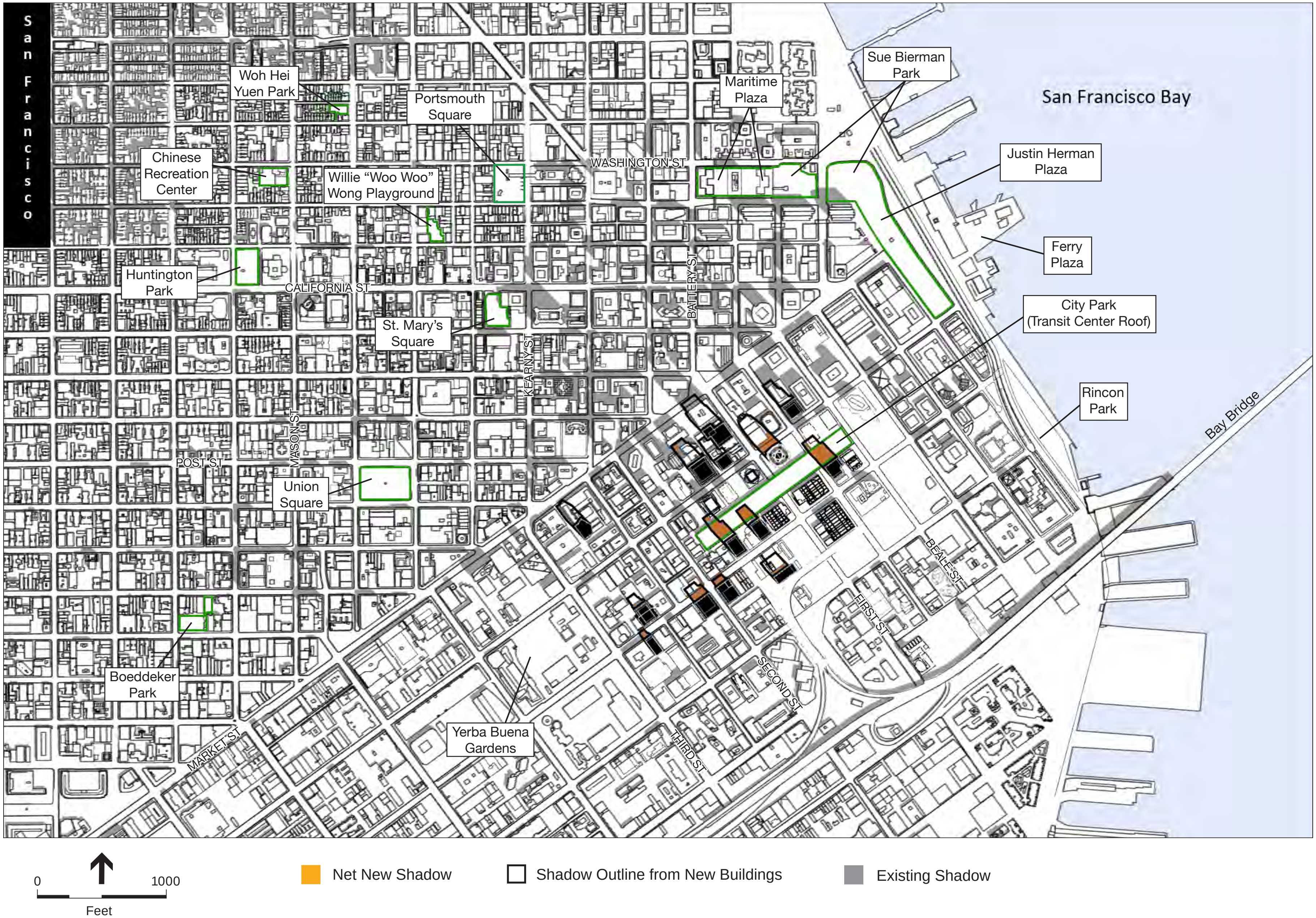
Net New Shadow | Shadow Outline from New Buildings | Existing Shadow

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 60-F

June 21 - 11AM



SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 60-G
June 21 - 12 Noon

0 1000
Feet

Net New Shadow
Shadow Outline from New Buildings
Existing Shadow

SOURCE: CADP

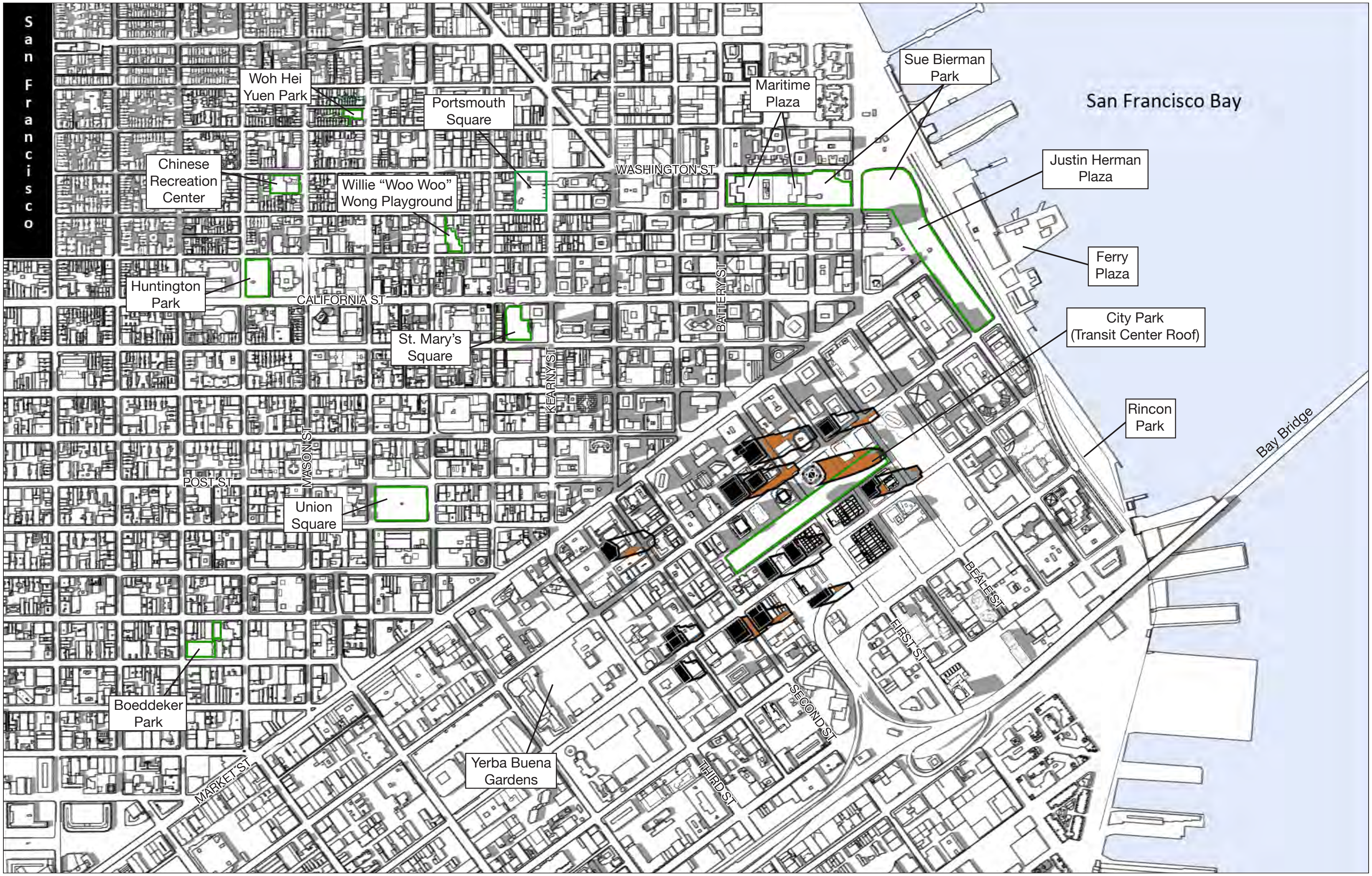
Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 60-H
June 21 - 1PM

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 60-I
June 21 - 2PM



0 1000 Feet

Net New Shadow

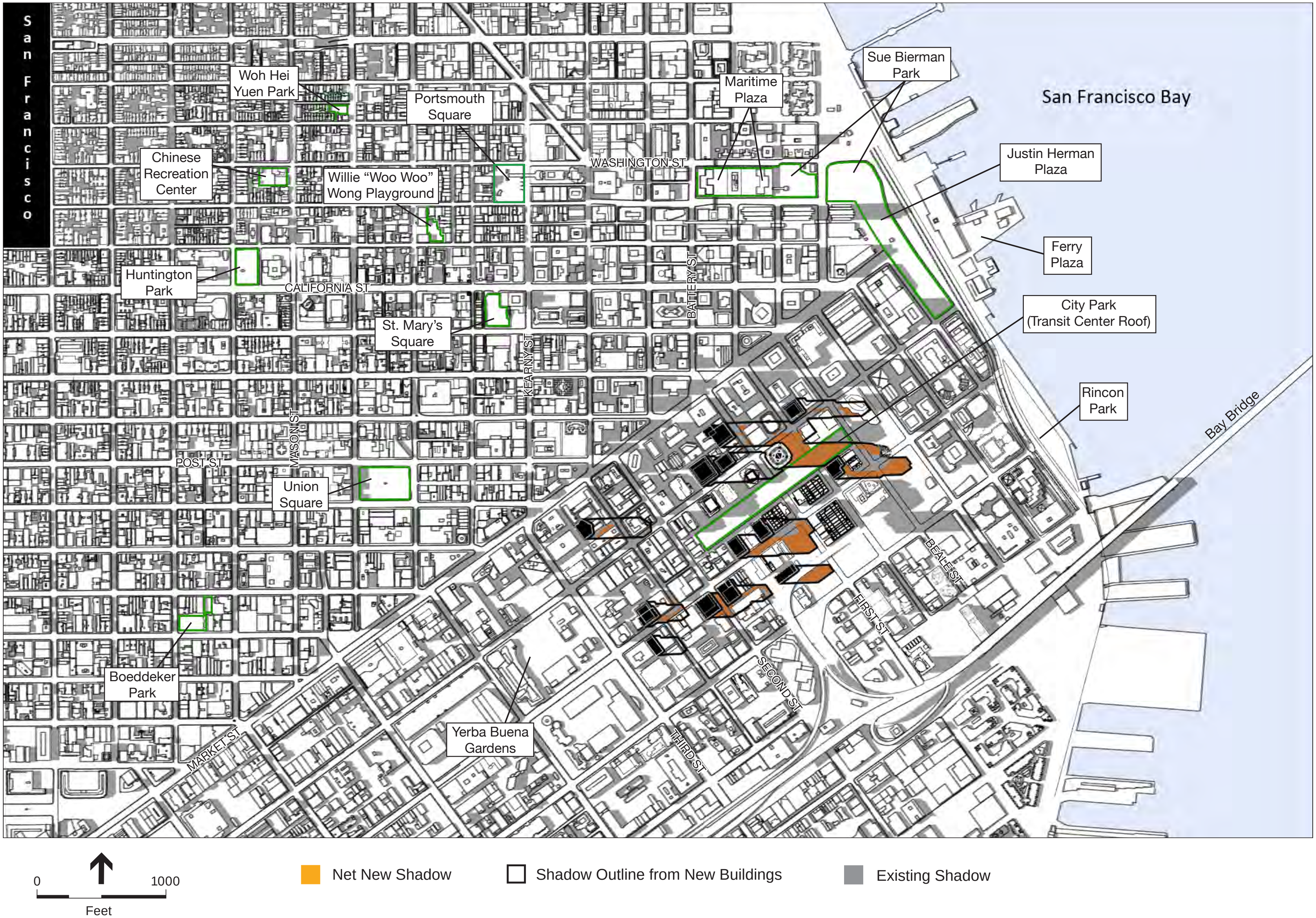
Shadow Outline from New Buildings

Existing Shadow

SOURCE: CADP

Figure 60-J

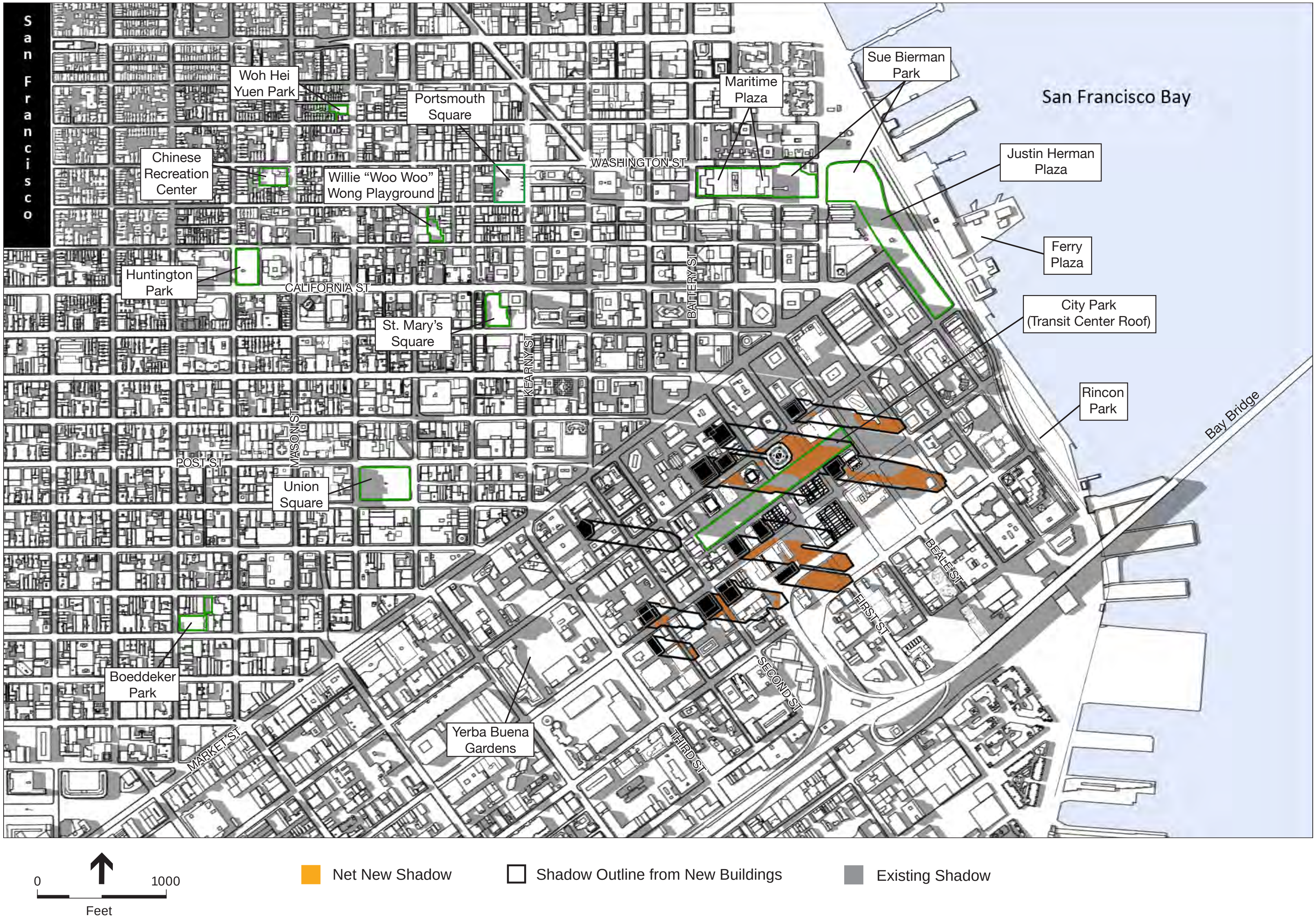
June 21 - 3PM



SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

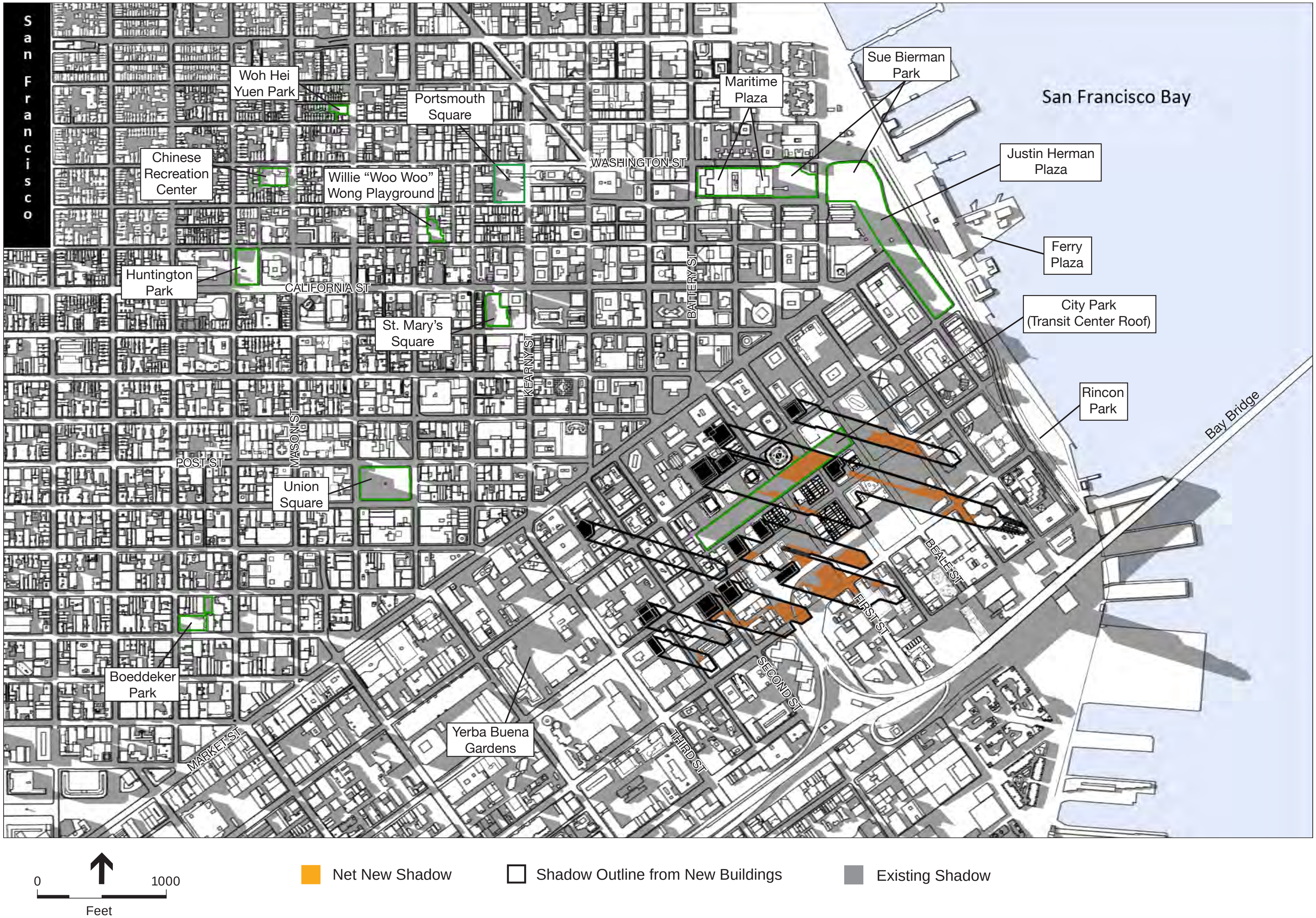
Figure 60-K
June 21 - 4PM



SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 60-L
June 21 - 5PM



483

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 60-M
June 21 - 6PM

0 1000 Feet

Net New Shadow | Shadow Outline from New Buildings | Existing Shadow

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

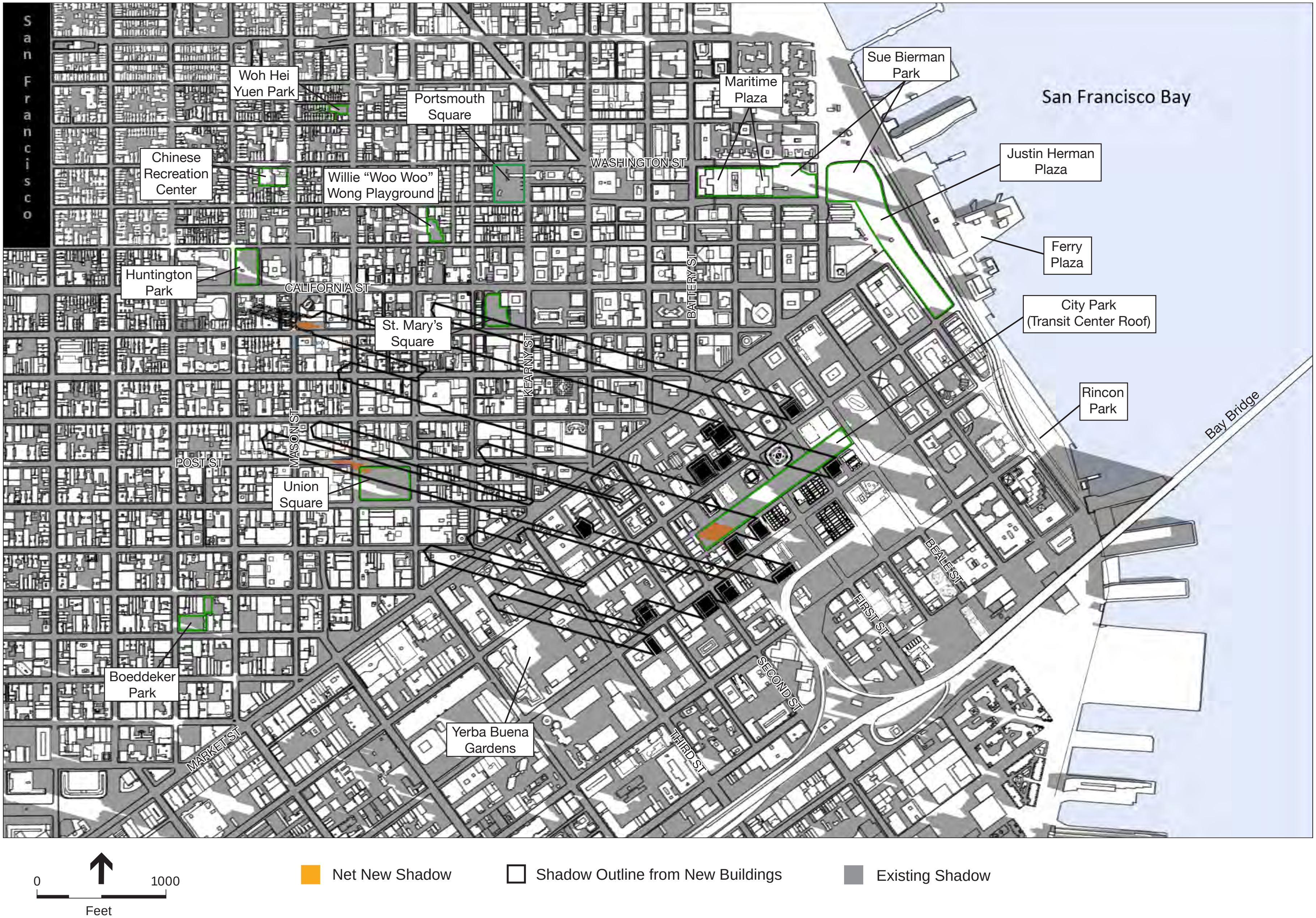
Figure 60-N
June 21 - 7PM

0 1000
Feet

Net New Shadow
Shadow Outline from New Buildings
Existing Shadow

SOURCE: CADP

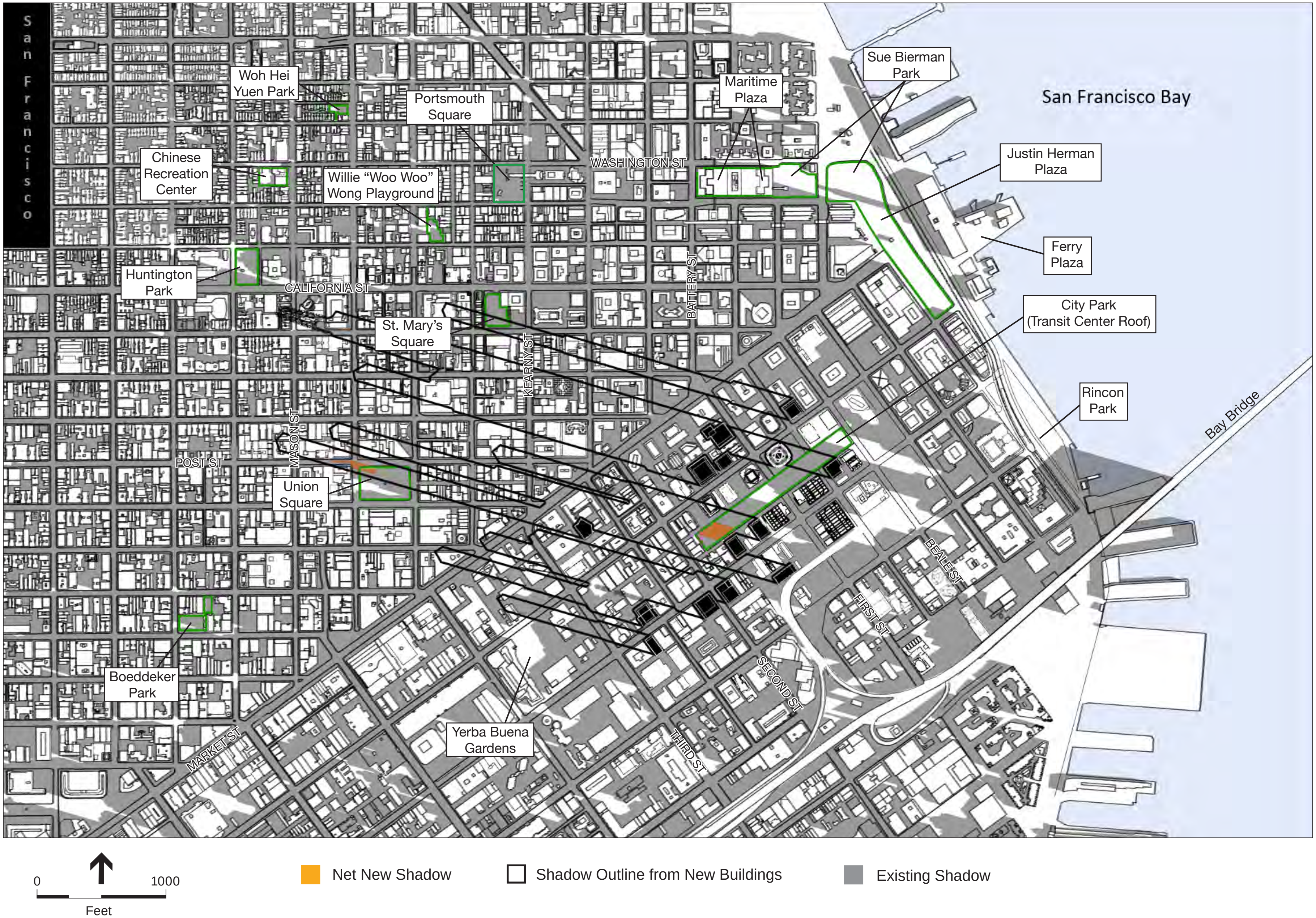
Figure 60-O
June 21 - Sunset -1 Hour



SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 61-A
September 21 - Sunrise +1 Hour
(March 21 Similar)



SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 61-B
September 21 - 8AM
(March 21 Similar)

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 61-C
September 21 - 9AM
(March 21 Similar)

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 61-D
September 21 - 10AM
(March 21 Similar)

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 61-E
September 21 - 11AM
(March 21 Similar)

SOURCE: CADP

Figure 61-F
September 21 - 12 Noon
(March 21 Similar)

0 1000
Feet

Net New Shadow

Shadow Outline from New Buildings

Existing Shadow

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

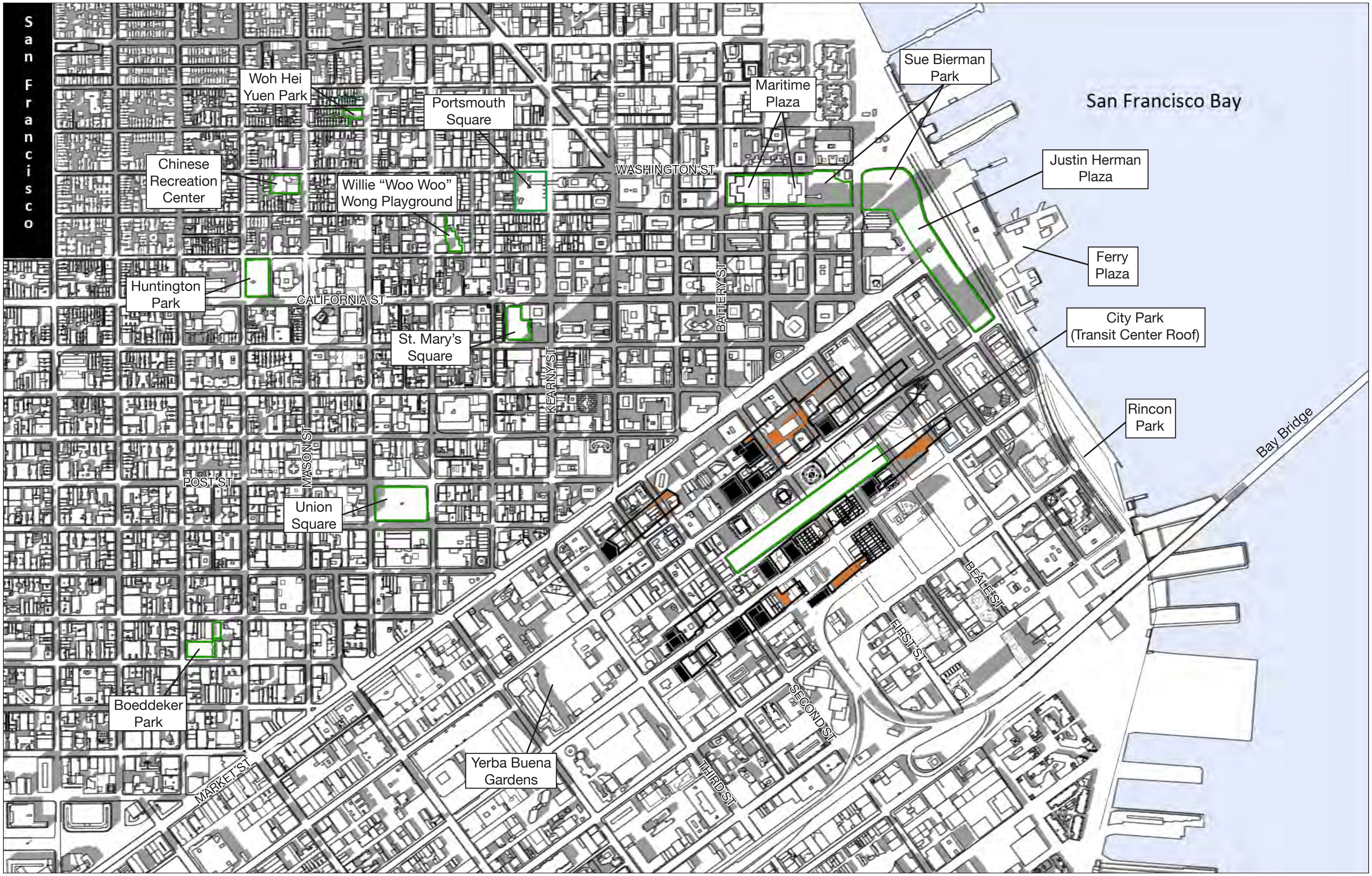
SOURCE: CADP

Figure 61-G
September 21 - 1 PM
(March 21 Similar)

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 61-H
September 21 - 2 PM
(March 21 Similar)



0 1000
Feet

Net New Shadow

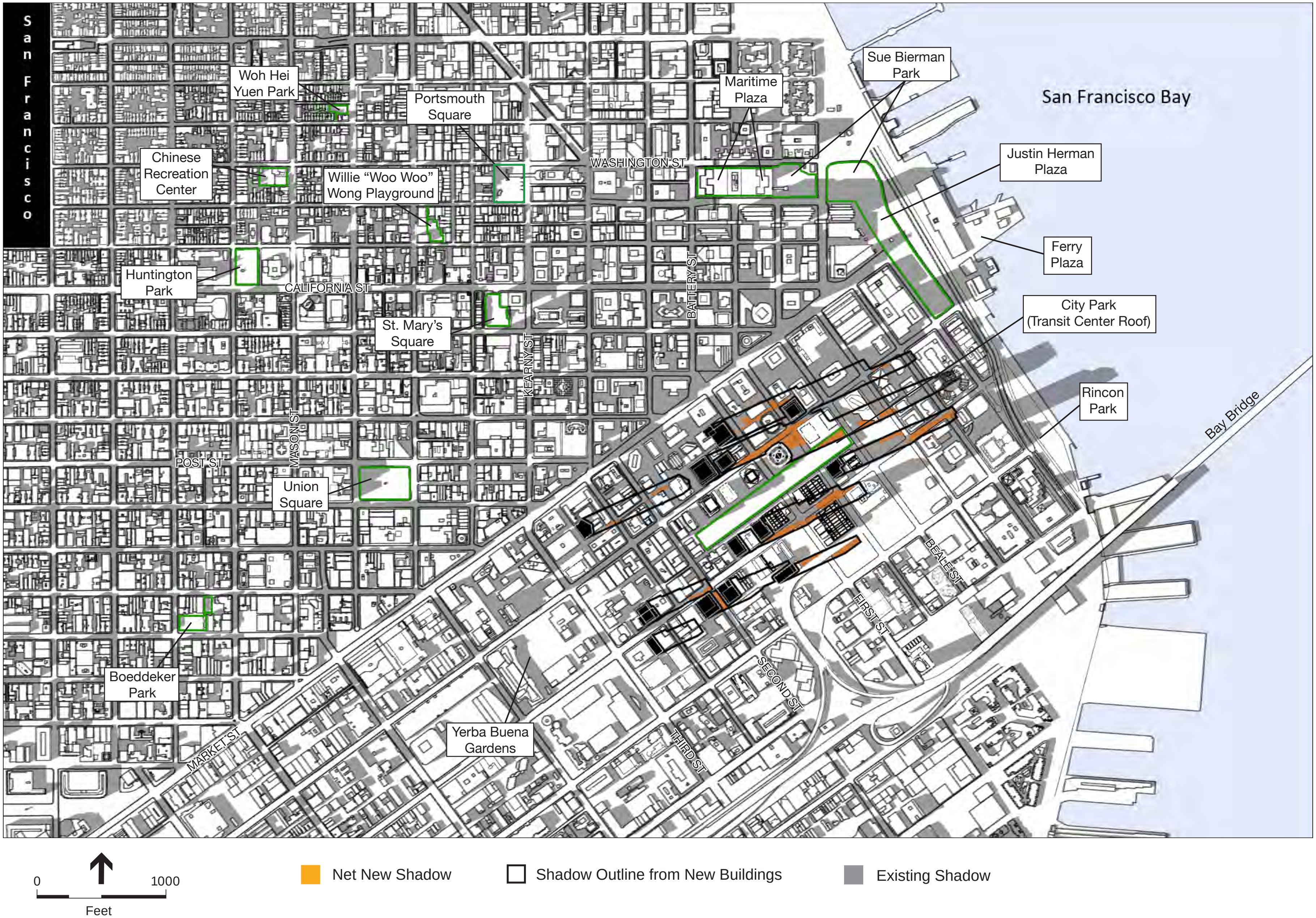
Shadow Outline from New Buildings

Existing Shadow

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 61-I
September 21 - 3PM
(March 21 Similar)



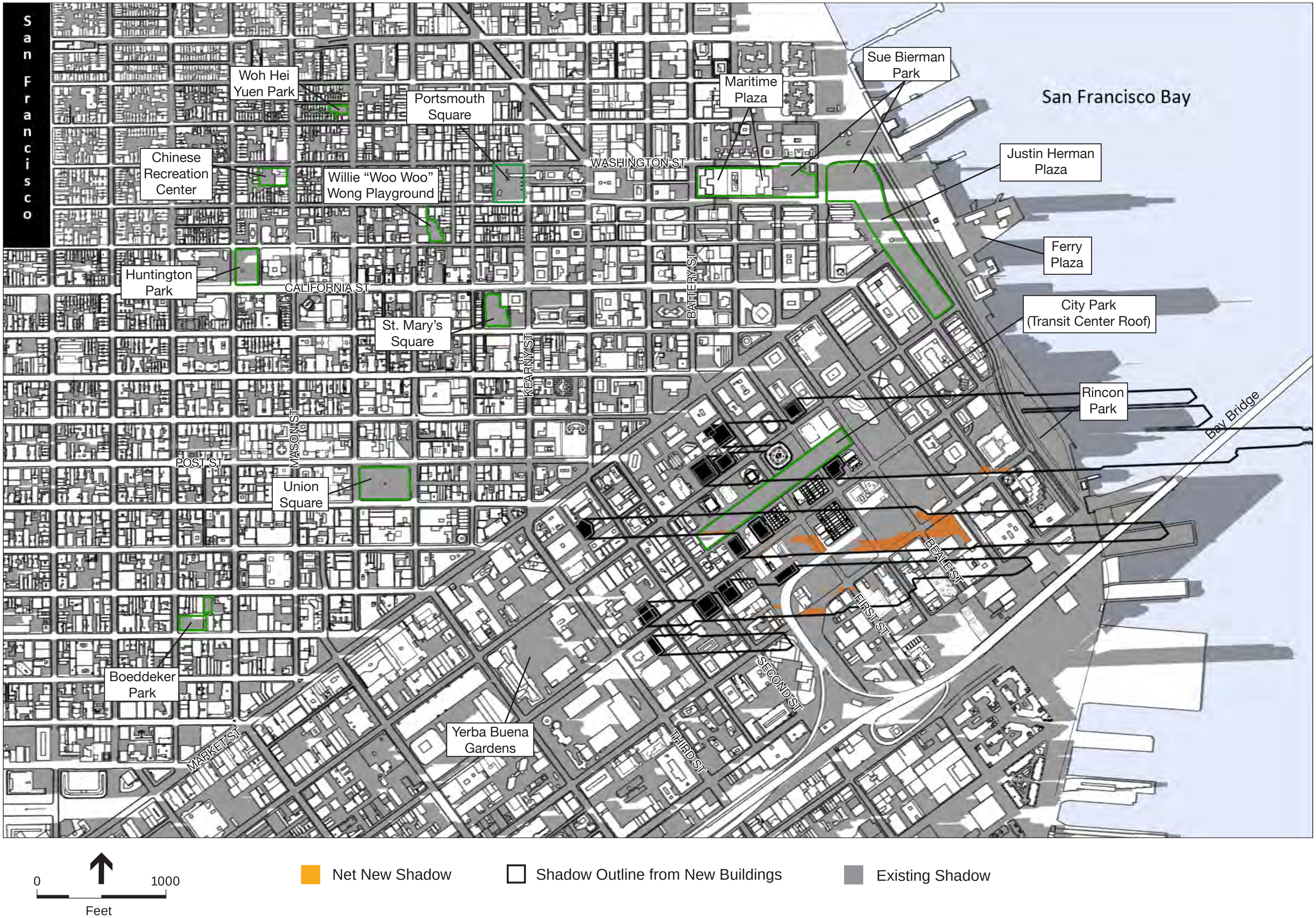
SOURCE: CADP

Figure 61-J
September 21 - 4PM
(March 21 Similar)

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

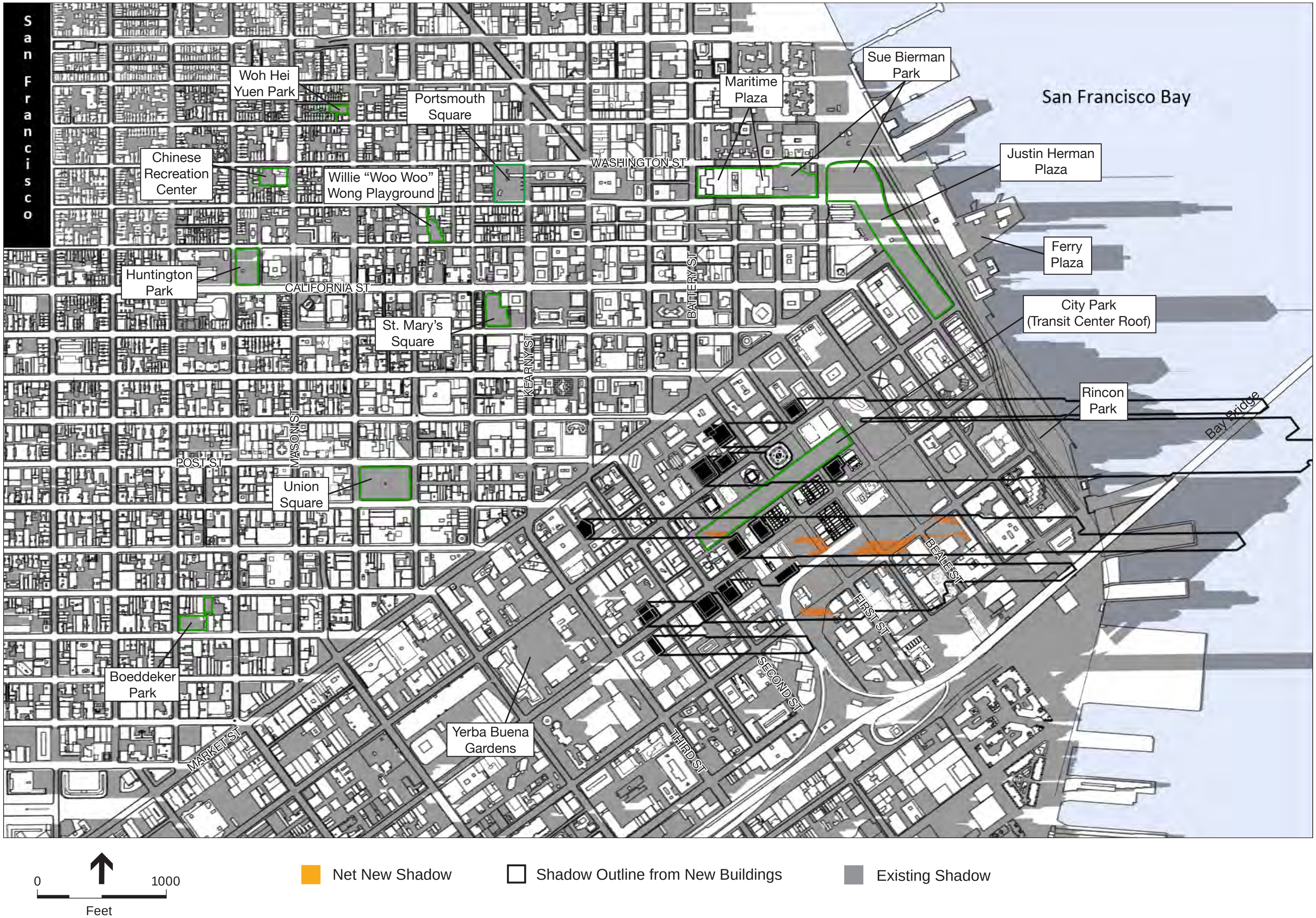
Figure 61-K
September 21 - 5PM
(March 21 Similar)



SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

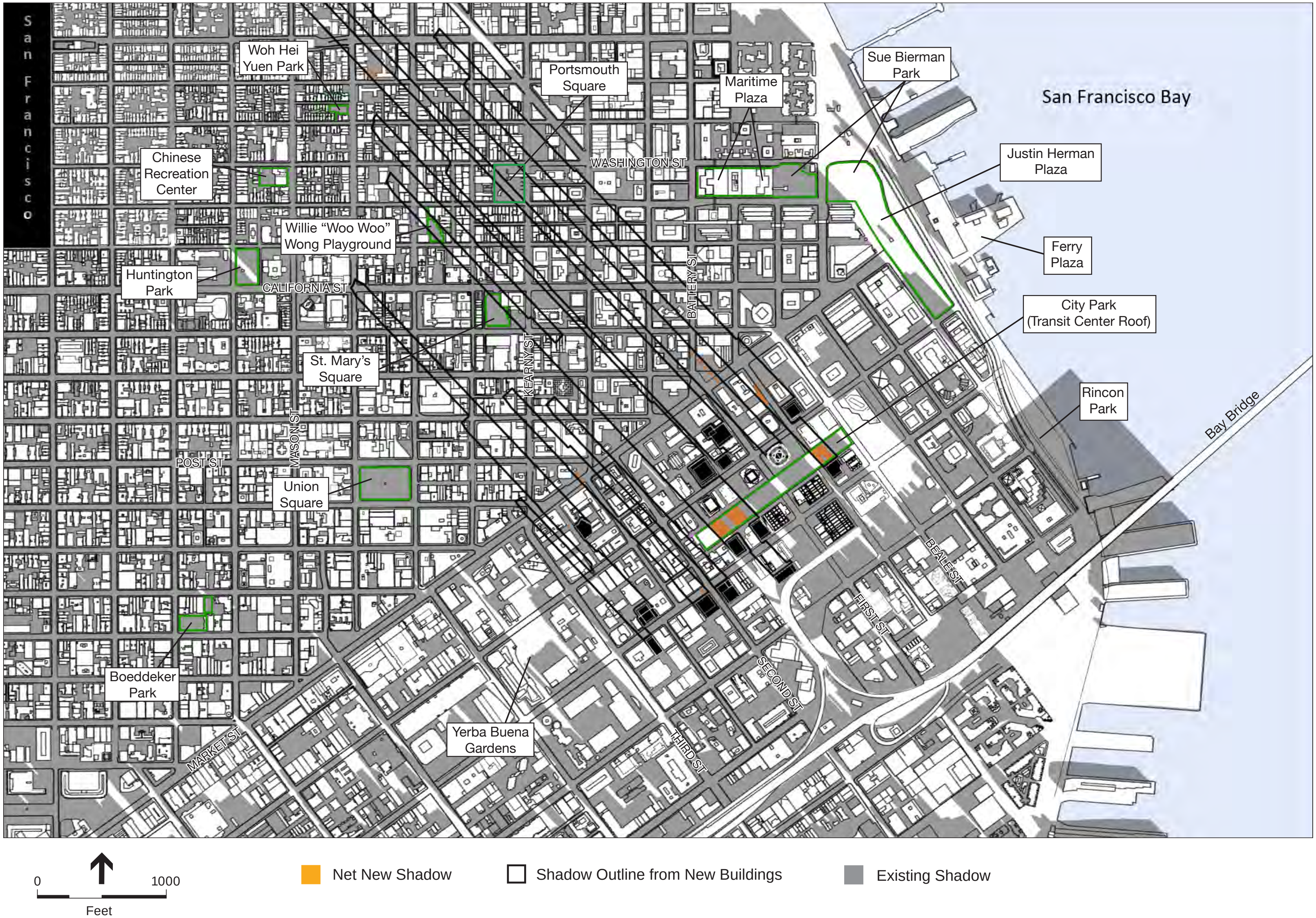
Figure 61-K
September 21 - 6PM
(March 21 Similar)



SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 61-M
September 21 - Sunset -1 Hour
(March 21 Similar)

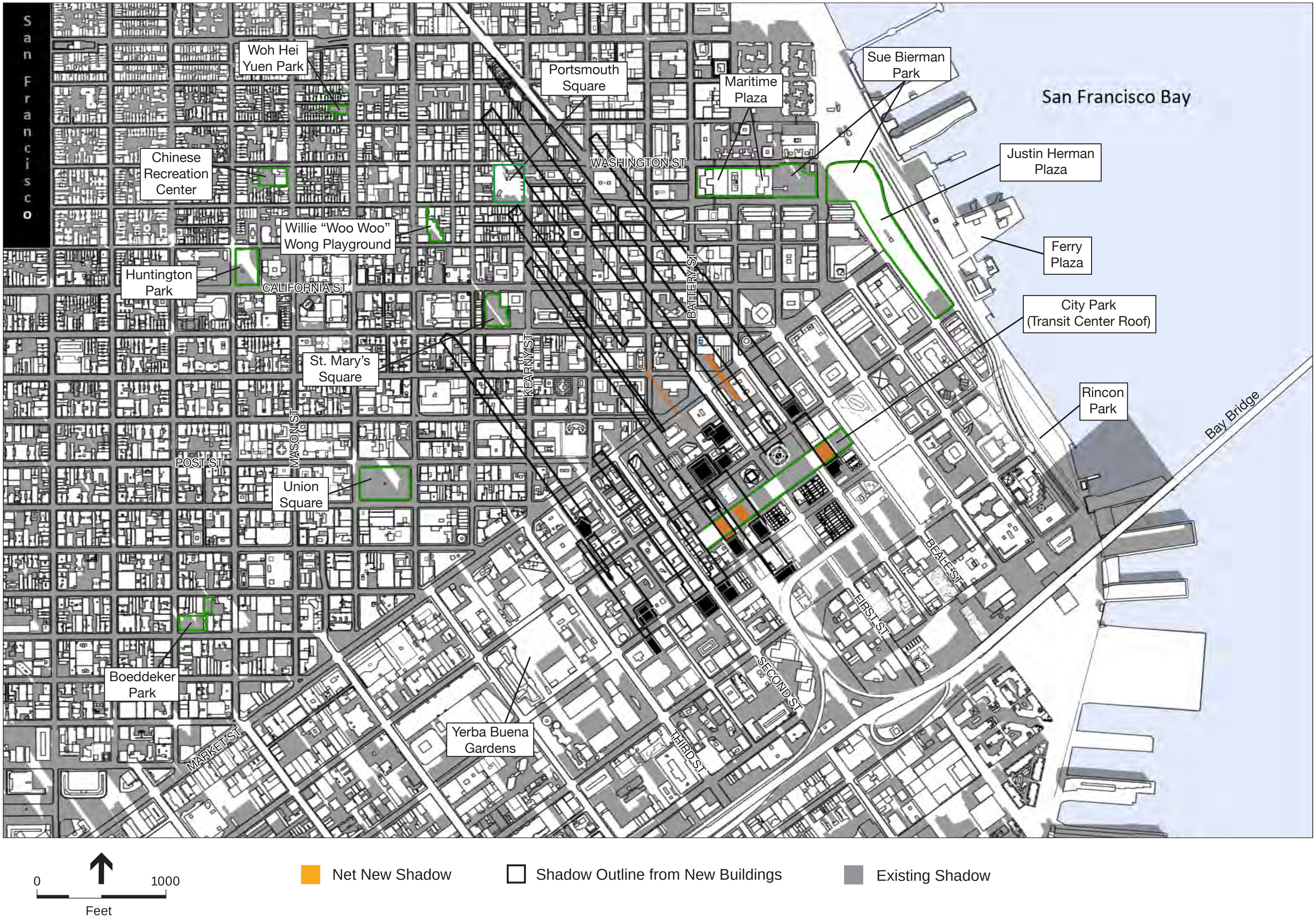


SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 62-A

December 21 - Sunrise +1 Hour



SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 62-B
December 21 - 9AM

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 62-C
December 21 - 10AM

0 1000
Feet

Net New Shadow
Shadow Outline from New Buildings
Existing Shadow

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 62-D
December 21 - 11AM

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 62-E

December 21 - 12 Noon

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 62-F
December 21 - 1 PM

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 62-G
December 21 - 2 PM

Net New Shadow

Shadow Outline from New Buildings

Existing Shadow

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 62-H

December 21 - 3 PM

0 1000
Feet

Net New Shadow
Shadow Outline from New Buildings
Existing Shadow

SOURCE: CADP

Figure 62-I
December 21 - Sunset -1 Hour

● TABLE 41
SHADOW ON SECTION 295 PARKS FROM DEVELOPMENT IN THE PLAN AREA

Open Space	Existing Shadow[1]	Permitted Shadow[2]	Shaded By:[3]	Plan Shadow[4]	Shadow w/Plan[5]	Time/Date of Net New Shadow	Maximum Shadow[6]
Union Square[7]	38.30%	0.1% (0.08%)	Pal., 50 F, TT, GGU, 181 Frmt.	0.19%	38.5%	mid-March – late September – 7:10 - 8:40 a.m.	24.5% (8:00 am, early Apr. & early Sept.)
St. Mary's Square[8]	51.90%	0.0%	TT, 50 F, GGU	0.09%	52.0%	mid- Sep – mid-October; late February – late March –8:10 - 9:10 a.m.	26.3% (8:45 am, mid-Mar. & late Sept.)
Portsmouth Square	39.00%	0.0%	TT, 50 First	0.41%	39.4%	late October – mid-February – 8:00 - 9:10 a.m.	42.5% (8:30 am, mid-Jan. & late Nov.)
Justin Herman Plaza[9]	37.60%	0.1% (0.007%)	TT, 50 F, 350 Msh.	0.09%	37.7%	early November - early February – 1:00 - 2:40 p.m.	10.1% (1:15 pm, early Jan. & early Dec.)
Willie "Woo Woo" Wong Plgrd.	52.80%	0.0%	P-F; GGU	0.03%	52.83%	early November. - early December; January – 8:00 - 8:20 a.m.	15.1% (8:15 am, mid-Jan. & late Nov.)
Maritime Plaza	68.40%	0.0%	Transit Tower	<0.01%	68.4%	early to mid-December; late December- early January – 10:40 to 11:05 a.m.	1.9% (10:45 am, late December)
Woh Hei Yuen Park[10]	n/a	n/a	Transit Tower	<0.01%	n/a	Early November and early February, approximately 7:45 a.m.	1.9% (7:44 am,* late Jan. & early Nov.)
Chinese Recreation Ctr.	n/a	0.0%	Transit Tower	<0.01%	n/a	Mid-October and mid-February, approximately 8:25 a.m.	36.5%(8:23 am,* late Feb. & mid-Oct.)
Boeddeker Park[11]	37.70%	0.244% (0.000%)	Transit Tower	<0.01%	37.70%	early June – early July, from 6:50 to 7:00 a.m.	2.9% (6:47 am,* late June)

1 Existing Shadow is the existing amount of shadow cast by existing buildings, measured by the percentage of theoretical annual available sunlight (TAAS) that would be available if no existing buildings were present (based on 1989 Planning Department analysis). TAAS is computed by multiplying the area of each park by 3,721.4 (number of hours covered by Sec. 295). n/a – Not Available
2 Permitted Shadow is the additional amount of **net new** shadow allowed (the Absolute Cumulative Limit) under Sec. 295 for each park. This includes any changes that have occurred since 1989. Bottom figure (in parentheses) indicates remaining budget available, if applicable.
3 Shaded By indicates Plan area buildings that would shade each park: TT – Transit Tower; Pal. – Palace Hotel tower addition; 50 F – 50 First Street; 181 Frmt. – 177 – 187 Fremont; GGU – Golden Gate University site tower; P-F – TJPA Parcel F; 350 Msh. – 350 Mission Street tower (at 700 feet, in accordance with the draft Plan height; this is taller than the 375-foot-tall approved project at this site).
4 Plan Shadow is the amount of net new shadow, given as an approximate percentage of the theoretical annual available sunlight, that would be cast on each park on an annual basis.
5 Shadow w/Plan is the percentage of theoretical annual available sunlight that would be shaded by existing building ***plus*** the proposed project, on an annual basis. Top number is entire Transit Tower; bottom number excludes rooftop element.
6 Maximum Shadow is the greatest amount of each park that would be newly shaded by Plan area buildings at any one moment. Percent of park area that would be shaded is given first; dates and time in parentheses. Asterisk (*) indicates time is first minute subject to Section 295.
7 The shadow budget remaining within the Absolute Cumulative Limit (ACL) for Union Square has been partially reduced since 1989. In 2004, 69,540 square foot hours was allocated to a project at 690 Market Street, which rehabilitated and expanded the historic De Young (Chronicle) Building, now the Four Seasons Residences, reducing the 0.1 percent budget by 0.02 percent.
8 Existing sunlight and existing shadow coverage for St. Mary's Square, as calculated by the Planning Department, assumed future expansion of this park.
9 The shadow budget remaining within the Absolute Cumulative Limit (ACL) for Justin Herman Plaza has been reduced since 1989, when an ACL for this park was established at 0.1 percent, by the allocation of most of the shadow budget. In 2000, the Planning Commission allocated more than nine-tenths of the available shadow under the 0.1 percent ACL to the Hotel Vitale at Spear and Mission Streets, reducing the remaining available shadow to 0.008 percent of theoretical annual available sunlight. In 2008, the Commission allocated an additional 0.001 percent of the available shadow to a proposed vertical expansion of an office building at 100 California Street (Case No. 2006.0660K), reducing the remaining available shadow to 0.007 percent of theoretical annual available sunlight. This latter project has not been constructed.
10 No Absolute Cumulative Limit has been established for Woh Hei Yuen Park.
11 The Absolute Cumulative Limit (ACL) for Boeddeker Park has been adjusted three times since 1989, to accommodate the Emporium/Bloomingdales project (amendment to the Yerba Buena Center Redevelopment Project, for which the ACL was increased from 0.0%to 0.007%); the Tenderloin Neighborhood Development Center (TNDC) Curran House residential project at 145 Taylor Street (0.087%); and, most recently, in 2009, the TNDC Eddy & Jones Family Housing Project (0.244%). This latter project has not yet been constructed.

SOURCE: San Francisco Planning Department; CADP; Environmental Science Associates

Among Recreation and Park Department parks, development pursuant to the draft Plan would most substantially affect Union Square, Portsmouth Square, and St. Mary's Square, both in terms duration (time of day and year) and amount of shadow (increased shadow coverage).

Union Square

Union Square would be newly shaded by up to five potential projects—the Transit Tower and private developments including the Palace Hotel residential tower, a mixed-use project consisting of two towers at 50 First Street, and a residential-office tower at 181 Fremont Street (also known as 177 – 187 Fremont Street)—applications are on file for all of these sites—as well as potential development of a 700-foot-tall building at the existing location of Golden Gate University, on Mission Street between First and Second Streets, as called for in the draft Plan.[297] Because of the location of Union Square relative to the Plan area and to the position of the sun in the sky, shadow from development in the Plan area would fall on Union Square from late March through late September, about 6 months in all, between about 7:10 a.m. and 8:40 a.m.; on any given day during that period, new shadow would fall on Union Square for between a few minutes and about one hour, with the duration being less than 30 minutes on most days except between late August and mid-September and between late March and mid-April, when shadows would last up to about one hour. Most of the new shadow on Union Square would be cast by the Palace Hotel tower, which is proposed for a site that is considerably closer to Union Square than other development in the Plan area.

New shadow from potential Plan area buildings would eliminate less than 0.2 percent of the theoretical annual available sunlight from Union Square, increasing the annual shadow load from approximately 38.3 percent to about 38.5 percent. Under the criteria adopted by the Planning and Recreation and Park Commissions in 1989, Union Square has an Absolute Cumulative Limit of 0.1 percent, meaning that one-tenth of one percent of additional shadow may be permitted, relative to theoretical annual available sunlight. Union Square has had the most development activity relative to the creation of net new shadow of any of the parks that would be affected by tall buildings in the Plan area. Changes have included the addition to the Macy's store facing Union Square at 235-281 Geary Street (Case No. 1996.228K; approved November 21, 1996), which involved the demolition of two six-story buildings and construction of a new eight-story structure of the south side of Geary Street between Powell and Stockton Streets; because of setbacks at the upper story, this project resulted in a net decrease in shadow on Union Square during the hours covered by *Planning Code* Section 295 of approximately 194,293 shadow-foot-hours; however, this amount was not formally "added back" to Union Square's shadow budget. New shadow was added to Union Square by the vertical expansion of the historic DeYoung (Chronicle) Building at 690 Market Street for development of the Ritz-Carlton Residences project (Case No. 2004.0584K; approved March 18, 2004). That project added approximately 69,540 shadow-foot-hour hours of new shade on Union Square, approximately 17.7 percent of the annual shadow hours available for use under the absolute cumulative limit. Therefore, in order for Plan area buildings that would add new shadow to Union Square to be

[297] No application is on file for the Golden Gate University site, although it is assumed in this analysis to be redeveloped in the future.

approved, the Absolute Cumulative Limit would have to be increased—as part of individual building approvals—to approximately 0.2 percent, if all Plan area buildings were to be approved.[298]

The greatest area of net new shadow at any one time would be approximately 27,500 square feet (about 24.5 percent of the total area of Union Square), at 8:00 a.m. in early September and early April, from the Palace Hotel tower (see **Figure 63**). At these times, shadow on Union Square would increase from about 67 percent shadow coverage to over 90 percent shading. Because most of the Plan area buildings (with the exception of the Palace Hotel tower) that would shade Union Square would do so in the very early morning, additional shadow would generally be cast on Union Square when the park is already three-fourths or more shaded, and often when existing shadow covers more than 90 percent of the park; in some instances, new shadow would complete the shading of Union Square, although for only a few minutes per day. The Palace Hotel tower, being farther west than the other building sites, would add shadow to Union Square when the park is as little as one-third in shadow under existing conditions, and would never result in full shading of the park.

Portsmouth Square

Two potential buildings (the Transit Tower and the project at 50 First Street) would newly shade Portsmouth Square. The park's location to the northwest of these project sites means that new shadow would fall on Portsmouth Square in the late fall and early winter, when shadows are longer. New shadow would reach Portsmouth Square between late October and mid-February (almost 4 months in all), from about 8:00 a.m. until just after 9:00 a.m. Because of the locations of the Transit Tower and the 50 First Street tower relative to Portsmouth Square, shadow from these two projects would fall on the park in sequence during November and early December and again during January and early February. For these approximately 10 weeks, shadow from the First Street project would begin to fall on Portsmouth Square just as shadow from the Transit Tower is leaving the park, meaning that new shadow would be cast for about one hour each morning between about 8:00 and 9:00 a.m. On any given day during the rest of the time when Portsmouth Square would be newly shaded, new shadow would last less than 30 minutes. The greatest area of net new shadow at any one time would be approximately 27,600 square feet (about 43 percent of the total area of Portsmouth Square), at 8:30 a.m. in late November and mid-January, from the project at 50 First Street; at these times, shadow on Portsmouth Square would increase from about 50 percent to more than 90 percent shadow coverage (see **Figure 64**).

New shadow from potential Plan area buildings would eliminate about 0.41 percent of the theoretical annual available sunlight from Portsmouth Square, increasing the annual shadow load from approximately 39 percent to about 39.4 percent. Under the criteria adopted by the Planning and Recreation and Park Commissions in 1989, Portsmouth Square has an Absolute Cumulative Limit of

[298] A pending case, 706 Mission Street (Case No. 2008.1084), proposes to exhaust the remaining shadow budget for Union Square, and to increase the budget by 0.004 percent. Should this project be approved, additional adjustments in the Absolute Cumulative Limit would be necessary to accommodate Plan area buildings.

Maximum Extent of New Shadow on Union Square (Draft Plan) - April 5 / September 6, 8:00 a.m.

Maximum Extent of New Shadow on Union Square (Transit Tower) - Mayt 10 / August 2, 7:45 a.m.

Net New Shadow Shadow Outline from New Buildings Existing Shadow

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

SOURCE: CADP

Figure 63
Maximum Extent of New Shadow on Union Square

Maximum Extent of New Shadow on Portsmouth Square - January 10 / November 29, 8:30 a.m.

Maximum Extent of New Shadow on Portsmouth Square - January 31 / November 8, 8:15 a.m.

Net New Shadow   Shadow Outline from New Buildings   Existing Shadow

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

SOURCE: CADP

Figure 64 (revised)
Maximum Extent of New Shadow on Portsmouth Square

0.0 percent, meaning that no additional shadow may be permitted. Therefore, in order for Plan area buildings that would add new shadow to Portsmouth Square to be approved, the Absolute Cumulative Limit would have to be increased—as part of individual building approvals—to approximately 0.41 percent, if all Plan area buildings were to be approved.

St. Mary's Square

St. Mary's Square has the greatest existing shadow load of the parks that would be most substantially affected, with nearly 52 percent of theoretical annual available sunlight already lost to building shadows. St. Mary's Square would be newly shaded by the Transit Tower, the 50 First Street project, and a potential 700-foot building at 350 Mission Street, as called for in the draft Plan.[299] New shadow would fall on St. Mary's Square from mid-September to mid-October, and during March (about 1.5 months in all), between about 8:10 a.m. and 9:10 a.m. As with Portsmouth Square, St. Mary's Square would be consecutively shaded by the Transit Tower and the 50 First Street project. This would occur in late September and early October, and in mid- to late March. During these times of the year, new shadow would last more than 30 minutes. At other times when new shadow would fall on St. Mary's Square, the duration on any particular day would be 20 minutes or less. The greatest area of net new shadow at any one time would be approximately 10,500 square feet (about 26 percent of the total area of St. Mary's Square), at 8:45 a.m. in late September and mid-March, from the project at 50 First Street; at these times, shadow on St. Mary's Square would increase from about 75 percent to 100 percent shadow coverage (see **Figure 65**).

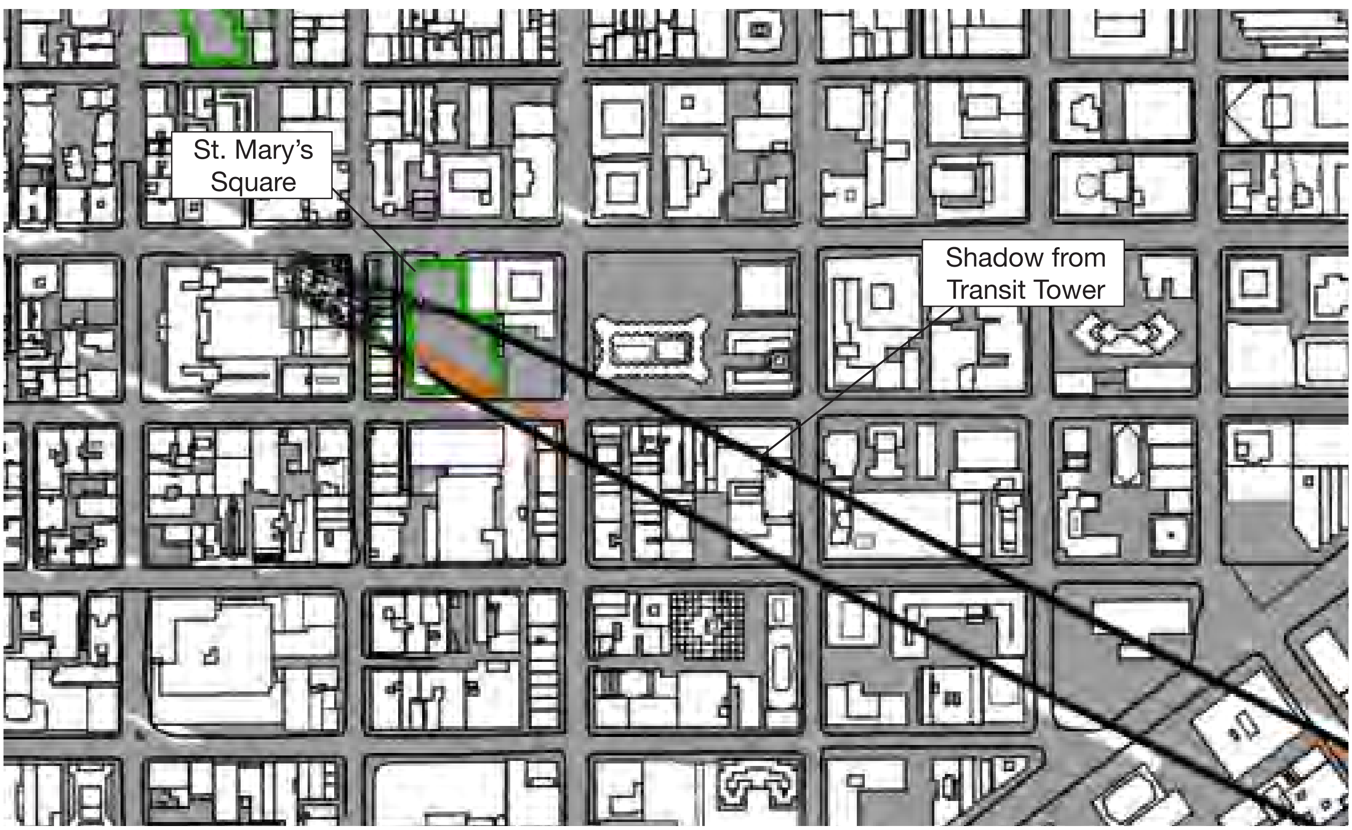
New shadow from potential Plan area buildings would eliminate less than 0.1 percent of the theoretical annual available sunlight from St. Mary's Square, increasing the annual shadow load from approximately 51.9 percent to about 52.0 percent. Under the criteria adopted by the Planning and Recreation and Park Commissions in 1989, St. Mary's Square has an Absolute Cumulative Limit of 0.0 percent, meaning that no additional shadow may be permitted. Therefore, in order for Plan area buildings that would add new shadow to St. Mary's Square to be approved, the Absolute Cumulative Limit would have to be increased—as part of individual building approvals—to approximately 0.09 percent, if all Plan area buildings were to be approved.

Justin Herman Plaza

The only other Proposition K park that would be affected by more than one building in the Plan area would be Justin Herman Plaza. Justin Herman Plaza is also the only Proposition K open space that would be affected at a time of day other than early morning. This park would be shaded by the Transit Tower, the 50 First Street project, and a building at 350 Mission Street developed at the draft Plan's proposed height limit of 700 feet. Justin Herman Plaza would be newly shaded between early November and early February (about 2.5 months in all), from about 1:00 p.m. to 2:40 p.m. New shadow would fall on Justin

[299] As stated in the Project Description, a 375-foot-tall building was approved at this site in 2011. However, the Plan proposes that the height limit on this site be increased to 700 feet.

Maximum Extent of New Shadow on St. Mary's Square - March 15 / September 27, 8:45 a.m.



Maximum Extent of New Shadow on St. Mary's Square - March 15 / September 27, 8:45 a.m.

Net New Shadow | Shadow Outline from New Buildings | Existing Shadow

SOURCE: CADP

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 65 (revised)

Maximum Extent of New Shadow on St. Mary's Square

Herman Plaza for between 15 minutes and 50 minutes per day. The greatest area of new shadow at any one time would be approximately 16,400 square feet (about 10 percent of the total area of Justin Herman Plaza), at 1:15 p.m. in early December and early January, from the Transit Tower; at these times, shadow on Justin Herman Plaza would increase from about 86 percent to about 96 percent shadow coverage (see **Figure 66**).[300]

New shadow from potential Plan area buildings would eliminate about 0.1 percent of the theoretical annual available sunlight from Justin Herman Plaza, increasing the annual shadow load from 37.6 percent to about 37.7 percent. Under the criteria adopted by the Planning and Recreation and Park Commissions in 1989, Justin Herman Plaza has an Absolute Cumulative Limit of 0.1 percent, meaning that one-tenth of one percent of additional shadow may be permitted. However, most of the 0.1 percent increment of new shadow was consumed by the Hotel Vitale, which was approved and constructed at Mission Street and the Embarcadero subsequent to adoption of the shadow criteria in 1989. According to the Final EIR for the Hotel Vitale, that project added approximately 510,544.8 square-foot-hours of shadow to Justin Herman Plaza, representing approximately 92 percent of the allowable new shadow (0.092 percent of potential sunlight), as established in 1989.Therefore, in order for Plan area buildings that would add new shadow to Justin Herman Plaza to be approved, the Absolute Cumulative Limit would have to be increased to approximately 0.2 percent.

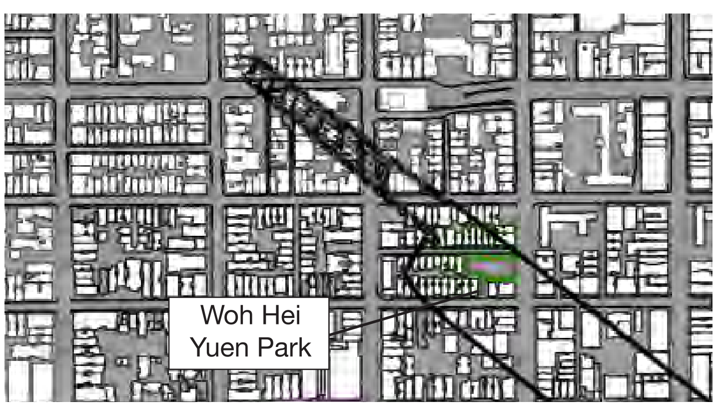
Willie “Woo Woo” Wong Playground

Plan area development would add new shadow to Willie “Woo Woo” Wong Playground (formerly Chinese Playground); this shadow would be cast by a potential 700-foot building on the Golden Gate University site and by a potential 700-foot building on the TJPA’s “Parcel F” (on the south side of the Transit Center east of Second Street), and would occur from early November to early December and during January (about 2 months in all), from about 8:00 to 8:20 a.m. New shadow would fall on Willie Wong Playground for about 20 minutes per day. The greatest area of new shadow at any one time would be approximately 4,000 square feet (about 15 percent of the total area of Willie Wong Playground), at 8:15 a.m. in late November and mid-January, from the building on TJPA Parcel F; at these times, shadow on the playground would increase from about 80 percent to about 97 percent shadow coverage (see **Figure 67**).

New shadow from potential Plan area buildings would eliminate about 0.06 percent of the existing sunlight on an annual basis from Willie Wong Playground (about 0.03 percent of the theoretical annual available sunlight), increasing the annual shadow load only incrementally (from 52.80 percent to about 52.83 percent. Under the criteria adopted by the Planning and Recreation and Park Commissions in 1989, Willie Wong Playground has an Absolute Cumulative Limit of 0.0 percent, meaning that no additional shadow may be permitted. Therefore, in order for Plan area buildings that would add new shadow to

[300] As described below under Impact SH-2, the shadow analysis includes shadow potentially cast by the rooftop sculptural element atop the proposed Transit Tower. This element was modeled as a series of discrete vertical columns and horizontal beams, and the shadow from each discrete column and beam was included in the analysis, even though this shadow would, in most cases, not be readily perceptible on the ground.

Maximum Extent of New Shadow on Justin Herman Plaza - January 3 / December 6, 1:15 p.m.



Maximum Extent of New Shadow on Woh Hei Yuen Park - January 31 / November 8, 7:44 a.m. (First Prop. K minute)

Net New Shadow   Shadow Outline from New Buildings   Existing Shadow

SOURCE: CADP

Figure 66
Maximum Extent of New Shadow on Justin Herman Plaza and Woh Hei Yuen Park

Maximum Extent of New Shadow on Willie “Woo Woo” Wong Playground - January 10 / November 29, 8:15 a.m.

Maximum Extent of New Shadow on Chinese Recreation Center - February 21 / October 18, 8:23 a.m. (First Prop. K minute)

Net New Shadow   Shadow Outline from New Buildings   Existing Shadow

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

SOURCE: CADP

Figure 67
Maximum Extent of New Shadow on Willie “Woo Woo” Wong Playground and Chinese Recreation Center

Willie Wong Playground to be approved, the Absolute Cumulative Limit would have to be increased to approximately 0.03 percent.

Other Section 295 Parks

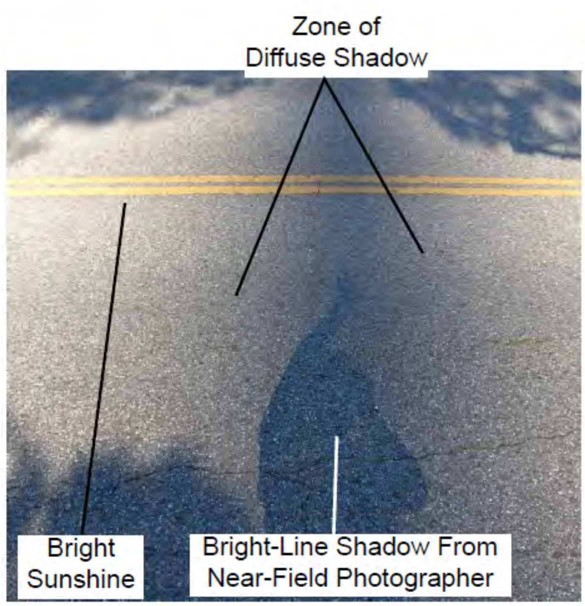
Development pursuant to the draft Plan would also result in net new shadow falling on Maritime Plaza (about 0.004 percent of theoretical annual available sunlight), Chinese Recreation Center (about 0.008 percent of theoretical annual available sunlight; see Figure 67), Boeddeker Park (about 0.003 percent of theoretical annual available sunlight), and Woh Hei Yuen Recreation Center and Park (about 0.001 percent of theoretical annual available sunlight). The first three of these parks have an Absolute Cumulative Limit of 0.0 percent, meaning that no additional shadow may be permitted; no Absolute Cumulative Limit has been established for Woh Hei Yuen Park, as this facility was developed subsequent to the 1989 action that set these limits for 14 downtown parks. Therefore, in order for Plan area buildings that would add new shadow to Maritime Plaza, Boeddeker Park, Chinese Recreation Center, or Woh Hei Yuen Park to be approved, the Absolute Cumulative Limit would have to be increased to between 0.001 percent and 0.008 percent, depending on the park. Because only the proposed Transit Tower would shade these parks, those shadows are discussed in detail under impact SH-2, below.

It is important to note that, because of the distance between many of the parks and the buildings whose shadow would fall on the parks, the great majority of new shadow from Plan area buildings on Section 295 parks would not have an edge defined by a clear divide between sunlight and shadow. Instead, the observer would see on the ground an area that would gradually change from fully sunlit to fully shaded, with no evident “edge” do the shadow. The reason for this is that the sun, when observed from earth at any given moment, is seen as a disk that occupies approximately one-half of one degree (0.53 degrees) of a 360-degree circle that represents the sun’s path across the sky. Because light emanates from the entire surface of the disk, sunlight can “pass around” objects that are occupy less than 0.53 degrees of the sky. For example, a finger held at arm’s length is not wide enough to obscure the sun. Accordingly, in the case of a building more than a few hundred feet from a particular park, the edge of the building intercepts only a portion of the sunlight at any given moment, and therefore the shadow from that building is cast as a diffuse “line” on the distant park. **Figure 68** illustrates this phenomenon, depicting shadow cast by Sutro Tower on Marview Way (about 900 feet distant) and by the residential tower at One Rincon Hill onto the corner of Howard and Fremont Streets, approximately 1,500 feet (one-quarter mile) distant. Because the parks that are subject to Section 295 and that would be shaded by Plan area buildings are all at least one-quarter mile from the building that would cast shadow—many are one-third to one-half a mile away, or even more—the actual area than an observer on the ground would see as being shaded would generally be less than is reported above. For this reason, actual effects of shadow as perceived by park users could be less substantial than indicated by the calculations.

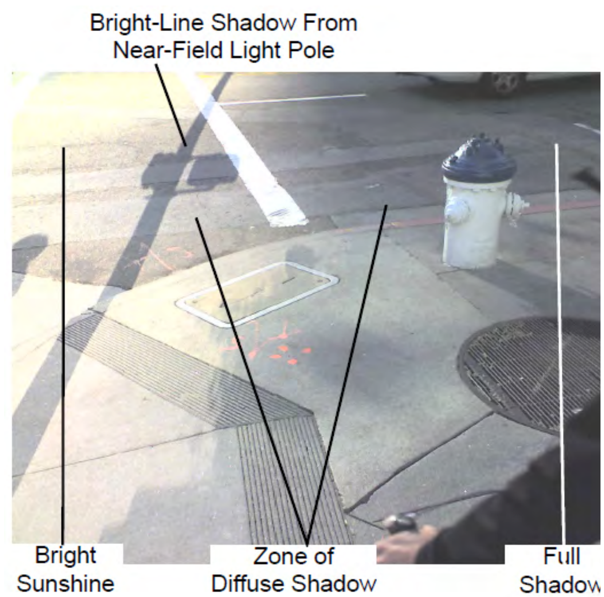
For the same reason, individual elements of a building, such as a spire or a small mechanical penthouse, cast no solid shadow on a distant park if they obscure less than the 0.533-degree angle. Thus, at a distance of one-third of a mile (1,750 feet), a 16-foot wide object will cast no discernible shadow at all because, like the finger at arm’s length, this object will not obscure the entirety of the sun’s disk, and the sun’s rays therefore can pass around the object to light the location one-third of a mile distant from the object. This phenomenon is the reasoning behind the decorative sculptural element at the top of the proposed Transit Tower.

Impacts on Use of the Affected Parks

Union Square, because it is in a retail and tourist hotel neighborhood, is generally not heavily used during the early morning hours (before 8:00 a.m.) when much of the new shadow from Plan area buildings would fall on the park. Between 8:00 a.m. and 9:00 a.m., when shadow from the Palace Hotel tower would fall on Union Square, activity is increased, although there is substantially more pedestrian activity on the sidewalks surrounding Union Square at this time than in the park itself, as many people pass Union Square when walking to work and other destinations.



Sutro Tower Shadow on Marview Way (900 feet distant)



One Rincon Hill Shadow at Fremont and Howard Streets (1,500 feet distant)

Figure 68
Diffuse Shadow

Portsmouth Square, at the eastern edge of Chinatown, a very dense residential neighborhood, is relatively heavily used even between 8:00 a.m. and 9:00 a.m., when new shadow from Plan area buildings would fall on the park. Much of the activity in Portsmouth Square at this time of day consists of individuals, many elderly, exercising.

St. Mary's Square, although near the southern edge of Chinatown, is not as heavily used as Portsmouth Square. However, it is used by people exercising in the early morning, when new shadow from Plan area buildings would fall on the park.

Justin Herman Plaza, which would be newly shaded in the early afternoon in late fall and early winter, is heavily used during the midday period by persons traveling to and from the Ferry Building, tourists, street vendors, and lunchtime office workers and strollers.

In general, due to the relatively small area that would be newly shaded and the limited times of the day that would be affected at most parks, shadow from the buildings that could be developed in the Plan area pursuant to the draft Plan would not be likely to result in major changes in usage of the affected parks, such that the use of any of the parks would be dramatically affected. In some cases, such as Portsmouth Square and Justin Herman Plaza, new shadow would be expected to be readily noticeable to park users. However, given that approval of the Plan area buildings would require that the Absolute Cumulative Limit be increased on eight downtown parks, the impact is considered adverse, and this impact would therefore be **significant and unavoidable**, with the Plan-proposed building heights. No mitigation is available for shadow impacts on existing parks, because it not possible to lessen the intensity or otherwise reduce the shadow cast by a building at a given height and bulk. Additionally, it is not normally possible to relocate an existing park or to add park space to existing parks. It is noted, however, that the draft Plan proposes to create or fund the creation of up to 11 acres of new open space (including the City Park atop the Transit Center) and to set aside funds from fees generated by new development in the Plan area to make improvements to parks that would be shaded by Plan area buildings, notably Portsmouth Square and St. Mary's Square. Chapter VI, Alternatives, discusses shadow impacts of alternatives that would reduce building heights from those proposed in the draft Plan.

In terms of shadow effects on sidewalks and open spaces not subject to *Planning Code* Section 295, development pursuant to the draft Plan would result in relatively greater impacts on sidewalks in the Plan area and on nearby non-Section 295 open spaces, compared to impacts on the Section 295 open spaces described above. This is because shadow effects are typically greater for closer-in locations than locations very far away because—assuming existing shadow loads are comparable—closer-in spaces will tend to be shaded for more days and more hours of the year than distant locations.

The non-Section 295 public open space that would be most greatly affected by Plan area development is Rincon Park along the Embarcadero. This open space would be newly shaded in the late afternoon throughout much of the year, except from mid-fall through mid-winter, by the Transit Tower, 181 Fremont, the 50 First Street project, and potential 700-foot buildings at the Golden Gate University site and at 350 Mission Street. Rincon Park is currently in substantial late afternoon shadow, cast primarily by office towers at 201 Spear Street, 2 Harrison Street (the GAP building), and 211 and 221 Main Street, as well as by the parking garage at Howard and Steuart Street and by Hills Plaza. New buildings in the Plan area would add additional shadow between the shadow cast by existing buildings, obscuring some of the existing sunlight. Several Plan area buildings, including the Transit Tower, 50 First Street project, and potential buildings at the Golden Gate University site and 350 Mission Street, would add new shadow to Ferry Plaza in the late afternoon in late fall and early winter. Much of the plaza is already shaded by the Ferry Building at this time; net new shadow would be limited to the southern portion of Ferry Plaza. Portions of Herb Caen Way (the pedestrian promenade along the Embarcadero) would also be shaded by Plan area buildings in the afternoon, year-round, with the precise location, extent, and duration varying by season. The 50 First Street project and the Transit Tower would each add new shadow to Mechanics Plaza, on the north side of Market Street at Battery Street, in the late morning in spring and fall. None of the Plan area buildings discussed above, including the Transit Tower, would add new shadow to Yerba Buena Gardens during the hours covered by Section 295 (from one hour after sunrise to one hour before sunset), because this open space is too far south of the Plan area building sites. Yerba Buena Gardens would be newly shaded in the early morning by buildings proposed and approved near the southwestern corner of the Plan area, such as the approved building at 222 Second Street and potential buildings at the southeast corner of Second and Howard Streets and on either side of Howard Street near Hawthorne Street.

Development pursuant to the draft Plan would also add new shadow to privately owned, publicly accessible open spaces (POPOS), such as the open spaces at 555 – 575 Market Street, 525 Market Street, 560 Mission Street, 50 Fremont Street (Fremont Center Plaza), 45 Fremont Street, and 50 Beale Street (Bechtel Plaza), as well as Crown Zellerbach Plaza (at One Bush Street) and McKesson Plaza (at one Post Street); this last open space would be shaded during the noon hour in spring and fall by the proposed Palace Hotel Tower. Plan area buildings, including the Transit Tower, would also add new shadow to the planned City Park atop the new Transit Center and to Mission Square, adjacent to the proposed Transit Tower (see Figures 60 through 62).

The only assumed development sites in the Plan area subject to *Planning Code* Section 146(a), which requires that buildings and additions fit within an envelope defined by a plane sloping away from the street at a prescribed angle above a prescribed height, are sites at the southwest corner of Second and Howard Streets, the proposed Palace Hotel tower at New Montgomery and Jessie Streets, and as site on the west side of Second Street between Natoma and Howard Streets. Regarding the first site, an office tower was approved in 2010 at 222 Second Street and, as part of that approval, the Planning Commission granted an exception to the shadow angle requirement of Section 146(a), pursuant to Section 309. The Palace Hotel tower and the other Second Street site would require the granting of similar exceptions if the Planning Commission finds that "the shadow created by the penetration of the plane is deemed insignificant because of the limited extent or duration of the shadow or because of the limited public use of the shadowed space." For all subsequent projects in the Plan area, a determination would have to be made, under Section 146(c), that each building is shaped "so as to reduce substantial shadow impacts on public sidewalks in the C-3 Districts" if this can be done "without creating an unattractive design and without unduly restricting the development potential of the site in question."

Planning Code Section 147 requires that all new development and additions to existing structures where the height exceeds 50 feet must be shaped to minimize shadow on public plazas or other publicly accessible open spaces other than those protected by Section 295, "in accordance with the guidelines of good design and without unduly restricting the development potential of the property." As indicated above and in Figures 60 through 62, Plan area buildings would add new shadow to various POPOS. A separate determination concerning Section 147 compliance would be required to be made for each subsequent project in the Plan area.

Impact SH-2: The proposed Transit Tower would adversely affect the use of various parks under the jurisdiction of the Recreation and Park Department and, potentially, other open spaces. (Significant and Unavoidable)

As stated under Impact SH-1, the proposed 1,070-foot-tall Transit Tower would cast new shadow on eight parks that are governed by Section 295 of the *Planning Code*: Union Square, Portsmouth Square, St. Mary's Square, Justin Herman Plaza, Maritime Plaza, Woh Hei Yuen Recreation Center and Park, Chinese Recreation Center, and Boeddeker Park. **Table 42** summarizes the impacts of the Transit Tower on each of these parks.

To evaluate the year-round Proposition K impact from the Transit Tower, a quantitative analysis of sunlight and shade was conducted for net new shadow. The analysis consisted of calculating the amount of shadow coverage resulting from existing buildings at 15-minute intervals on one day per week, for six months of the year. The shadow coverage at the 15-minute intervals was averaged to calculate hourly shadow coverage (in shadow-foot-hours), and the hourly figures for each day were added and resulting numbers extrapolated to weekly figures through averaging with the preceding week's total. Because the sun's path from January through June essentially mirrors its path from July through December, the six months' shadow-foot-hour totals were doubled to return a yearly figure.[301]

It is noted that the proposed Transit Tower would consist of a 920-foot-tall building with 150-foot-tall sculptural element atop the roof (and a 20-foot-tall mechanical penthouse within the sculptural element, set back from the perimeter of the roof). Because the sculptural element is proposed as a lattice-like structure, the sculptural element would not cast a solid shadow on the ground at distant locations, such as the Section 295 parks included in this analysis. This analysis considers shadow cast by the sculptural element as part of the total building shadow; the sculptural element was included in the shadow model as a series of discrete vertical columns and horizontal beams, as is proposed. As discussed above in Impact SH-1, building components that are narrower than the apparent width of the sun in the sky do not cast actual shadow that can be seen on the ground at distant locations, because the sun's rays pass around the object. Because the sculptural element would consists of a steel lattice with individual columns and beams no more than 2 feet wide, none of the individual steel members would cast discernible shadow on any of the Section 295 parks, and the only actual shadow that would be cast by the 150-foot-tall sculptural element would occur if the sun were to be at an angle relative to the building such that several of the steel members were lined up next to one another, like a closely spaced picket fence. This condition would not be expected to generally arise, except at discrete locations in a park that would be much smaller than the theoretical shadow from the sculptural element, were it to be a solid object. **Figures 63 and 66** illustrate this potential for representative times at Union Square and Justin Herman Plaza. Although these figures depict shadow from the entire sculptural element, the single "strands" of shadow illustrated in the figures are artifacts of the computer modeling program, and would not, under actual conditions, be visible on the ground. Moreover, the drawing program uses lines that appear thicker in the shadow images than the theoretical shadow on the ground. Nevertheless, for purposes of a conservative analysis,

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301 This is the same methodology used by the Planning Department to calculate shadow and establish the Proposition K baseline shadow coverage for other San Francisco parks.

TABLE 42
TRANSIT TOWER SHADOW ON SECTION 295 PARKS

Open Space	Existing Shadow[1]	Permitted Shadow[2]	Project Shadow[3]	Pct. new Shadow[4]	Shadow w/Project[5]	Time/Date of Net New Shadow includes Rooftop Element)	Maximum Shadow Sq. Ft.[6]	Maximum Shadow Percent[7]	Maximum Shadow Date/ Time[8]
Union Square[9]	38.30%	0.1% (0.08%)	47,165 22,935	0.011% 0.005%	38.31% 38.31%	Mid-July – mid-August; May, from approx. 7:30 to 8:00 a.m.	7,565 3,882	6.7% 3.4%	7:45 am, mid-May & early Aug.
St. Mary's Square[10]	51.90%	0.0%	70,928 52,120	0.048% 0.035%	51.95% 51.94%	Mid- September – early October; March – 8:30 - 9:10 a.m.	7,442 6,579	18.8% 16.6%	8:45 am, mid-Mar. & late Sept.
Portsmouth Square	39.00%	0.0%	321,553 277,780	0.133% 0.115%	39.13% 39.12%	Mid-October - early Dec.; early Jan. - mid-Feb. – 8:00 - 8:40 a.m.	22,523 22,523	34.7% 34.7%	8:15 am, late Jan. & early Nov.
Justin Herman Plaza[11]	37.60%	0.1% (0.007%)	277,935 119,665	0.046% 0.020%	37.65% 37.62%	Mid-November - late January – 1:00 - 1:40 p.m.	16,381 8,263	10.1% 5.1%	1:15 pm, early Jan. & early Dec.
Maritime Plaza	68.40%	0.0%	19,110 0	0.004% 0.000%	68.40% 68.40%	Early December – early January, from 10:40 to 11:10 a.m.	2,659 0	1.9% 0.0%	10:45 am, late December
Woh Hei Yuen Park[12]	n/a	n/a	510 510	0.001% 0.001%	n/a n/a	Early November and late January, approximately 7:45 a.m.	275 275	1.9% 1.9%	7:44 am,* late Jan. & early Nov.
Chinese Recreation Ctr.	n/a	0.0%	8,415 0	0.008% 0.000%	n/a n/a	Mid-October and mid-February, approximately 8:25 a.m.	10,386 0	36.5% 0.0%	8:23 am,* late Feb. & mid-Oct.
Boeddeker Park[13]	37.70%	0.244% (0.000%)	3,900 3,900	0.003% 0.003%	37.70% 37.70%	early June – early July, from 6:50 to 7:00 a.m.	1,188 1,188	2.9% 2.9%	6:47 am,* late June

1 Existing Shadow is the existing amount of shadow cast by existing buildings, measured by the percentage of theoretical annual available sunlight (TAAS) that would be available if no existing buildings were present (based on 1989 Planning Department analysis). TAAS is computed by multiplying the area of each park by 3,721.4 (number of hours covered by Sec. 295). n/a – Not Available
2 Permitted Shadow is the additional amount of **net new** shadow allowed (the Absolute Cumulative Limit) under Sec. 295 for each park. This includes any changes that have occurred since 1989. Bottom figure (in parentheses) indicates remaining budget available, if applicable.
3 Project Shadow is the amount of net new shadow, measured in shadow-foot-hours, that would be cast on each park on an annual basis. Top number is entire Transit Tower; bottom number excludes rooftop element.
4 Pct. new Shadow is the percentage of theoretical annual available sunlight (TAAS) that would be lost due to project shadow, on an annual basis. Top number is entire Transit Tower; bottom number excludes rooftop element.
5 Shadow w/Project is the percentage of theoretical annual available sunlight that would be shaded by existing building ***plus*** the proposed project, on an annual basis. Top number is entire Transit Tower; bottom number excludes rooftop element.
6 Sq. Ft. is the greatest amount of each park that would be newly shaded by the proposed project at any one moment. Top number is entire Transit Tower; bottom number excludes rooftop element.
7 Percent Coverage is the percent of each park that would be newly shaded by the proposed project at any one moment. Top number is entire Transit Tower; bottom number excludes rooftop element.
8 Date/Time indicates the date(s) during the year and the time of day when the maximum shadow would fall on each park. Asterisk (*) indicates time is first minute subject to Section 295.
9 The shadow budget remaining within the Absolute Cumulative Limit (ACL) for Union Square has been partially reduced since 1989. In 2004, 69,540 square foot hours was allocated to a project at 690 Market Street, which rehabilitated and expanded the historic De Young (Chronicle) Building, now the Four Seasons Residences, reducing the 0.1 percent budget by 0.02 percent.
10 Existing sunlight and existing shadow coverage for St. Mary's Square, as calculated by the Planning Department, assumed future expansion of this park.
11 The shadow budget remaining within the Absolute Cumulative Limit (ACL) for Justin Herman Plaza has been reduced since 1989, when an ACL for this park was established at 0.1 percent, by the allocation of most of the shadow budget. In 2000, the Planning Commission allocated more than nine-tenths of the available shadow under the 0.1 percent ACL to the Hotel Vitale at Spear and Mission Streets, reducing the remaining available shadow to 0.008 percent of theoretical annual available sunlight. In 2008, the Commission allocated an additional 0.001 percent of the available shadow to a proposed vertical expansion of an office building at 100 California Street (Case No. 2006.0660K), reducing the remaining available shadow to 0.007 percent of theoretical annual available sunlight. This latter project has not been constructed.
12 No Absolute Cumulative Limit has been established for Woh Hei Yuen Park.
13 The Absolute Cumulative Limit (ACL) for Boeddeker Park has been adjusted three times since 1989, to accommodate the Emporium/Bloomingdales project (amendment to the Yerba Buena Center Redevelopment Project, for which the ACL was increased from 0.0%to 0.007%); the Tenderloin Neighborhood Development Center (TNDC) Curran House residential project at 145 Taylor Street (0.087%); and, most recently, in 2009, the TNDC Eddy & Jones Family Housing Project (0.244%). This latter project has not yet been constructed.

SOURCE: San Francisco Planning Department; CADP; Environmental Science Associates these narrow shadows are considered in the quantitative analysis below. For information, Table 42 also indicates the amount of new shadow that would be cast by the solid portion of the Transit Tower, excluding shadow from the rooftop sculptural element.

As can be seen in Table 42, the quantitative analysis found that the proposed Transit Tower would result in an increase in shadow on the eight affected open spaces of between 0.003 percent and 0.133 percent of the Theoretical Annual Available Sunlight (TAAS). The greatest impact would occur on Portsmouth Square (0.133 percent of TAAS), followed by St. Mary's Square (0.048 percent of TAAS), Justin Herman Plaza (0.046 percent), Union Square (0.011 percent), Chinese Recreation Center (0.008 percent), Maritime Plaza (0.004 percent), Boeddeker Park (0.003 percent), and Woh Hei Yuen Recreation Center and Park (0.001 percent). Approval of the proposed Transit Tower would require that the Absolute Cumulative Limit for six of these eight parks be increased to accommodate project shadow, in general by the amount of new shadow that would be cast by the Transit Tower.[302] Union Square has sufficient available shadow remaining within its Absolute Cumulative Limit to allow for the shadow from the Transit Tower, although approval would require a finding by the Planning Commission, upon the advice of the Recreation and Park Commission or General Manager, that project shadow would not adversely affect the use of Union Square. Woh Hei Yuen Park has no Absolute Cumulative Limit; however, effects on this park would also have to be found to not adversely affect its use.

As with the impacts of buildings that could be developed pursuant to the draft Plan, most net new shadow from the Transit Tower would occur in the early morning hours—before 8:45 a.m. at three of the eight parks and before 9:15 a.m. at three others. As with Plan impacts, Justin Herman Plaza would be the only park shaded in the midday period: new shadow from the Transit Tower would fall on Justin Herman Plaza between mid-November and late January, from about 1:00 - 1:40 p.m.[303] The Transit Tower would add new shadow to Maritime Plaza in the late morning—between early December and early January, from about 10:40 to 11:10 a.m.

The greatest one-time effect would be on Portsmouth Square. The Transit Tower would add about 22,500 square feet of shadow, covering about 35 percent of the park, at 8:15 a.m. in early November and late January (see **Figure 64**). The largest impact on Justin Herman Plaza would be about 16,400 square feet (10 percent of the park) in early December and early January (see **Figure 66**), while the largest single area shaded at Union Square and St. Mary's Square would be about 7,500 square feet on each park (see **Figures 63** and **65**). At Union Square, this would represent about 7 percent of the park area, and would occur in early August and mid-May, while at St. Mary's Square, this would amount to about 19 percent of the park, and would occur in late September and mid-March. The Transit Tower would add a small amount of new shadow to Woh Hei Yuen Recreation Center and Park, for about two weeks of the year, in early November and late January, for less than 15 minutes after the "first Proposition K minute"; that is, approximately 7:45 a.m. At these times, the Tower would delay for a few minutes the sunlight beginning

[302] Justin Herman Plaza has approximately 0.007 percent of theoretical available annual sunlight remaining to be allocated; thus, the Absolute Cumulative Limit for this par, would have to be increased to 0.167 percent in order for the Transit Tower to be approved.

[303] Shadow from the solid portion of the building, excluding the rooftop sculptural element, would occur at generally the same times, but only in December and early January, and for a few minutes less each day.

to fall on this park, casting shadow on the 2 percent of the park that is not then shaded—but only for about 10 minutes (see Figure 66). Likewise, the maximum one-time shadow on Chinese Recreation Center would occur for less than 15 minutes after the "first Proposition K minute" (8:23 a.m.) for one week in late February and one week in mid-October, when the Transit Tower would shade about 35 percent of the park's area (see **Figure 67**). The maximum one-time shadow on Maritime Plaza and Boeddeker Park would each be less than 3 percent of the parks' areas, and each would be shaded by the Transit Tower for less than one month of the year (see **Figure 69**).

As with the effects of Plan area buildings discussed above in Impact SH-1, shadow from the proposed Transit Tower would not be likely to result in major changes in usage of the affected parks, such that the use of any of the parks would be dramatically affected, because the areas that would be newly shaded would be relatively small at most times of the day and year. However, in many instances, the new shadow would be noticeable to park users. Therefore, given that approval of the Transit Tower would require that the Absolute Cumulative Limit be increased on six downtown parks, the impact of the Transit Tower with respect to shading of Section 295 parks is considered adverse. This impact would be significant and unavoidable, with the Transit Tower as proposed, because design solutions would not entirely reduce this impact to a less-than-significant level. Chapter VI, Alternatives, discusses shadow impacts of alternatives that would develop the Transit Tower at a lesser height, which would reduce shadow impacts.

As described above in Impact SH-1, the proposed Transit Tower would add new shadow to Mission Square, which would be adjacent to and east of the Tower. Accordingly, the Transit Tower (and the 181 Fremont Street and 50 First Street projects building to the southeast and northwest, respectively) would shade Mission Square to varying degrees in the late morning and the afternoon throughout the year (see Figures 50-F, 60-H through 60-M, 61-D, 61-G through 61-K, 62-D and 62-E, and 66). (Mission Square is not proposed to be under the jurisdiction of the Recreation and Park Commission, and therefore would not be subject to *Planning Code* Section 295.) The Transit Tower would also add shadow to the planned City Park, atop the Transit Center. However, because the Transit Tower would be northwest of this park, the Tower would shade only the eastern end of City Park (east of the Tower), and only in the late afternoon (see Figures 60-J through 60-M, 61-J, and 61-K). (No shadow from the Transit Tower shadow would fall on City Park in late fall and early winter, when the sun does not move far enough to the north, relative to the earth.)

The Transit Tower would cast new shadow on nearby sidewalks and POPOS, as well. For example, new Tower shadow would fall on the open space at 333 Market Street in the morning in winter (see Figure 62-B); on the open spaces at 525 Market Street and 50 Fremont Street at mid-morning in spring, summer, and fall (see Figures 60-E, 60-F, 61-C, 61-E, 61-F); on the 50 Fremont Street at noon in summer (see Figure 60-G); and on the open spaces at 199 Fremont Street and 301 Howard Street during summer afternoons (see Figure 60-K).

Maximum Extent of New Shadow on Maritime Plaza - December 20, 10:45 a.m.

Maximum Extent of New Shadow on Boeddeker Park- June 21 / September 21, 6:47 a.m. (First Prop. K minute)

Net New Shadow   Shadow Outline from New Buildings   Existing Shadow

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

SOURCE: CADP

Figure 69
Maximum Extent of New Shadow on Maritime Plaza and Boeddeker Park

Impact C-SH: The draft Plan, including the proposed Transit Tower, would contribute to cumulative new shadow that would adversely affect the use of various parks under the jurisdiction of the Recreation and Park Department and, potentially, other open spaces. (Significant and Unavoidable)

In addition to shadow from development in the Plan area, a 550-foot-tall residential tower is proposed at 706 Mission Street (Case No. 2008.1084E), just west of the Plan area. This tower, which is part of a project that would also rehabilitate the historic Aronson Building at Third and Mission Streets and provide a permanent location for the Mexican Museum, would add new shadow to Union Square. This project would add new shadow to Union Square from mid-October to mid-November, and during the month of February, between about 7:20 a.m. and 9:20 a.m. This shadow would fall on Union Square at different times of the year than shadow from Plan area buildings, due to the fact that the 706 Mission Street project is east of the Plan area. As noted previously in Impact SH-1, the 706 Mission Street project proposes to exhaust the reminder of the 0.1 percent shadow budget for Union Square, and to increase the budget by 0.004 percent. Therefore, in order for the 706 Mission Street project and all Plan area buildings that would add new shadow to Union Square to be approved, the Absolute Cumulative Limit would have to be increased—as part of individual building approvals—to approximately 0.2 percent (subject to variation in individual building designs), if all Plan area buildings and the 706 Mission Street project were to be approved. The draft Plan, in combination with the 706 Mission Street project, would contribute considerably to a significant cumulative shadow impact on Union Square; this impact, as with the draft Plan and Transit Tower, would be **significant and unavoidable**. It is noted that design changes to the building might reduce impacts, but not necessarily to a less-than-significant level.

Mitigation Measures

None available.

Chapter VI, Alternatives, discusses shadow impacts of alternatives that would allow for development of the Transit Tower and other Plan area buildings at lesser heights, which would reduce shadow impacts.

K. Recreation and Public Space

Setting

Citywide Recreational Resources

The San Francisco Recreation and Park Department maintains more than 200 parks, playgrounds, and open spaces throughout the City. The City's park system also includes 15 recreation centers, nine swimming pools, five golf courses as well as tennis courts, ball diamonds, athletic fields and basketball courts. The Recreation and Park Department manages the Marina Yacht Harbor, Candlestick Park, the San Francisco Zoo, and the Lake Merced complex. In total, the Department currently owns and manages roughly 3,400 acres of parkland and open space within the San Francisco city limits. Together with other city agencies and state and federal open space properties within the city, about 5,250 acres of recreational resources (a variety of parks, walkways, landscaped areas, recreational facilities, playing fields and unmaintained open areas) serve San Francisco.[304]

In addition to local resources, San Franciscans benefit from the Bay Area regional open spaces system. Regional resources include public open spaces managed by the East Bay Regional Park District in Alameda and Contra Costa counties; the National Park Service in Marin, San Francisco and San Mateo counties as well as state park and recreation areas throughout. In addition, thousands of acres of watershed and agricultural lands are preserved as open spaces by water and utility districts or in private ownership.

Within San Francisco, publicly accessible open spaces and recreational facilities are categorized according to their size and particular amenities as serving the city, district, neighborhood, or sub-neighborhood. Several larger open space areas, including Golden Gate Park (1,017 acres), the Lake Merced complex (700 acres; 368-acre lake) and John McLaren Park (317 acres) compose about one-half of the total city-owned acreage in recreational use. Unlike neighborhood facilities, these larger areas provide programs, activities or recreation opportunities that serve the city as a whole. These spaces, in addition to smaller areas with unique attributes such as water features or hilltop vista points, function as city-serving open spaces because they attract residents from the entire city.

In addition to the larger open spaces, Recreation and Park Department land comprises more than one hundred parks and recreational facilities (both outdoor and indoor), which function mainly for neighborhood use. These smaller facilities are primarily used by residents in the immediate surrounding area and are categorized by size and intended service area. District-serving parks are generally larger than 10 acres and have a service area consisting of a three-eighths-mile radius around the park, while neighborhood-serving parks are generally one to 10 acres and have a service area of one-quarter of a mile. Sub-neighborhood-serving open spaces, often referred to as mini parks, are too small to accommodate athletic facilities. These parks tend to include seating areas, small landscaped spaces, tot lots targeting

[304] Recreational resource acreages taken from: City and County of San Francisco, *General Plan Draft Recreation and Open Space Element*, San Francisco Planning Department, May 2009.

pre-school age children, and playgrounds with amenities generally for elementary school age children. The service area for sub-neighborhood parks is one-eighth of a mile.

As applied by the San Francisco Recreation and Park Department, the San Francisco Sustainability Plan defines the need for open space capacity at 5.5 acres per 1,000 residents. The San Francisco Department of Public Health, in its Healthy Development Measurement Tool (HDMT) Development Checklist, includes a benchmark for publically accessible open space as 10 acres per 1,000 residents that is based on National Parks and Recreation Association (NPRA) guidelines.[305] However, the HDMT recognizes that other indicators, such as accessibility, safety, park maintenance, and usability, are also appropriate measures for appraising open space.

Plan Area Recreational Resources

Although no publicly-managed facilities exist within the Plan area, several parks and open spaces are located within an approximately three-block radius of its boundary. Facilities under the jurisdiction of the Recreation and Park Department include the following:

- South Park – located between Bryant and Brannan Streets and between Second and Third Streets (approximately two blocks south of the Plan area's southern boundary), the South Park contains a tree-lined oval garden with two play areas, which contain sand pits and climbing structures.
- Union Square – located at Post and Stockton Streets (about three blocks northwest of the Plan area's northern boundary), the square takes up a full block and is elevated above the street level. It features a large performance stage, landscaped areas, seating around the perimeter, seasonal ice skating, a restaurant and an open air café. Special events are occasionally held here and the park is often used by shoppers and office workers as a place of mid-day rest and relaxation.
- Justin Herman/Embarcadero Plaza – located at the foot of the Embarcadero Center complex (about one block north of the Plan area's northern boundary), the Justin Herman/Embarcadero Plaza features large-scale art sculptures, seating areas, limited landscaping, and seasonal ice skating.

The San Francisco Redevelopment Agency has jurisdiction over the following two facilities in the vicinity of the Plan area:

- Yerba Buena Gardens – located at Mission and Howard Streets, between Third and Fourth Streets (approximately one half block west of the Plan area's western boundary), the gardens are part of the 87-acre redevelopment project, and contain extensive landscaping and seating areas, a child care center, an ice rink, a bowling center, an arts and technology center for youth, a carousel and a two-acre interactive play garden.
- Rincon Park – located along the Embarcadero and extending from just north of Howard to approximately Harrison Street (within one half block of the Plan area's eastern boundary), this park contains landscaped areas for passive recreational activities and features a large-scale art installation, commonly known as "bow and arrow." The park offers unobstructed views of the bay and the Bay Bridge and provides passive recreation areas.

- The Port of San Francisco has jurisdiction over the following facility in the vicinity of the Plan area:

- Embarcadero Promenade – extending along the length of much of the City's eastern waterfront, the Embarcadero Promenade is located about a block east of the Plan area's eastern boundary. The

[305] San Francisco Department of Public Health, Healthy Development Measurement Tool Development Checklist, Version 3.02, January, 2010.

paved pathway is used for active and passive recreation by joggers, bikers and urban hikers to enjoy unobstructed views of the bay and the Bay Bridge.

In addition, the Plan area is interspersed with numerous privately owned publicly accessible open spaces, most of which are associated with adjacent office and mixed-use towers. A map of these "pocket parks" is provided in Figure 59, p. 467. These spaces typically contain seating areas and limited landscaping, and some also featuring art installations. They are typically used by office workers during weekdays.

As part of the Transit Center project being implemented by the TJPA (separate from this environmental review process), a new 5-acre "City Park" would also be sited atop the new Transit Center; this park is planned as part of the initial construction of the Transit Center and is not dependent on a potential future extension of Caltrain and high-speed rail service to the new terminal.

Transit Tower Project Site

The Transit Tower Project site would be located adjacent to the new Transit Center on the south side of Mission Street between Fremont and First Streets. As stated in the Project Description, the Transit Tower project site is approximately 50,000 square feet in size and was most recently used as the passenger waiting and loading and Muni drop-off/layover area for the old Transbay Terminal, which was demolished beginning in August 2010. No parks or recreation facilities are located at the site.

Impacts and Mitigation Measures

Approach to Analysis

The city, state and federal property permanently dedicated to open space uses total approximately 5,250 acres, which is about five acres per 1,000 San Francisco residents. This is about half the standard of the NPRA, which as stated above, called for 10 acres of open space per 1,000 residents in cities. However, the NPRA no longer recommends a single absolute "average" of park acreage per population. Other factors are now considered to be of greater importance, such as location and walking distance, and whether a facility provides needed services to the population it is intended to serve.

The *San Francisco General Plan* Recreation and Open Space Element recognizes that San Francisco is likely to provide less open space acreage than many communities, given land constraints, high population density, and existing urban development. The City does not have an established level of service standard related to population density in terms of district-, neighborhood- and sub-neighborhood-serving parks or provision of recreational facilities.

Significance Criteria

The proposed project would have a significant impact on the environment if it would:

- Increase the use of existing neighborhood and regional parks or other recreational facilities such that physical deterioration of the facilities would occur or be accelerated;

- Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment; or,
- Physically degrade existing recreational resources.

Transit Center District Plan

Impact RE-1: The implementation of the draft Plan would result in an increased use of existing neighborhood parks and recreational facilities, but not to a degree that would lead to or accelerate their physical deterioration or require construction of new facilities. (Less than Significant)

As described in the Project Description, the draft Plan would rezone a number of sites within the Plan area, which would change height and bulk limits and floor-area ratio limits and, as a result, accommodate a more intensified development potential than is allowed under current allowable limits. The redevelopment of the 17 specifically identified “opportunity sites” would generate approximately 6.35 million sq. ft. of office space, 86,500 sq. ft. of retail space, 985 hotel rooms, and 1,298 housing units within the Plan area. Because the proposed draft Plan is a regulatory program, it would not directly physically degrade any existing recreational resources within the Plan area. However, additional daytime and permanent population would likely be generated as a result of the more intensified development under the Plan. The additional population would increase the use of parks and recreational facilities within the Plan area, but not to a level that would be considered **significant and unavoidable**, for reasons discussed below.

In terms of physical deterioration resulting from population increases and/or use attributable to the draft Plan’s rezoning program, this would also be considered less than significant. Any unmet demand for parks and recreational resources that currently exists within the Plan area is not, in and of itself, considered to be a significant impact on the environment. Based on the CEQA significance criteria, the proposed project would have an adverse environmental impact if it were to cause the deterioration of existing recreational resources through increased use or require the construction or expansion of recreational facilities that may have an adverse effect on the environment.

The draft Plan would noticeably increase the amount of office space within the Plan area. While office workers often use local open spaces as, for example, spots to take a lunch break, this type of use generates relatively little impact and does not tend to result in substantial deterioration of open spaces that could rise to the level of significance. Thus, while some increases in park uses could occur with Plan implementation, it is not expected that the increase in office space throughout the Plan area would lead to heavy use of local parks and recreational facilities in a way that would result in their deterioration. Moreover, the 1,298 housing units that could be developed under the draft Plan would also likely generate some increased demand in park use, but such demand would also not be considered substantial. While the combination of all potential park and recreational facility users that would be generated as a result of the draft Plan could result in proportionately greater use of such facilities in the Plan area, population increases are only one factor in determining whether parks and recreational facilities would deteriorate through increased used. Other variables include park design, age, infrastructure, how the park is being used, as well as whether adequate levels of upkeep are maintained.

As noted above, under Setting, one major new open spaces would be established within the Plan area as a result of separate planning efforts – the new 5-acre "City Park" atop the new Transit Center. In addition, the draft Plan proposes to create a new public space at the northeast corner of Second and Howard Streets that would include a vertical circulation feature connecting to the City Park and the Transit Center, which would facilitate public access from the south to both the new open space and transit service (November 2009 Draft Plan, Policy 3.15). These open spaces would alleviate some of the demand that would be generated by the increased population within the Plan area. In addition, new development under the draft Plan would be required to provide public and private open space in accordance with existing residential and non-residential open space *Planning Code* requirements. The draft Plan proposes several flexible strategies in meeting these requirements within the Plan area, particularly in the vicinity of the Transit Center's City Park (November 2009 Draft Plan, Objective 3.13). One approach included in the Plan is for future projects adjacent to the City Park to provide direct pedestrian connections to the City Park rather than incorporating privately owned, publicly accessible open spaces into project designs, as is typically the case with downtown buildings, in fulfillment of the requirements of *Planning Code* Section 138 (November 2009 Draft Plan, Policies 3.17 and 3.20). Any such specific physical improvement would be subject to CEQA review at such time as it is proposed for consideration. A payment of in-lieu fees is another measure proposed in the Plan to allow for greater flexibility in meeting open space requirements for individual projects within the Plan area (November 2009 Draft Plan, Policy 3.19); the draft Plan specifically identifies the proposed Second and Howard Streets plaza as an improvement that would be funded with such fees. In addition to providing exterior open space adjacent to new developments, the draft Plan would also require that open space also be provided within the interior of new buildings (see Project Description for the various specifications that such interior open space would be subject to). The draft Plan also proposes new impact fees to create and/or improve open space.

Subsequent individual development proposals that include open space as part of the programming would be subject to project-level environmental review. Thus, to the extent that construction or expansion of recreational facilities or connections to the City Park that are associated with such projects result in any adverse physical impacts, such impacts would be studied further and mitigated to the extent feasible through project-specific environmental analysis. In general, however, the creation of privately-owned publicly-accessible open spaces within the Plan area is expected to result in beneficial effects as most would involve minor physical changes (introduction of landscaping, installation of pedestrian amenities, etc.) which are not expected to degrade the environment in any significant way.

The Planning Department, in conjunction with the Recreation and Park Department, the Mayor's Office, and the Neighborhood Parks Council is currently evaluating the open space needs of the entire City over the next 100 years. As part of the Open Space 2100 project, a Draft Open Space Framework is being developed that includes two components: the draft Citywide Vision for Open Space, which provides a broad outline of the City's ideal open space network over the next 100 years, and the draft update of the Recreation and Open Space Element (ROSE) of the City's *General Plan*.

These documents were released for public review in May 2009 and comments were accepted through October 2009. During the summer of 2009, a series of community focus groups was conducted to discuss specific comment areas for inclusion into a final draft for adoption. An Action Plan will also be drafted consisting of a set of five and ten year programs that describe how the City will implement the vision for open space as well as the objectives and policies of the ROSE.

Specific goals and objectives from these documents applicable to Transit Center District Plan area include the development of new open spaces in high need areas; promotion of higher quality experiences in existing open spaces; use of residual spaces in proximity to freeways as a system of linear green buffers; "green connector streets" designed to calm and/or divert vehicular traffic and prioritize pedestrian and bicycle travel with connections to larger open spaces; and "living streets" in which sidewalks are expanded on streets with excess right-of-way to accommodate open spaces or pocket parks.

Based on the above, the implementation of the draft Plan is not expected to result in any significant unavoidable impacts to parks and recreational facilities.

Mitigation: None required.

Transit Tower Impacts

Impact RE-2: The proposed Transit Tower would result in the increased use of existing neighborhood parks and recreational facilities, but not to such a degree that would lead to or accelerate their deterioration, nor require the construction of new facilities. (Less than Significant)

The Transit Tower would account for a portion of the growth described above in the discussion of Plan impacts. Therefore, all effects of the Transit Tower would be subsumed within the effects described in Impacts RE-1. Because all of those impacts were determined to be less than significant, effects related to the Transit Tower would likewise be less than significant.

Mitigation: None required.

L. Utilities and Service Systems

Setting

The project site is within an urban area that is served by utilities and service systems, including water, wastewater and storm water collection and treatment, solid waste collection and disposal, gas, and electricity.

Water

The San Francisco Public Utilities Commission (SFPUC) provides water services to approximately 2.5 million people in San Francisco, Santa Clara, Alameda, and San Mateo Counties; SFPUC also provides wastewater collection and treatment within the City. Eighty-five percent of the water delivered to SFPUC customers comes from Sierra Nevada snowmelt stored in the Hetch Hetchy Reservoir on the Tuolumne River in Yosemite National Park. The remaining 15 percent comes from runoff in the Alameda and Peninsula watersheds captured in reservoirs located in San Mateo and Alameda Counties. The entire regional system delivers approximately 265 million gallons of water per day (mgd) to its customers.[306]

The local water system provides distribution and storage for water and fire protection within the City. This system includes 10 reservoirs, 8 water tanks, 18 pump stations, and approximately 1,250 miles of transmission lines and water mains within the City.[307] SFPUC manages distribution of potable water through two systems: a low-pressure water main system provides water for domestic and commercial uses at about 1,000 gallons per minutes (gpm), and a high-pressure system provides a dedicated water source for fire suppression at about 10,000 gpm. Citywide water use totaled approximately 71 mgd in 2010, a figure that was lower than previously projected, due to factors including cool weather, water use reductions due to earlier dry years, and the economic downturn that resulted in decreased non-residential consumption.[308]

In an effort to streamline the water supply planning process, the SFPUC adopted resolutions in 2002 and 2006 to allow for all development projects requiring a Water Supply Assessment (WSA) under Water Code Section 10910 et seq. to rely on the adopted Urban Water Management Plan (UWMP) as long as the anticipated growth was contained in the current UWMP. Likewise, in connection with the adoption of the *2010 UWMP* in June 2011, the SFPUC adopted a similar resolution, finding that *2010 UWMP* accounts for projected growth in the City through the year 2035 and thereby satisfies the water supply and demand assessment requirements for specified developments pursuant to the CEQA and the *California Water Code*.[309] According to the 2010 UWMP, the SFPUC can meet the current and future demand in years of average or above average precipitation. However, during a multiple dry year event, the SFPUC would not be able to meet 100 percent of demand in 2030 and would therefore have to impose reductions on its

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306 San Francisco Public Utilities Commission (SFPUC), *2010 Urban Water Management Plan (UWMP) for the City and County of San Francisco*, June 2011.
307 *2010 UWMP*, p. 10.
308 *2010 UWMP*, p. 34.
309 San Francisco Public Utilities Commission Resoltion No. 11-0090, approved June 14, 2011.

supply to wholesale water users outside San Francisco. Accordingly, the SFPUC adopted a Water Shortage Allocation Plan, which outlines procedures for allocating water from the SFPUC regional system during system-wide shortages up to 20 percent.

The ability to meet the demand of the customers is in large part due to the anticipated development of 10 mgd of local supplies in the City through implementation of the Water Supply Improvement Program (WSIP). These additional sources of groundwater, recycled water, and conservation supplies are essential to provide the City with adequate supply in dry year periods, as well as improving supply reliability during years with normal precipitation. With the Water Shortage Allocation Plan in place, and the addition of local WSIP supplies, the SFPUC concluded that it has sufficient water available to serve existing customers and planned future uses in San Francisco.

Wastewater

Combined Sewer System

The San Francisco Public Utilities Commission (SFPUC) maintains and operates the existing Combined Sewer System. This system combines stormwater runoff and wastewater flows in the same network of pipes. It conveys flows to the City's three treatment plants, where wastewater is treated prior to discharge through outfalls into the Bay or Pacific Ocean. Wastewater from the Plan area is treated at the Southeast treatment plant, in the Bayview District, with additional wet-weather capacity provided by the North Point plant, on the northeast waterfront. Discharges into the system are regulated under two National Pollution Discharge Elimination System (NPDES) permits, which are described in Section IV.P, Hydrology and Water Quality.

Solid Waste

San Francisco generated 5,870 tons of solid waste per day in 2008, and an average of 1,535 tons of that went to a landfill.[310] According to the California Integrated Waste Management Act of 1989 (AB 939), San Francisco is required to adopt an integrated waste management plan, implement a program to reduce the amount of waste disposed, and have its waste diversion performance periodically reviewed by the California Department of Resources Recycling and Recovery (CalRecycle). The City achieved a 77 percent landfill diversion rate for 2008, up from 70 percent in 2006, and the highest of any city in the country. San Francisco diverted more than 1.6 million tons of waste material in 2008 through recycling, composting, and re-use. The City sent 560,000 tons of waste to the landfill in 2008, the lowest total recorded.[311] The San Francisco Department of the Environment estimates that the City will generate 2.15 million tons of waste in 2010, 60 percent of which will be recycled and 20 percent of which will be composted.

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[310] Dmitriew, Alex, Commercial Recycling Assistant Coordinator, San Francisco Department of the Environment, Response to Transit Center District Plan EIR SF Environment Questionnaire, August 4, 2010.

[311] Office of the Mayor, City and County of San Francisco, Press Release, "Mayor Newsom Announces San Francisco's Waste Diversion Rate At 77 Percent, Shattering City Goal And National Recycling Records," August 27, 2010.

Solid waste generated in San Francisco is transported to the Altamont Landfill in Alameda County. The landfill has a permitted peak maximum daily disposal of 11,150 tons per day and accepted 1.29 million tons in 2007. The landfill has an estimated remaining capacity of approximately 46 million cubic yards or 74 percent of its permitted capacity. The estimated closure date of the landfill is 2025.[312] However, the City's remaining contracted capacity at the landfill is anticipated to be reached as soon as 2015. In July 2011, upon the recommendation of the San Francisco Department of the Environment, the Board of Supervisors approved a 10-year contract with Recology to ship the City's solid waste to the Ostrom Road Landfill in Yuba County when the current agreement with the Altamont Landfill expires. The Ostrom Road Landfill has an estimated capacity of approximately 39 million tons (90 percent of permitted capacity) and an estimated closure date of 2066. The Ostrom Road landfill has a permitted capacity of 3,000 tons of solid waste per day.[313]

Energy

Electrical and natural gas service in San Francisco is provided by Pacific Gas and Electric Company (PG&E). PG&E provides natural gas and electricity to approximately 13 million people throughout a 70,000 square mile service area in Northern and Central California. Under deregulation, other companies may also provide electricity, but PG&E delivers the service.

The California Energy Commission (CEC) indicates that San Francisco County consumed 5,550 gigawatt hours (GWh) of electricity in 2009, down from 5,694 GWh in 2008.[314] In the area served by PG&E, total consumption in 2009 was approximately 108,503 GWh, compared to 111,228 GWh in 2008; in 2018, total consumption is estimated to be 119,644 GWh with a peak of approximately 24,600 MW.[315] Currently, 12 kilovolt (kV) electric distribution lines and 2-inch and 3-inch diameter high-pressure gas mains serve the Transit Center District Plan area.[316, 317]

The California Independent System Operator (California ISO) is charged with managing the flow of electricity along the State's open market wholesale power grid. The California ISO Energy Demand Forecast (2008–2018) estimates that residential, commercial, and industrial sectors represented 85 percent of statewide electricity demand in 2008, while the mining sector represented 2 percent. Statewide

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312 California Department of Resources Recycling and Recovery (CalRecycle), "Active Landfills Profile for Altamont Landfill and Resource Recovery (01-AA-0009)." Accessed September 2, 1011. Available on the internet at: www.calrecycle.ca.gov/Profiles/Facility/Landfill/LFProfile1.asp?COID=1&FACID=01-AA-0009.

313 California Department of Resources Recycling and Recovery (CalRecycle), "Active Landfills Profile for Recology (Norcal) Ostrom Road LF Inc. (58-AA-0011)." Accessed September 2, 1011. Available on the internet at: http://www.calrecycle.ca.gov/Profiles/Facility/Landfill/LFProfile1.asp?COID=58&FACID=58-AA-0011.

314 California Energy Consumption Data Management System, http://www.ecdms.energy.ca.gov/elecbyplan.aspx

315 The CEC defines the PG&E Planning Area to include PG&E bundled retail customers, customers served by energy service providers using the PG&E distribution system to deliver electricity to end users, and customers of publicly owned utilities and irrigation districts in PG&E transmission system (with the exception of the Sacramento Municipal Utility District).

316 Lam, William, Supervisor, PG&E San Francisco Division Gas Planning Department, Response to Transit Center District Plan EIR PG&E Questionnaire, July 1, 2010.

317 Cannon, Tom, Supervisor, PG&E San Francisco Division Electric Planning Department, Response to Transit Center District Plan EIR PG&E Questionnaire, July 1, 2010.

consumption is expected to increase 11.6 percent by 2018, due primarily to growth in the residential and commercial sectors.

Impacts

Significance Criteria

The proposed project would result in a significant impact with respect to utilities and service systems if it would:

- Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board;
- Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects;
- Have sufficient water supply available to serve the project from existing entitlements and resources, or require new or expanded water supply resources or entitlements;
- Result in a determination by the wastewater treatment provider that would serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments;
- Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs; or
- Comply with federal, state, and local statutes and regulations related to solid waste.

Plan Impacts

Water

Impact UT-1: The draft Plan and Transit Tower would not require or result in the construction or substantial new water treatment facilities, and SFPUC would have sufficient water supply available from existing entitlements. (Less than Significant)

The addition of 6,100 additional households with 9,500 residents, as well as 30,000 jobs would generate additional water demand in the Plan area. The Plan is estimated to generate 1.9 mgd of water demand, based on the land use program. Of this amount, as much as one-third could be for non-potable uses, including landscape irrigation, toilet flushing, and boilers and chillers, and could be supplied by non-potable water (recycled water, rain water, etc.) once a distribution system is in place.

All but the very northwest corner of the Plan area (northwest of the corner of Second and Mission Streets) is within the Eastside Reclaimed Water Use Area designated by Section 1029 of the Reclaimed Water use Ordinance (approved November 7, 1991), which added Article 22 to the *San Francisco Public Works Code*. In this area, non-residential projects over 40,000 square feet in floor area that require a site permit, building permit, or other authorization, must provide for the construction and operation of a reclaimed water system for the transmission of the reclaimed water within buildings and structures. That is, the building would need to be designed with separate plumbing (typically purple pipes) to service uses that could employ reclaimed water (e.g., toilets). The ordinance also requires that owners, operators, or managers of all development projects register their projects with the San Francisco Public Utilities Commission (SFPUC). The SFPUC will issue a certificate of intention to use reclaimed water, and reclaimed water shall be used unless the SFPUC issues a certificate exempting compliance because reclaimed water is not available, an alternative water supply is to be used, or the sponsor has shown that the use of reclaimed water is not appropriate. (To date, no area-wide recycled water system has been developed.)

The draft Plan includes several policies that, if adhered to, would reduce overall water demand. Policies 6.14 through 6.20 would encourage developers and the City to install non-potable water delivery infrastructure and distribution pipes and to pursue a reliable supply of non-potable water to reduce potable water demand. In particular, Policy 6.18 encourages the City to identify a location for a treatment facility to increase recycled water generation near the Plan area. Policies 6.19 and 6.20 encourage the reduction of water demand through on-site measures at the level of individual developments.

According to the *2010 UWMP*, which incorporated Planning Department 2009 growth projections inclusive of the draft Plan and the proposed Transit Tower project, the SFPUC would continue to meet the current and future demand in years of average or above average precipitation. However, during a multiple dry year event, the SFPUC would not be able to meet 100 percent of demand in 2030 and would therefore have to impose reductions on its supply. Accordingly, the SFPUC adopted the Water Shortage Allocation Plan, which outlines procedures for allocating water from the SFPUC regional system during system-wide shortages up to 20 percent. The SFPUC concluded that under the Water Shortage Allocation Plan, and with additional local Water System Improvement Program (WSIP) supplies, sufficient water is available to meet existing demand and planned future uses within San Francisco, although wholesale customers (outside the City) would experience shortfalls in both single dry years and multiple dry-year scenarios.[318] Therefore, implementation of projects pursuant to the Transit Center District Plan would not require major expansion of the SFPUC's water facilities; nor would it adversely affect the City's water supply. Therefore, the impact would be less than significant.

Mitigation: None required.

Wastewater

Impact UT-2: The draft Plan and Transit Tower would increase sanitary wastewater flows, but it would not require or result in the construction or substantial new wastewater treatment or stormwater facilities, or exceed the wastewater treatment requirements of the Regional Water Quality Control Board. (Less than Significant)

As stated in Section IV.P, Hydrology and Water Quality, the Transit Center District Plan area currently comprises primarily impervious surfaces. Therefore, construction of new buildings and paved areas

[318] SFPUC, 2010 UWMP, Sections 5.6 and 5.7.

would not result in a substantial increase in impervious surfaces or stormwater runoff. Buildout pursuant to the Plan Policies 6.19 and 6.20—including the implementation of on-site collection, treatment, storage and conveyance systems for rainwater, fog, graywater, blackwater, stormwater, and foundation drainage water and Low-Impact Development techniques for public spaces—would reduce storm water flow as compared to existing conditions.

As stated above, the draft Plan would result in up to 1.9 mgd of water demand. Conservatively assuming that 90 percent of water used would be expelled as sanitary wastewater, the draft Plan would result in an additional 1.7 mgd of sanitary flow. The Southeast Water Pollution Control Plant has an average dry weather flow (ADWF) capacity of 84.5 mgd, and it treats approximately 67 mgd during dry weather to a secondary treatment standard, with a total capacity to treat up to 150 mgd to that standard. The addition of 1.7 mgd generated by the proposed project would be accommodated within the dry-weather capacity of the Southeast Plant.

Regarding wet weather flow, the Transit Center District Plan would not result in an increase in stormwater flow due to compliance with the stormwater management requirements of the San Francisco Public Utilities Commission. Therefore, the only increase in wet weather flow would be from sanitary sewage generation. The up to 1.7 mgd of additional wastewater flow would be accommodated within the existing system during all but the most severe storm events, and it would not be so large as to exceed waste discharge requirements of the NPDES permit. The impact would be less than significant.

As noted, the Transit Center District Plan includes several policies that may lower anticipated flows to the combined system. These policies encourage reuse of greywater and cooling tower blow down, as well as installation of water-efficient water fixtures.[319]

In light of the above, effects related to wastewater collection and treatment would be less than significant.

Mitigation: None required.

Energy

Impact UT-3: The draft Plan and Transit Tower would increase demand for electricity and natural gas, but not to an extent that would result in a significant impact. (Less than Significant)

Construction of projects pursuant to the Transit Center District Plan and Transit Tower would require temporary planned outages with customers notified prior to the outage. However, these outages would not be expected to significant affect service for existing or future customers.

319 Although plan policies encourage the city to locate of a potential new treatment facility for creating a local non-potable water supply, such a facility would require a separate, project-level environmental review.

Operation of projects constructed pursuant to the Transit Center District Plan would increase demand for electric service within the Plan area, but not to levels that could not be met by PG&E.[320] The PG&E Electric Planning Department monitors load growth at each substation in the city, and project projected loads are forecasted based on load trends and known projects—such as those projects planned pursuant to the Transit Center District Plan—to accommodate the system growth. PG&E also has adequate capacity and reliability within the gas system to service the Plan area. [321]

In addition, the Transit Center District Plan includes several policies that, if implemented, would lower overall energy demand. Policies 6.1 through 6.7 call for the City and project developers to implement a Central Heat and Power (District Heating/Energy) system, through which waste and excess heat and energy would be shared among new and refurbished projects within the Plan area.[322] Policies 6.8 through 6.12 call for individual projects to be designed not only to meet LEED levels established in the San Francisco Green Building Ordinance, but also to take advantage of specific energy-saving measures, such as on-site renewable energy systems, natural ventilation, and passive solar heating and lighting. Adherence to such policies would lower overall energy demand. The Transit Center District Plan would result in less-than-significant impacts to energy generation and distribution systems.

Mitigation: None required.

Solid Waste

Impact UT-4: The draft Plan and Transit Tower would be served by a landfill with sufficient permitted capacity to accommodate solid waste generated by projects constructed pursuant to the plan. Individual building owners and tenants would comply with federal, state, and local statutes and regulations related to solid waste. (Less than Significant)

According to growth projections, the Plan area would comprise 6,100 additional households and 9,500 residents. In addition, a total of about 30,000 jobs would be generated in new developments, most of which would be Management, Information, and Professional Services jobs in commercial uses. Nonetheless, the San Francisco Department of the Environment predicts a flat rate of solid waste generation through 2030 based on current and projected economic conditions.[323]

Although the increased employee and visitor population and business activities would incrementally increase the total waste generated by the City, this waste would be accommodated within these projections. In addition, the increasing rate of waste diversion from landfills would ensure that the waste

[320] Cannon, Tom, Supervisor, PG&E San Francisco Division Electric Planning Department, Response to Transit Center District Plan EIR PG&E Questionnaire, July 1, 2010.
[321] Lam, William, Supervisor, PG&E San Francisco Division Gas Planning Department, Response to Transit Center District Plan EIR PG&E Questionnaire, July 1, 2010.
[322] No design has been developed for such a system, and therefore its implementation would be subject to subsequent review under CEQA.
[323] Dmitriew, Alex, Commercial Recycling Assistant Coordinator, San Francisco Department of the Environment, Response to Transit Center District Plan EIR SF Environment Questionnaire, August 4, 2010.

generated by the projects constructed pursuant to the Transit Center District Plan would not result in a significant impact to landfill capacity.

Projects built pursuant to the Transit Center District Plan would be required to comply with San Francisco Ordinance No. 27-06 regarding the recycling of construction and demolition (C&D) debris. This ordinance requires the diversion from landfills of a minimum 65 percent of C&D debris. Given this fact, and given the long-term capacity available at these landfills, the Transit Center District Plan and Transit Tower would not result in either landfill exceeding its permitted capacity; therefore, the impact would be less than significant.

Mitigation: None required.

Transit Tower Impacts

Impact UT-5: The proposed Transit Tower would not result in the need for new or physically altered facilities related to water or wastewater, energy, or solid waste. (Less than Significant)

The Transit Tower would account for a portion of the growth described above in the discussion of Plan impacts. Therefore, all effects of the Transit Tower would be subsumed within the effects described in Impacts UT-1 through UT-4. Because all of those impacts were determined to be less than significant, effects related to the Transit Tower would likewise be less than significant.

Mitigation: None required.

Cumulative Impacts

Impact C-UT: The draft Plan, including demand on public services from the proposed Transit Tower, would not result in a considerable contribution to any significant impacts related to provision of utilities and service systems. (Less than Significant)

The analysis above concludes that the development pursuant to the draft Plan, including the Transit Tower, would not adversely affect the provision of utilities and service systems in the Plan area. Because there is no shortfall identified in water supply or wastewater treatment capacity, and because there is no projected shortfall with respect to energy or solid waste, neither the Plan nor the Transit Tower project would result in significant cumulative effects with respect to utilities or service systems.

Mitigation: None required.

M. Public Services

Setting

Police Protection

The San Francisco Police Department (SFPD) provides police protection services in San Francisco and within the Plan area, including the Transit tower project site. SFPD's headquarters is located at the Hall of Justice at 850 Bryant Street. Southern Station is located on the first floor of the building; this district station provides police services to the area bounded by Market Street to the northwest, the Embarcadero to the east, Mission Creek, Berry Street, and 16th Street to the south, and Division Street/Duboce Avenue to the southwest, which includes the Plan area.[324] Treasure Island and Yerba Buena Island are also served by the Southern District. The Station is staffed by approximately 115 officers.

The Transit Center District Plan is located in an area staffed by approximately 12 officers who provide coverage 24 hours per day. The crime rate in this area is average relative to the entire Southern Station service area. Due to the relatively high density, it requires more police services than other areas of the city. In the first five months of 2010, there were 100 violent crimes, 253 property crimes, and 354 other crimes in the area bounded by Market, Main, Folsom, and Third Streets.[325]

In 2007, Southern Station received 8,050 Priority A calls (life-threatening emergency); 18,297 Priority B calls (potential for harm to life and/or property); and 20,416 Priority C calls (crime committed with no threat to life or property). [326] Southern Station received more calls for service and reported more crimes than any other district station. The Southern District accounts for approximately 19 percent of the crimes that occur citywide.

Fire Protection and Emergency Medical Services

The San Francisco Fire Department (SFFD), headquartered at 698 Second Street, provides fire suppression and emergency medical services to the City and County of San Francisco, including the Plan area and the Transit Tower site. The SFFD consists of 3 divisions, which are subdivided into 10 battalions and 42 active stations located throughout the City. Fire protection for the Transit Center District Plan area is provided primarily by the three closest fire stations. Station 1, at 676 Howard Street at Third Street, has one engine company, with one officer and three firefighters; one aerial (ladder) truck company, with one officer and four firefighters, and a Heavy Rescue Squad, with one officer and three firefighters. Station 1 is scheduled to be relocated to 935 Folsom Street, between Fifth Street and Sixth Street, in the next several years[327]; this move would occur in conjunction with the proposed expansion of the San Francisco Museum of Modern

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324 Acting Captain Arthur J. Borges, Jr., San Francisco Police Department, Response to Transit Center District Plan EIR Police Services Questionnaire, June 9, 2010.

325 *Ibid.*

326 San Francisco Police Department, *2007 Annual Report*, 2008.

327 Doudiet, Thomas, Assistant Deputy Chief, Division of Support Services, San Francisco Fire Department, Response to Transit Center District Plan EIR Fire Protection Services Questionnaire, November 12, 2010.

Art, a separate project just outside the Plan area that is undergoing its own CEQA review (Case Nos. 2009.0291E and 2010.0275E). Station 8, at 36 Bluxome Street, at Fourth Street, has one engine company and one truck company, and a battalion chief. Station 35, at Pier 22½ on the Embarcadero at Harrison Street, currently has no firefighting vehicles or crews pending renovation of the facility, but is the docking location of the SFFD fireboats. Station 13, at Washington and Sansome Streets (one engine and one truck) is the next closest station to the Plan area. There is also a new station planned to be incorporated into the Public Safety Building at Third Street and Mission Rock in the Mission Bay neighborhood, the construction of which is slated to begin in early 2012. Other stations serve the Plan area on an as-needed basis. For example, in the absence of Engine Company 35, Engines 13, 36 (Oak and Franklin Streets), or 29 (Vermont Street in Showplace Square) can respond along with units from Station 1 and Station 8.

For the Plan area in 2009, there were a total of 857 alarms, 92 fire-related calls, 932 non-emergency medical calls, and 1,458 medical calls. For all calls except non-emergency calls, average response time was about 5 minutes 10 seconds.

The Auxiliary Water Supply System (AWSS), which provides a dedicated high-pressure water system for fire suppression, serves the entire Plan area. It includes five underground cisterns located at the following locations: Howard Street at Beale Street, First Street at Folsom Street, First Street at Harrison Street, First Street at Howard Street, and Second Street at Folsom Street. There are no currently existing water deficiencies in the Plan area related to firefighting concerns, and there are no Fire Department water supply improvements proposed or planned.

The SFFD provides emergency medical services (EMS) in the City, including basic life support (BLS) and advanced life support (ALS) ambulance services. In addition, several privately operated ambulance companies are authorized to provide BLS and ALS services. The City's emergency dispatch (911) center routes fire and medical emergency calls to the appropriate station and units best able to respond to the particular address and situation.

San Francisco Division of Emergency Services is currently planning a process to re-structure the contracts for EMS Service Providers, as the prior "exclusivity" exemption, under which City ambulances handles all EMS calls, has ended. A request for proposals will be released, likely in 2011, and eligible service providers will be considered for contracts. It is projected that the overall effect of this change will be to increase the "floor" number of ambulances available for dispatch at any given time in San Francisco from the current level. This increase will lead to an overall improvement in call response intervals.

SFFD ambulances are deployed to the City at large in order to be most flexible to changes in call volume and distribution changes throughout the day and week, and there are no subdivision of ambulance zones within the City. There were 82,678 calls for medical assistance in 2009, and the most common calls were for "breathing problems," "sick persons" "unconscious/fainting," and "falls."[328] For Code 3 (life-

[328] Mercer, Mary, Fellow, EMS & Disaster Management, UCSF-SFGH Department of Emergency Medicine, San Francisco EMS Agency, San Francisco Department of Emergency, Response to Transit Center District Plan EIR EMS Services Questionnaire, August 30, 2010.

threatening emergency) calls, average response time was 5 minutes, 12 seconds, and 90th percentile response time was 7 minutes 27 seconds. For Code 2 calls, average response time was 10 minutes 16 seconds, and 90th percentile response time was 18 minutes 26 seconds.

Schools

The San Francisco Unified School District (SFUSD) operates San Francisco's public schools. SFUSD managed 112 schools during the 2009 – 2010 academic year, including: 73 elementary schools, 13 middle schools, 19 high schools, and nine charter schools, with a total enrollment of 55,140.[329] From 1995 to 2007, student enrollment within the SFUSD declined from 61,889 to 55,069, a drop of 11 percent. Enrollment has stabilized since 2007, and has actually increased slightly, by just over 0.1 percent, since then.[330] Overall capacity exceeds current enrollment, but in some areas of the city the enrollment exceeds capacity for elementary, middle, and high schools.[331] SFUSD anticipates that elementary school enrollment will grow due to the large birth cohorts earlier in the decade. Middle school enrollment is anticipated to rise, as well, but remain below current enrollment through 2013. High school enrollment will experience a continuous decline through 2013 due to the declining birth rates of the 1990s.[332] SFUSD has held discussions to build additional school sites in Mission Bay, Treasure Island, and Bayview Hunter's Point, as well as building a campus for the Asawa School of the Arts in the Civic Center, but no final decisions have been made.

Bessie Carmichael Elementary School at 275 Seventh Street, John Yehall Chin Elementary School at 350 Broadway, and the Chinese Education Center at 657 Merchant Street are the nearest schools to the Transit Center District Plan area. In March 2009, the SFUSD Board of Education approved new guidelines for attendance boundaries around schools. Under this new policy, Bessie Carmichael will become a "city-wide" school with no attendance area beginning with the 2011-2012 academic year.[333]

Past enrollment figures at individual schools are not an indication of potential enrollment trends because SFUSD will implement a new student assignment plan for the 2011-12 school year. According to initial proposals for school attendance boundaries and elementary to middle school feeder patterns, students living at Mission and First Street would attend either John Yehall Chin Elementary School or Daniel Webster Elementary School (at 465 Missouri Street), depending on the side of the street on which they live. Most students that attend Chin Elementary School would go to Francisco Middle School (2190 Powell Street), and most students attending Webster would attend Mann Middle School (3351 23rd Street) based on the current recommendations, which are in draft form and are subject to approval by the Board of Education. Students would be able to apply for any high school across the city.

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329 San Francisco Unified School District Overview, http://www.sfusd.edu/en/about-sfusd/overview.html; Education Data Partnership, Fiscal, Demographics, and Performance Data on California's K-12 Schools, www.ed-data.k12.ca.us; accessed May 12, 2011.
330 California Department of Education, Educational Demographics Office, http://dq.cde.ca.gov/dataquest, accessed May 12, 2011.
331 Waymack, Nancy. San Francisco Unified School District, Director of Policy & Operations, Response to Transit Center District Plan EIR SFUSD Questionnaire, September 3, 2010.
332 San Francisco Unified School District (SFUSD), *Capital Plan, FY 2010-2019*, September 2009.
333 SFUSD, *Student Assignment Redesign: Report on City-Wide Schools*, July 2010.

Parks and Recreational Facilities

Parks and recreational facilities are discussed in Section IV.K of this document.

Impacts

Significance Criteria

The proposed project would result in a significant impact with respect to public services if it would:

- Result in substantial adverse physical impacts associated with the provision of, or the need for, new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any public services such as fire protection, police protection, schools, parks, or other services.

Impact Analysis

The project would increase development on the site. Thus, the project would increase the demand for, and use of, public services, but not in excess of amounts expected and provided for in this area. As discussed in the previous section, no need for expansion of public services facilities is anticipated due to the proposed project. The draft Plan would increase demand for police and fire services, but not in excess of amounts provided for in the Plan area. The project would not be expected to have a substantial impact on police and fire services and would not necessitate the need for new or physically altered governmental facilities.

The incremental daytime residential population growth that would result from the draft Plan and the new office, hotel, and retail space that would be developed in the Plan area would not necessitate the need for new or physically altered parks or other governmental facilities.

Plan Impacts

Police Protection

Impact PS-1: The draft Plan and Transit Tower would not result in the need for new or physically altered police protection facilities. (Less than Significant)

According to growth projections, the Transit Center District Plan area, inclusive of the Transit Tower, would comprise 6,100 additional households with 9,500 residents by 2030. In addition, almost 30,000 jobs would be added to the Plan area.[334] This increase in employment and residential population would increase demand for police protection services such that additional police protection services would be needed.[335] SFPD

[334] Hausrath Economics Group, *Transit Center District Plan Development Fee Nexus Study: Preliminary Draft Report*. Prepared for the San Francisco Planning Department, August 9, 2010.

[335] Acting Captain Arthur J. Borges, Jr., San Francisco Police Department, Response to Transit Center District Plan EIR Police Services Questionnaire, June 9, 2010.

would assess the need not based just on population growth, but also on calls for service, types and times of traffic and pedestrian flow patterns, and operational hours of uses within the Plan area.

As part of the permit review process, building planners would work with the San Francisco Police Department and the Department of Emergency Management to ensure that emergency communication systems within new high-rise buildings are functional and appropriately designed. Such strategies may include police access to control systems, surveillance cameras and other technology, evacuation procedures and live drills, high-rise crime prevention through environmental design, disaster preparedness, access and egress points of identification, and private security offices, if appropriate. SFPD also recommends close-circuit monitoring, wireless and mesh networks, perimeter security systems, access control systems, weapons and explosion detection systems, and anti-terrorism and blast mitigation systems and designs. These systems would be incorporated into the new towers, including the Transit Tower, to the extent practicable based on consultation with SFPD.

According to SFPD, the existing police infrastructure would accommodate this additional growth through re-deployment of resources from other areas of the city, if needed. For example, the boundaries of the Southern District could be modified depending on demand for police protection services. Southern Station may also be relocated to an as-yet-to-be-determined site, which may necessitate redefining the district's boundaries. The Transit Center District Plan and Transit Tower's impact on police protection services would be less than significant.

Mitigation: None required.

Fire Protection and Emergency Medical Services

Impact PS-2: The draft Plan and Transit Tower would not result in the need for new or physically altered fire protection facilities, but may delay emergency medical response. (Less than Significant)

The addition of 6,100 additional households with 9,500 residents, as well as 30,000 jobs primarily located in high-rise buildings, would affect fire protection services in the Plan area. SFFD would require additional personnel, equipment, and facilities to maintain adequate levels of fire protection and emergency medical services. As the worker and employee population within the Transit Center District Plan area increases, additional revenues would be paid into the City's General Fund to support personnel growth at the SFFD. There are currently no plans to increase SFFD personnel beyond the new station at Third Street and Mission Rock.

Studies have shown that buildings greater than three stories in height increase the length of emergency medical service (EMS) response times up to twice as long as average response times for single occupancy residencies or those three stories or less. Response times showed significant improvement when EMS responders were greeted on arrival or had access to an "emergency mode" of elevator transport (preventing non-critical elevator stops). However, commercial and office space have relatively low utilization rates of the pre-hospital (emergency medical services) system, compared to residential spaces.[336]

Construction of high-rise buildings (taller than 75 feet), including the proposed Transit Tower and other tall buildings, both those with applications on file and other anticipated development, would be required to conform to the provisions of the *Building Code* and *Fire Code* which require additional life-safety protections for such structures.

Standard fire-fighting techniques applicable in high-rise buildings would apply to fire-fighting, and adherence to all applicable *Building Code* and *Fire Code* provisions would ensure that new high-rise buildings are constructed to allow for efficient emergency response, avoiding the majority of problems associated with emergency response.[337] Nonetheless, the overall height of new high-rise buildings could delay fire and emergency medical response. However, commercial and office space have relatively low utilization rates of the pre-hospital system, compared to residential spaces.[338] Although compliance with the existing *Fire Code* would address this effect, [339] the overall height of the high-rises that may be developed on the opportunity sites pursuant to the Transit Center District Plan could delay emergency medical response.

The City's EMS Agency recommends that all new high-rise buildings have in place a system to assist entry of Fire Department and/or EMS personnel, including a protocol to greet paramedics at the door to the building or in the street, to assist in navigation to the patient, as well as to provide express elevator service when necessary. Methods for assisting EMS staff could include designation of qualified building staff (ideally with first-responder or first aid training) who are familiar with evacuation plans and can assist the entry of pre-hospital personnel; placement of first aid kits, automatic emergency defibrillators, and fire response equipment (hoses, air tanks, forcible entry tools, etc.) throughout buildings (every 10 floors or 500 occupants); and appointment of floor-based "safety wardens" to assist in first aid, single person medical evacuation, or evacuation for larger disasters. These measures would ensure that any potential delay by fire or emergency medical response due to building height would be minimized, and that care would be provided prior to their arrival. Combined with strict adherence to Fire Codes, fire and medical emergency response would not be significantly affected.

Mitigation: None required.

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[336] Mercer, Mary, Fellow, EMS & Disaster Management, UCSF-SFGH Department of Emergency Medicine, San Francisco EMS Agency, San Francisco Department of Emergency, Response to Transit Center District Plan EIR EMS Services Questionnaire, August 30, 2010.

[337] Doudiet, Thomas, Assistant Deputy Chief, Division of Support Services, San Francisco Fire Department, Response to Transit Center District Plan EIR Fire Protection Services Questionnaire, November 12, 2010.

[338] Mercer, Mary, Fellow, EMS & Disaster Management, UCSF-SFGH Department of Emergency Medicine, San Francisco EMS Agency, San Francisco Department of Emergency, Response to Transit Center District Plan EIR EMS Services Questionnaire, August 30, 2010.

[339] Doudiet, Thomas, Assistant Deputy Chief, Division of Support Services, San Francisco Fire Department, Response to Transit Center District Plan EIR Fire Protection Services Questionnaire, November 12, 2010.

Schools

Impact PS-3: The draft Plan and Transit Tower would not result in the need for new or physically altered school facilities. (Less than Significant)

The addition of 6,100 households and 30,000 jobs would both directly and indirectly increase student population in the SFUSD. Based on student generation rates of 0.70 students for all-affordable building units, 0.25 students for inclusionary units, and 0.05 students for market rate units, the Transit Center District Plan area's 6,100 new households could generate about 965 students for SFUSD. Of this, about 100 new students would result from development outside Zone 1 of the approved Transbay Redevelopment Area, including about 60 students that would result from taller residential buildings permitted by the draft Plan and proposed rezoning that would accompany the Plan. Because the draft Plan's emphasis is on ensuring adequate space to accommodate office development, 90 percent of new student generation in the Plan would not be attributable to the Plan, but to projects in the existing redevelopment area.

In addition to growth in Plan area housing units, as described in Section IV.C, Population, Housing, Business Activity, and Employment, the increment of 8,000 jobs that would be accommodated by the draft Plan and rezoning would result in the need for about 2,800 housing units in San Francisco, generating an enrollment increase of an additional approximately 230 students. The total employment growth in the Plan area, about 29,300, would similarly generate enrollment of some 820 students. (To the extent the Plan area employees would live in the Plan area, some of these students would be the same as those generated by Plan-area housing.) Depending on the grade level distribution of the students and whether they are new to the district or already enrolled, it is likely SFUSD would need to expand capacity in the elementary and middle school levels.[340]

The Leroy F. Greene School Facilities Act of 1998, or Senate Bill 50 (SB 50), restricts the ability of local agencies such as the City and County of San Francisco to deny land use approvals on the basis that public school facilities are inadequate. SB 50 establishes the base amount of allowable developer fees at $2.97 per square foot of residential construction and $0.47 per square foot of commercial construction. These fees are intended to address local school facility needs resulting from new development. Public school districts can, however, impose higher fees provided they meet the conditions outlined in the act. Private schools are not eligible for fees collected pursuant to SB 50.

SFUSD has approval from the Board of Education to levy the following School Facilities Impact Fees to be collected for residential, commercial, and industrial developments as of Summer 2010. These rates are subject to change based on updated studies.

Residential Development:	$2.24/sq. ft for new residential construction
Office:	$0.27/sq. ft
Retail:	$0.18/sq. ft

340 Waymack, Nancy. San Francisco Unified School District, Director of Policy & Operations, Response to Transit Center District Plan EIR SFUSD Questionnaire, September 3, 2010.

Industrial/Warehouse/Manufacturing:	$0.21/sq. ft.
Lodging/Hotel/Motel:	$0.09/sq. ft.
Hospitals:	$0.22/sq. ft.
Research and Development:	$0.24/sq. ft.

Local jurisdictions are precluded under state law (SB 50) from imposing school-enrollment–related mitigation beyond the school development fees. Therefore, potential effects associated with additional development that could result from construction, tenanting, and operation of the Transit Tower, would be considered less than significant.

Mitigation: None required.

Transit Tower Impacts

Impact PS-4: The proposed Transit Tower would not result in the need for new or physically altered facilities related to police, fire protection, or emergency medical services. (Less than Significant)

The Transit Tower would account for a portion of the growth described above in the discussion of Plan impacts. Therefore, all effects of the Transit Tower would be subsumed within the effects described in Impacts PS-1 through PS-3. Because all of those impacts were determined to be less than significant, effects related to the Transit Tower would likewise be less than significant.

Specific recommendations related to provision of fire and emergency medical services in high-rise buildings, described under Impact PS-2, would also apply to the Transit Tower.

Mitigation: None required.

Cumulative Impacts

Impact C-PS: The draft Plan, including demand on public services from the proposed Transit Tower, would not result in a considerable contribution to any significant impacts related to provision of public services. (Less than Significant)

The analysis above concludes that the development pursuant to the draft Plan, including the Transit Tower, would not adversely affect the provision of public services in the Plan area. Because neither the Police Department nor the Fire Department or Emergency Medical Services Agency has identified a citywide service gap, and because there is no projected shortfall with respect to school capacity citywide, neither the Plan nor the Transit Tower project would result in significant cumulative effects with respect to public services.

Concerning relocation of Fire Station No. 1, proposed in conjunction with the expansion of the Museum of Modern Art, the DEIR for that project (Case Nos. 2009.0291E and 2010.0275E) identifies no significant effect on Fire Department response times due to the proposed relocation.

Mitigation: None required.

N. Biological Resources

This section describes the biological resources that occur or have the potential to occur within or adjacent to the Transit Center District Plan area and the Transit Tower project site and evaluates the possible project-related impacts on these resources. Mitigation measures to reduce adverse impacts on biological resources to less than significant levels are identified.

Information on existing vegetation, wildlife, and special-status species was obtained from regional plans and reports, records from the California Natural Diversity Database, California Native Plant Society Electronic Inventory, the U.S. Fish and Wildlife Service (USFWS), aerial photo interpretation, and other biological literature.[341]

Regional Setting

The Transit Center District Plan area and the Transit Tower project site are located in the Bay-Delta Bioregion[342]. This bioregion consists of a variety of natural communities that range from the open waters of the Bay and Delta to salt and brackish marshes to grassland, chaparral and oak woodlands. The temperate climate is Mediterranean in nature, with relatively mild, wet winters and warm, dry summers. The high diversity of vegetation and wildlife found in the region is a result of soil, topographic, and micro-climate diversity that combine to promote relatively high levels of endemism.[343] This, in combination with a long history of uses resulting in alteration of the natural environment, and the increasingly rapid pace of development in the region, has resulted in a relatively high degree of endangerment for local flora and fauna.

The San Francisco Bay-Delta is the second largest estuary in the United States and supports numerous aquatic habitats and biological communities. It encompasses 479 square miles, including shallow mudflats, tidal marshes, and open waters. The San Francisco Bay-Delta is an important wintering and migratory stop-over site for the Pacific Flyway. More than 300,000 wintering waterfowl use the region.

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341 CNDDB. 2010. California Natural Diversity Data Base, Rarefind 3 computer application, Sacramento, CA; CNPS. 2010. Online Inventory of Rare and Endangered Plants. Version 7-08b (04/02/08), http://cnps.web.aplus.net/cgi-bin/inv/inventory.cgi, accessed 07/20/10; USFWS. 2010. Official List of Federal Endangered and Threatened Species that Occur in or may be Affected by Projects in San Francisco County and the San Francisco North USGS 7.5 Minute Quadrangle, Document Number: 100730110200, retrieved July 30, 2010.

342 A bioregion is an area defined by a combination of ecological, geographic and social criteria, that consists of a system of related, interconnected ecosystems. The Bay-Delta bioregion is considered the immediate watershed of the Bay Area and the Delta, not including the major rivers that flow into the Delta. Bounded on the north by northern edge of Sonoma and Napa counties and the Delta and extending east to the edge of the valley floor. Bounded on the south by the southern edge of San Joaquin County, the eastern edge of the Diablo Range, and the southern edge of Santa Clara and San Mateo counties.

343 *Endemism* refers to the degree to which organisms or taxa are restricted to a geographical region or locality and are thus individually characterized as endemic to that area.

Project Setting

Transit Center District Planning Area

The CEQA baseline for biological resources analysis comprises an area of downtown San Francisco that is nearly fully developed with structures and roadways.[344] Although the district is currently zoned for building heights ranging from 30 feet to 550 feet, the heart of the district (south of the old Transbay Terminal site) is largely occupied by buildings less than 10 stories tall, with the exception of two office towers near the intersection of Fremont and Howard Streets. Taller building are prevalent along Mission and Market Streets in the north, Main, Spear, and Steuart Streets to the east, and Hawthorne and Third Streets to the west. Many existing buildings in the center of the district are older, less than five stories in height, and are have masonry exteriors and "punched" windows, without large continuous expanses of glass. There are no natural communities remaining within the Plan area and there are currently only small pockets of open space, such as Yerba Buena Gardens and a number of small privately owned, publicly accessible open spaces created in conjunction with various development projects.[345]

Vegetation Communities

There are no natural vegetation communities within the Plan area. Vegetation within the Plan area consists of street trees and landscaping, on the street and in occasional back yards or courtyards and POPOS throughout the area. These types of vegetated areas generally provide habitat only for species habituated to urban life and high disturbance levels. Typical urban wildlife are usually generalists,[346] and often non-native species, that are tolerant of human presence and activities, such as house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris*), rock dove (*Columba livia*), house finch (*Carpodacus mexicanus*), Norway rat (*Rattus norvegicus*), house mouse (*Mus musculus*), and pocket gopher (*Thomomys bottae*).

Sensitive Natural Communities

Sensitive natural communities are designated as such by various resource agencies, such as the California Department of Fish and Game (CDFG), or in local policies and regulations, and are generally considered to have important functions or values for wildlife and/or are recognized as declining in extent or distribution and are considered threatened enough to warrant some sort of protection. For example, many local agencies in California consider protection of oak woodlands important and federal, state, and most local agencies also consider wetlands and riparian habitat as sensitive communities. The California

344 The primary exception is the land along the north side of Folsom Street and between Beale and Main Streets formerly occupied by the Terminal Separator Structure (Bay Bridge on- and off-ramps and Embarcadero Freeway ramps). Approved for mixed-use development as part of the Transbay Redevelopment Plan, many of these parcels were in use as staging areas for construction of the new Bay Bridge west approach and most remain unbuilt upon.

345 Not all of these spaces, referred to as POPOS, are planted; many are primarily hardscape, with limited vegetation.

346 Generalist species are able to use a variety of habitats and food sources, unlike many special-status species that are closely restricted to a specific habitat type or food source.

Natural Diversity Data Base (CNDDB; administered by CDFG) tracks communities it believes to be of conservation concern and these communities are typically considered sensitive for the purposes of CEQA analysis. There are no sensitive communities within the Plan area, nor is there any riparian habitat.

Jurisdictional Waters and Wetlands

The Plan area is fully developed, with no waterways, lakes or other impoundments of water. There are no potentially jurisdictional waters or wetlands within the Plan area.

Special-Status Species

A number of species known to occur in the vicinity of the proposed Plan area are protected pursuant to federal and/or State endangered species laws, or have been designated Species of Special Concern by the CDFG. In addition, Section 15380(b) of the state CEQA Guidelines provides a definition of rare, endangered or threatened species that are not currently included in an agency listing but that whose "survival and reproduction in the wild are in immediate jeopardy" (endangered) or that "in such small numbers throughout all or a significant portion of its range that it may become endangered if its environment worsens" or "is likely to become endangered within the foreseeable future throughout all or a significant portion of its range and may be considered 'threatened' as that term is used in the Federal Endangered Species Act" (rare).[347] Species recognized under these terms are collectively referred to as "special-status species." For the purposes of this EIR, special-status species include:

- Plant and wildlife species listed as rare, threatened or endangered under the federal or State endangered species acts;
- Species that are candidates for listing under either federal or State law;
- Species formerly designated by the USFWS as Species of Concern or by CDFG as Species of Special Concern;
- Species designated as "special animals" by the state;[348]
- Species designated as "fully protected" by the state (of which there are about 35, most of which are also listed as either endangered or threatened);[349]

[347] For example, CDFG interprets Lists 1A, 1B, and 2 of the California Native Plant Society's *Inventory of Rare and Endangered Vascular Plants of California* to consist of plants that, in a majority of cases, would qualify for listing as rare, threatened, or endangered. However, the determination of whether an impact is significant is a function of the lead agency, absent the protection of other laws.

[348] Species listed on the current CDFG Special Animals List (July 2009), which includes 883 species. This list includes species that CDFG considers "those of greatest conservation need." The list is available at http://www.dfg.ca.gov/biogeodata/cnddb/plants_and_animals.asp; reviewed December 16, 2010.

[349] The "fully protected" classification was "the State's initial effort in the 1960s to identify and provide additional protection to those animals that were rare or faced possible extinction." The designation exists in the state *Fish and Game Code*. (CDFG, Fully Protected Animals, http://www.dfg.ca.gov/wildlife/nongame/t_e_spp/fully_pro.html. Reviewed December 6, 2010.

- Raptors (birds of prey), which are specifically protected by the *California Fish and Game Code* Section 3503.5, which prohibits the take, possession, or killing of raptors and owls, their nests, and their eggs;[350] and
- Species such as candidate species that may be considered rare or endangered pursuant to Section 15380(b) of the CEQA *Guidelines*.

Appendix F provides comprehensive lists of the special-status species that have been documented from, or have potential to occur in suitable habitat within San Francisco County. These lists were obtained from the California Natural Diversity Database, California Native Plant Society Electronic Inventory, and the U.S. Fish and Wildlife Service. Data requests were made for the San Francisco North USGS 7.5 minute topographic quadrangle (in which the Plan area is located). Based on ESA's review of the biological literature of the region, previous EIRs, and an evaluation of the habitat conditions of the Plan area, most of these species were eliminated from further evaluation because the Plan area does not provide suitable habitat for them.

Species Assessed in Detail

Potential impacts of the Project on special status species were assessed based on the literature review, professional judgment, and the following criteria:

1) A determination of susceptibility. This determination is a three-level process that evaluated for each species: a) potential occurrence in the Plan area (generally, the habitats of the Plan area, including the Transit Tower project site); b) potential occurrence within the footprint of one or more development projects that could occur in the Plan area; or, c) absence from either the Plan area or proposed development sites. If the species was determined unlikely to be found in the Plan area, (e.g., if no potential habitat exists for the species in the Plan area), then the species was given no further consideration.

2) If a species was determined to have the potential to occur in the Plan area, further analyses were made of life history and habitat requirements, as well as the suitability of habitat for the species found within the Plan area or its immediate vicinity.

3) If suitable habitat was determined present within the Plan area or vicinity and the species has been documented as observed within the Plan area or has some potential to occur, additional analysis considered whether the species would be adversely affected by the draft Plan or Transit Tower project. Both direct effects (e.g., displacement of habitat) and indirect effects (e.g. noise) were considered. In addition, life history and habitat requirements were evaluated to ascertain the likelihood and severity of impact.

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[350] The inclusion of birds protected by Fish & Game Code Section 3503.5 is in recognition of the fact that these birds are substantially less common in California than most other birds, having lost much of their habitat to development, and the recognition that the populations of these species are therefore substantially more vulnerable to further loss of habitat and to interference with nesting and breeding than are most other birds. It is noted that a number of raptors and owls are already specifically listed as threatened or endangered by state and federal wildlife authorities.

Of the special-status plants and animals presented in **Appendix F**, only the following six species, which were determined to have some potential to occur within the Plan area, were fully considered in the impact analysis:

- American peregrine falcon
- American kestrel
- Cooper's hawk
- Red-tailed hawk
- Western red bat
- Townsend's big-eared bat

These species are described in further detail below.

Special-Status Plants

No special-status plant species are expected to occur in the Plan area. Although a number of special-status plant species are identified in **Appendix F** as occurring within the Plan area vicinity, there are no intact natural communities remaining within the Plan area. Vegetation in the few scattered open space areas within the Plan area is dominated by landscaping, turf, or weeds. In addition, some of plant species presented in **Appendix F** are considered by CNPS (2010) to be extirpated from the Plan area vicinity due to a long-standing history of disturbance and lack of habitat.

Special-Status Animals

Birds

Peregrine falcon (*Falco peregrinus anatum*). Listed as Fully Protected[351] under the *California Fish and Game Code*, the peregrine falcon is known throughout California and is a year-around resident along the Pacific coast. The peregrine is a specialist, preying primarily on mid-sized birds, such as pigeons and doves, in flight. Occasionally these birds will take insects and bats. Although typical nesting sites for the species are tall cliffs, preferably over or near water, peregrines are also known to use urban sites, including the Bay Bridge and tall buildings in San Francisco and San Jose.[352] The San Francisco financial district has been considered a peregrine falcon territory since the late 1980s. The Santa Cruz Predatory Bird Research Group placed a nest box on the northwest corner of the PG&E building at 77 Beale Street when falcons were seen perching there often. Peregrine falcons first nested on the building in 2003 and have used PG&E and other nest structures, including the Bay Bridge, within their territory each year since then.[353] The PG&E building lies within the Plan area, at Mission and Beale Streets.

American kestrel *(Falco sparverius)* is a relatively small member of the falcon family that preys on small birds and on mammals, lizards, and insects. The kestrel is most common in open habitats, such as grasslands or pastures. American kestrels nest in cavities, primarily in trees (Sibley, 2001), but may also

[351] A fully protected species cannot be taken at any time, except, under certain circumstances, in association with a species recovery plan.
[352] Peeters, H. and J. Peeters, Raptors of California, University of California Press, Berkeley, CA, 2005, [California Natural History Guides: 82].
[353] Santa Cruz Predatory Bird Research Group, http://www2.ucsc.edu/scpbrg/pefa.htm, accessed July 28, 2010.

use buildings for nesting. Two breeding pairs were observed in San Francisco during data collection for the San Francisco Breeding Bird Atlas (SFBBA)[354]. While these were not located within the Plan area, both nests were located in cavities or crevices in buildings and the Breeding Bird Atlas indicates it is possible that the species could nest in and around downtown San Francisco. American kestrel is protected under Section 3503.5 of the *California Fish and Game Code*.

Cooper's hawk (*Accipiter cooperi*). Cooper's hawk ranges over most of North America and may be seen throughout California, most commonly as a winter migrant. Nesting pairs have declined throughout the lower-elevation, more populated parts of the state. Cooper's hawk generally forage in open woodlands and wooded margins and nests in tall trees, often in riparian areas. This species is known to nest locally in Bay Area urban neighborhoods but has not been documented as breeding in San Francisco.[355] This species occasionally may forage in and around the Plan area; however, there is no suitable nesting habitat for this species there. Cooper's hawk is protected under Section 3503.5 of the California Fish and Game Code.

Red-tailed hawk (*Buteo jamaicensis*). Red-tailed hawks are commonly found in woodlands and open country with scattered trees. These large hawks feed primarily on small mammals, but will also prey on other small vertebrates, such as snakes and lizards, as well as on small birds and invertebrates. Red-tailed hawks nest in a variety of trees in urban, woodland, and agricultural habitats and has been observed throughout the City. Breeding for this species within San Francisco has only been confirmed in areas that included sufficient grassland habitat for foraging.[356] This hawk may forage in and around the Plan area, however it is highly unlikely to nest there. Red-tailed hawk is protected under Section 3503.5 of the *California Fish and Game Code*.

Mammals

Special-status bat species. Surveys for bats have been conducted in San Francisco, focusing on natural areas and parks. Findings were that the three most commonly encountered species in the area are: Mexican free-tailed bat (*Tadaridia brasiliensis*), Yuma myotis (*Myotis yumanensis*), and western red bat (*Lasiurus blossevillii*), a California species of concern. While Mexican free-tailed bat were widespread and abundant throughout the sampled natural areas, Yuma myotis and western red bat were much less abundant and generally restricted to parks with lakes.[357] Knowing that these bats do occur in natural areas of the City, it is noted that the Plan area provides limited potential roosting habitat for two special-status bat species. However, foraging opportunities in such an urbanized area are relatively low, with few open or vegetated areas and no areas of standing water to host insect populations. The **western red bat** has a widespread distribution throughout California. These bats are generally solitary and roost in trees with dense foliage. They are tolerant of cold temperatures and are not known to hibernate, although

354 San Francisco Field Ornithologists, San Francisco Breeding Bird Atlas, 2001-2003, available: http://www.sffo.org accessed July 26, 2010.
355 *Ibid*.
356 *Ibid*.
357 Krauel, J.K. 2009. Foraging Ecology of Bats in San Francisco. M.S. Thesis, San Francisco State.

it is possible that they do in colder climates.[358] This species may use larger trees within the Plan area for roosting but the potential for their presence is low, given the lack of water bodies in the area. **Townsend's big-eared bats** (*Corynorhinus townsendii townsendii)* occur in a variety of habitats and utilize caves, mines, tunnels, buildings, or other human-made structures for roosting. While the potential for their occurrence within the Plan area is low, it is possible that this species could be found in abandoned or underutilized buildings.

Other Breeding and Migratory Birds

The City of San Francisco and surrounding Bay waters provide habitat for well over 200 species of birds, with some species as year-round residents, other species as winter residents, and still others passing through along the Pacific Flyway during spring and fall migrations. Avian diversity in the City is highest in areas with relatively large sized, diverse patches of habitat remaining. Nonetheless, trees, shrubs, and buildings within the Plan area provide nesting habitat for a variety of birds as well as patches of habitat for potential use by migrants as stop-over sites. The most common species documented as nesting in the general Downtown area[359] include Brewer's blackbird (*Euphagus cyanocephalus*), American robin (*Turdus migratorius*), mourning dove (*Zenaida macroura*), rock dove, house finch, house sparrow, European starling, and brown-headed cowbird (*Molothrus ater*). Less frequently found nesters include Anna's hummingbird (*Calypte anna*), common bushtit (*Psaltriparus minimus*), white-crowned sparrow (*Zonotrichia leucophrys*), chestnut backed chickadee (*Poecile rufescens*), and hooded oriole (*Icterus cucullatus*). As discussed below under Regulatory Setting, most migratory birds are protected from harm by the federal Migratory Bird Treaty Act.

Designated Critical Habitat

USFWS designates critical habitat for certain species that it has listed as threatened or endangered. 'Critical habitat' is defined in Section 3(5)(A) of the federal Endangered Species Act as those lands within a listed species' current range that contain the physical or biological features that are considered essential to the species' conservation, as well as areas outside the species' current range that are determined to be essential to its conservation. Critical Habitat has been designated for Central Coast steelhead trout (*Oncorhychus mykiss*), winter-run chinook salmon (*Oncorhynchus tshawytscha*), and Steller sea-lion (*Eumetopias jubatus*) in the waters off San Francisco's shoreline. However, the Plan area is not located within designated critical habitat for any federally-listed species.

Transit Tower Project Site

The Transit Tower site consists of an urban parcel covered in asphalt and concrete, with some landscaped areas containing trees and shrubs. The 645-foot tall Millennium Tower is to the east, other tall buildings are located to the north and west, and the site of the former Transbay Terminal—demolished beginning in August 2010—is to the south.

[358] Jameson, E.W., Jr., and H.J. Peeters, *Mammals of California: California Natural History Guides No. 66* (revised edition, 2004). Berkeley: University of California Press. 2004.
[359] San Francisco Field Ornithologists. *Op. cit.*

Vegetation Communities

There are no natural vegetation communities within the project site. Existing vegetation within or immediately adjacent to the project site consists of landscaping that had been planted in front of the former Transbay Terminal, and that remained in front of the demolition site as of December 2010. Otherwise the site consists of concrete and asphalt.

Sensitive Natural Communities

As defined earlier in the Plan setting, there are no sensitive communities within the project site.

Jurisdictional Waters and Wetlands

The project site is fully developed in an urban setting and there are no water features of any kind at the site. There are no potentially jurisdictional waters or wetlands within the project site.

Special-status Species

The consideration process for special-status species for this EIR was discussed in detail earlier in the Plan setting.

Special-Status Plants

No special-status plant species are expected to occur at the project site. This is a fully developed site in an urban setting, with no vegetation present except for some landscape trees and shrubs.

Special-Status Animals

Of the special-status plants and animals presented in **Appendix F**, only the following four species, which were determined to have some potential to occur within the vicinity of project site, were fully considered in the project-level impact analysis:

- American peregrine falcon
- American kestrel
- Cooper's hawk
- Red-tailed hawk

These species were described in detail in the Plan setting (see p. 555). While there is no suitable breeding habitat available for these birds at the project site, there is marginally suitable foraging habitat as these species all are known to prey on other birds. These raptors may also use buildings adjacent to the project site for loafing and roosting.

Other Breeding and Migratory Birds

As was described in the Plan setting, it is possible some species may nest in or on buildings on, or adjacent to, the Transit Tower project site. The Plan setting provides further details on the species most likely to use such areas for breeding.

Designated Critical Habitat

As defined earlier in the Plan setting, project site is not located within designated critical habitat for any federally-listed species.

Bird Strikes and Their Effects on Bird Populations

It is estimated that, in North America alone, between 100 million and 1 billion birds are killed due to collisions with buildings and other structures each year.[360] Collisions are currently recognized as one of the leading causes of bird population declines worldwide.[361] Daytime collisions occur most often when birds fail to recognize window glass as a barrier. Regardless of overall building height, the ground floor and first few stories of buildings present the greatest hazards to most birds; reflections of attractive ground-level features like vegetation draw birds toward glass surfaces and often result in collisions. Recent increases in glass surfaces used to better daylight buildings can be considered a "biologically significant" issue, potentially affecting the viability of local and regional bird populations.[362] Transparent features – especially buildings where birds can see through two glass surfaces to vegetation on the other side – also attract birds and cause collisions. Vegetated areas and bodies of water provide potentially valuable stopover habitat for migratory birds. Open space areas adjacent to developed areas create bird habitats in the vicinity of proposed buildings, potentially resulting in higher bird collision risks.

Many collisions are induced by artificial night lighting, particularly from large buildings, which can be especially problematic for migrating songbirds since many are nocturnal migrants.[363] The tendency of birds to move towards lights at night when migrating, and their reluctance to leave the sphere of light influence for hours or days once encountered, has been well documented.[364] It has been suggested that structures located at key points along migratory routes may present a greater hazard than those at other locations.[365] Other research suggests that fatal bird collisions increase as light emissions increase, that weather often plays an important part in increasing the risk of collisions, and that nights with heavy cloud cover and/or precipitation present the conditions most likely to result in high numbers of collisions.[366] The type of light used may affect its influence on the birds: for example, studies have indicated that blinking lights or strobe lights affect birds significantly less than non-blinking lights.[367]

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[360] San Francisco Planning Department, *Standards for Bird-Safe Buildings*, Adopted July 14, 2011. Reviewed August 18, 2011.Available on the internet at: http://www.sf-planning.org/ftp/files/publications_reports/bird_safe_bldgs/Standards_for_Bird-Safe_Buildings_8-11-11.pdf.

[361] Brown, H., Caputo, S., McAdams, E.J., Fowle, M., Phillips, G., Dewitt, C., Gelb, Y., Bird-safe Building Guidelines, New York Audubon, available online: http://nycaudubon.org, accessed 08/24/10.

[362] *Ibid.*

[363] Ogden, L.E., Collision Course: The Hazards of Lighted Structures and Windows to Migrating Birds, Special Report for the World Wildlife Fund and the Fatal Light Awareness Program, September 1996, available online: www.flap.org, accessed 08/25/10.

[364] *Ibid*.

[365] *Ibid*.

[366] Ogden, L.E., Summary Report on the Bird Friendly Building Program: Effect of Light Reduction on Collision of Migratory Birds, Special Report for the Fatal Light Awareness Program, available online: www.flap.org, January 2002, accessed 08/24/10.

[367] Gauthreaux, S.A., Belser, C.G., Effects of Artificial Night Lighting on Migrating Birds, In: Rich, C. and Longcore, T., Ecological Consequences of Night Lighting, Island Press, Covelo, CA, pp. 67-93, 2006.

Power lines, communications towers, and wind turbines ("windmills") have also been implicated in bird strikes.

As the DEIR was being published, the San Francisco Board of Supervisors unanimously approved, and the mayor subsequently signed, legislation amending the *Planning Code* to incorporate bird-safe building standards into the Code. The Commission also approved *Standards for Bird-Safe Buildings*.[368] The amendments, reviewed and recommended by the Planning Commission, introduced a new *Planning Code* Section 139, Standards for Bird-Safe Buildings, that focuses on buildings, both public and private, that create location-specific hazards and building feature-related hazards. Location-specific hazards apply to buildings in, or within 300 feet of and having a direct line of sight to, an Urban Bird Refuge; such a Refuge includes "open spaces two acres and larger dominated by vegetation, including vegetated landscaping, forest, meadows, grassland, or wetlands, or open water." Section 139 requires that 90 percent of glazing in the "Bird Collision Zone" (60 feet above grade, plus 60 feet above an adjacent vegetated roof two acres or larger) be treated (fritted, stenciled, frosted, or covered with netting, screens, grids, or bird-visible UV patterns). Lighting must also be minimized, and any wind generators must comply with Planning Department requirements, "including any monitoring of wildlife impacts that the Department may require."

In addition to buildings in and near an Urban Bird Refuge, Section 139 applies similar standards to certain building features citywide, including "free-standing glass walls, wind barriers, skywalks, balconies, and greenhouses on rooftops that have unbroken glazed segments 24 square feet and larger in size."

The *Standards for Bird-Safe Buildings* include guidelines for use and types of glass and façade treatments, wind generators and grates, and lighting treatments. The standards impose requirements for both location-related hazards and feature-related hazards, which are the same hazards identified in *Planning Code* Section 139.[369] Required treatments are generally as specified in Section 139:

For location-related hazards involving new buildings or additions to existing buildings (and replacement of 50 percent or more of the existing glazing within the Bird Collision Zone on façade(s) facing the Urban Bird Refuge), the following requirements apply:

- **Façade Treatments:** Bird-Safe Glazing Treatment is required such that the Bird Collision Zone consists of no more than 10 percent untreated glazing. Building owners are encouraged to concentrate permitted transparent glazing on the ground floor and lobby entrances to enhance visual interest for pedestrians.
- **Lighting Design:** Minimal lighting shall be used. Lighting shall be shielded. No uplighting shall be used. No event searchlights should be permitted for the property.

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[368] San Francisco Planning Department, *Standards for Bird-Safe Buildings*, Adopted July 14, 2011. Available on the internet at: http://www.sf-planning.org/ftp/files/publications_reports/bird_safe_bldgs/Standards_for_Bird-Safe_Buildings_8-11-11.pdf. Reviewed August 18, 2011.

[369] Ordinance No. 199-11, approved by the Board of Supervisors on September 27, 2011 (Board File No. 110785), and signed by the Mayor on October 7, 2011.

- **Wind Generators:** Sites must not feature horizontal access windmills or vertical access wind generators that do not appear solid.

For building feature-related hazards involving new buildings and new additions to existing buildings, the entirety of the hazard must be made bird-safe through such treatments as fritting, netting, permanent stencils, frosted glass, exterior screens, physical grids placed on the exterior of glazing or ultraviolet patterns visible to birds. Vertical elements of the window patterns should be at least 1/4 inch wide at a minimum spacing of 4 inches, or have horizontal elements at least 1/8 inch wide at a maximum spacing of 2 inches, according to the Standards.

The Standards prescribe the use of a checklist to educate project sponsors and their future tenants on potential hazards and applicable treatments. They also provide that treatments for designated historic buildings meet the *Secretary of the Interior's Standards for Rehabilitation*, and they exempt residential buildings less than 45 feet in height with limited glass facades. The Standards also recommend educational guidelines and voluntary programs.

Regulatory Setting

This section briefly describes federal, state, and local regulations, permits, and policies pertaining to biological resources and wetlands as they apply to the proposed project.

Special-Status Species

Federal Endangered Species Act

The USFWS, which has jurisdiction over plants, wildlife, and most freshwater fish, and the National Marine Fisheries Service (NMFS), which has jurisdiction over anadromous fish, marine fish, and mammals, oversee implementation of the federal Endangered Species Act. Section 7 of the Act mandates that all federal agencies consult with the USFWS and NMFS to ensure that federal agencies actions do not jeopardize the continued existence of a listed species or destroy or adversely modify critical habitat for listed species. A federal agency is required to consult with USFWS and NMFS if it determines a "may effect" situation will occur in association with the proposed project. The federal Endangered Species Act prohibits the "take"[370] of any fish or wildlife species listed as threatened or endangered, including the destruction of habitat that could hinder species recovery.

[370] "Take," as defined in Section 9 of the Act, is broadly defined to include intentional or accidental "harassment" or "harm" to wildlife. "Harass" is further defined by the U.S. Fish and Wildlife Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, and sheltering. "Harm" is defined as an act which actually kills or injures wildlife. This may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

California Endangered Species Act

Under the California Endangered Species Act, CDFG has the responsibility for maintaining a list of threatened and endangered species (*California Fish and Game Code* Sec. 2070). CDFG also maintains a list of "candidate species," which are species formally noticed as being under review for addition to either the list of endangered species or the list of threatened species. In addition, CDFG maintains lists of "species of special concern," which serve as "watch lists." Pursuant to the requirements of the Act, an agency reviewing a proposed project within its jurisdiction must determine whether any state-listed endangered or threatened species could be present on the project site and determine whether the proposed project could have a potentially significant impact on such species. In addition, CDFG encourages informal consultation on any proposed project that may impact a candidate species.

California Native Plant Protection Act

State listing of plant species began in 1977 with the passage of the California Native Plant Protection Act (NPPA), which directed CDFG to carry out the legislature's intent to "preserve, protect, and enhance endangered plants in this state." The NPPA gave the California Fish and Game Commission the power to designate native plants as endangered or rare and to require permits for collecting, transporting, or selling such plants. The California Endangered Species Act expanded upon the original NPPA and enhanced legal protection for plants. The California Endangered Species Act established threatened and endangered species categories, and grandfathered all rare animals—but not rare plants—into the act as threatened species. Thus, there are three listing categories for plants in California: rare, threatened, and endangered.

Special-Status Natural Communities

Special-status natural communities are identified as such by CDFG's Natural Heritage Division and include those that are naturally rare and those whose extent has been greatly diminished through changes in land use. The California Natural Diversity Database (CNDDB) tracks 135 such natural communities in the same way that it tracks occurrences of special-status species: information is maintained on each site in terms of its location, extent, habitat quality, level of disturbance, and current protection measures. CDFG is mandated to seek the long-term perpetuation of the areas in which these communities occur. While there is no statewide law that requires protection of all special-status natural communities, CEQA requires consideration of the potential impacts of a project to biological resources of statewide or regional significance.

Federal Migratory Bird Treaty Act

The federal Migratory Bird Treaty Act (16 USC, Section 703, Supplement I, 1989) prohibits killing, possessing, or trading in migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, and bird nests and eggs.

California Fish and Game Code

Under Section 3503 of the *California Fish and Game Code*, it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto. Section 3503.3 of the *Code* prohibits take, possession, or destruction of any birds in the orders Falconiformes (hawks) or Strigiformes (owls), or of their nests and eggs. *Code* Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish) allow the designation of a species as Fully Protected. This is a greater level of protection than is afforded by the California Endangered Species Act, since such a designation means the listed species cannot be taken at any time, except, under certain circumstances, in association with a species recovery plan.

Waters of the United States and the State (Wetlands)

The Plan area is fully developed, with no waterways, lakes or other impoundments of water. There are no potentially jurisdictional waters or wetlands within the Plan area. Therefore, federal and state regulations concerning wetlands are not discussed.

San Francisco's Urban Forestry Ordinance

The City and County of San Francisco's Urban Forestry Ordinance (Article 16 of the Public Works Code) protects San Francisco's street trees, significant trees and landmark trees regardless of species. The three categories of trees protected by the ordinance are defined as follows:

Street trees are "any tree growing within the public right-of-way, including unimproved public streets and sidewalks, and any tree growing on land under the jurisdiction of the Department [of Public Works]" as defined in Section 802 of the Ordinance. The removal of street trees by persons other than the Department of Public Works is restricted by Section 806b, whereby a permit is required for removal.

Significant trees are defined in Section 810A of the Ordinance as trees (1) on property under the jurisdiction of the Department of Public Works or on privately owned-property with any portion of its trunk within 10 feet of the public right-of-way, and (2) that satisfies at least one of the following criteria: (a) a diameter at breast height (DBH) in excess of 12 inches, (b) a height in excess of 20 feet, or (c) a canopy in excess of 15 feet. The removal of significant trees by persons other than the Department of Public works requires a permit from the Department, according to the process described in Section 806b.

Landmark trees are trees that have been nominated as landmark trees by a member of the public, the landowner, the Planning Commission, the Board of Supervisors, or the Historic Preservation Commission, and that have been subsequently recommended as a landmark tree by the Urban Forestry Council (within the Department of the Environment), and then must be designated a landmark tree by ordinance approved by the Board of Supervisors. Trees that have been nominated and are undergoing review are protected according to the same standards as designated landmark trees while going through the review process, according to Section 810 of the Ordinance. There are no Landmark trees in the Plan area.

San Francisco's Bird-Safe Building Ordinance

The City's newly adopted *Planning Code* provisions regarding bird-safe building design and *Standards for Bird-Safe Buildings* are discussed above, on p. 560.

Impact Analysis

Significance Criteria

The proposed project would have a potentially significant impact related to biological resources if they were to:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations or by the CDFG, the USFWS, or NOAA Fisheries;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFG or USFWS;
- Have a substantial adverse effect on Federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) or "navigable waters" as defined in Section 10 of the Rivers and Harbors Appropriation Act, through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any applicable local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance;
- Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or State habitat conservation plan; or
- Substantially reduce the habitat of a fish and wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or wildlife community, substantially reduce the number or restrict the range of an endangered, rare or threatened species (consistent with CEQA Guidelines Sections 15065(a)(1) and (c).

Project Impacts

As noted in the Setting, there is no riparian habitat in the Plan area, nor are there any wetlands. None of the Plan area is within the jurisdiction of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or State habitat conservation plan. Neither the draft Plan nor the proposed Transit Tower would conflict with the City's Urban Forestry Ordinance. Policy conflicts, if any, are addressed in Chapter III, Plans and Policies. Therefore, these issues are not discussed below.

Transit Center District Plan

Impact BI-1: Development under the draft Plan has the potential to adversely impact species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service. (Less than Significant with Mitigation)

The Plan area and surrounding environs are developed and covered with structures and other largely impermeable surfaces. Because the Plan area is in a developed urban area with no natural vegetation communities remaining, development under the draft Plan would not affect any special-status plants.

As discussed in the Setting there are several special-status animals that may potentially use habitat in the Plan area, including the American peregrine falcon, red-tailed hawk, American kestrel, western red bat, and Townsend's big-eared bat. In addition there are a number of native resident and migratory bird species with potential to use trees, shrubs, and buildings within the Plan area for nesting.

Moreover, disruption of nesting native birds is not permitted under the federal Migratory Bird Treaty Act or the *California Fish and Game Code*. The loss of any active nest (i.e., removing a tree or shrub or demolishing a building containing a nest) must thus be avoided under federal and state law.

The loss of an active nest also would be considered a significant impact under CEQA if that nest were being occupied by a special-status bird species. The mortality of special-status bats through tree removal or building demolition would also be considered potentially significant. However, implementation of Mitigation Measures M-BI-1a and M-BI-1b, which would require pre-construction surveys for nesting birds and bats, would reduce potential impacts to a less-than-significant level. Additionally, through implementation of these measures, compliance would be achieved with the federal Migratory Bird Treaty Act and the *California Fish and Game Code*.

Mitigation Measure

M-BI-1a: **Pre-Construction Bird Surveys:** Conditions of approval for building permits issued for construction within the Plan area shall include a requirement for pre-construction breeding bird surveys when trees or vegetation would be removed or buildings demolished as part of an individual project. Pre-construction nesting bird surveys shall be conducted by a qualified biologist between February 1st and August 15th if vegetation (trees or shrubs) removal or building demolition is scheduled to take place during that period. If special-status bird species are found to be nesting in or near any work area or, for compliance with federal and state law concerning migratory birds, if birds protected under the federal Migratory Bird Treaty Act or the *California Fish and Game Code* are found to be nesting in or near any work area, an appropriate no-work buffer zone (e.g., 100 feet for songbirds) shall be designated by the biologist. Depending on the species involved, input from the California Department of Fish and Game (CDFG) and/or the U.S. Fish and Wildlife Service (USFWS) Division of Migratory Bird Management may be warranted. As recommended by the biologist, no activities shall be conducted within the no-work buffer zone that could disrupt bird breeding. Outside of the breeding season (August 16 – January 31), or after young birds have fledged, as determined by the biologist, work activities may proceed. Birds that establish nests during the construction period are considered habituated to such activity and no buffer shall be required, except as needed to avoid direct destruction of the nest, which would still be prohibited.

M-BI-1b: **Pre-Construction Bat Surveys:** Conditions of approval for building permits issued for construction within the Plan area shall include a requirement for pre-construction special-status bat surveys when large trees are to be removed or underutilized or vacant buildings are to be demolished. If active day or night roosts are found, the bat biologist shall take actions to make such roosts unsuitable habitat prior to tree removal or building demolition. A no disturbance buffer shall be created around active bat roosts being used for maternity or hibernation purposes at a distance to be determined in consultation with CDFG. Bat roosts initiated during construction are presumed to be unaffected, and no buffer would necessary.

Level of Significance after Mitigation

With implementation of Mitigation Measures M-BI-1a and M-BI-1b, requiring pre-construction surveys for special-status nesting birds and bats prior to construction of individual buildings or projects under the Plan, the impacts on special-status species resulting from development under the draft Plan would be less than significant.

Impact BI-2: Implementation of the draft Plan could interfere substantially with the movement of native resident wildlife species and with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. (Less than Significant)

As stated in the Setting, bird strikes result in millions of bird deaths annually and are a leading cause of worldwide declines in bird populations. Direct effects from bird strikes include death or injury as the birds collide with lighted structures and other birds that are attracted to the light, as well as collisions with glass during the daytime, while indirect effects include delayed arrival at breeding or wintering grounds, and reduced energy stores necessary for migration, winter survival, or subsequent reproduction.[371] Avian collisions are a potentially significant impact, inasmuch as they may affect special-status bird species. Moreover, as more research is undertaken with respect to bird collisions, the findings raise the potential that these collisions could be implicated in, and contribute to, the decline of some bird populations below self-sustaining levels or the substantial elimination of some bird communities in certain locales.

The existing environment is one of high ambient disturbance due to human activity and noise generated by City and freeway traffic. Therefore, nesting by raptors such as peregrine falcon, hawks, and kestrels is

[371] Gauthreaux and Belser. *Op. cit*.

not expected to be common within the Plan area (although, as noted above, peregrine falcons do nest atop the PG&E building in the Plan area); however, raptors may use the area for foraging purposes. Because the draft Plan calls for increasing open space within the Plan area, foraging opportunities may increase for these birds due to increased planting of trees and other vegetation, which could be a beneficial effect. However, changes in building heights and density, as well as construction of new buildings in the current prevailing architectural style, which are often characterized by large glazed expanses, could have a potentially adverse effect on raptors, as well as resident and migratory passerines, by increasing the risk for avian collisions with buildings. These effects could be exacerbated by increasing areas of open space in proximity to buildings, as called for under the draft Plan. These potentially adverse impacts are discussed in detail under Impact BI-4.

The Plan area currently contains street lights, parking lot lights, and building lights and is located in a generally urban setting, surrounded by other light sources. Therefore, existing lighting sources already provide a substantial source of illumination throughout the Plan area. Overall, development under the draft Plan is not expected to significantly increase the amount of light generated from the Plan area over baseline levels (see Section IV.B, Aesthetics, for a discussion of lighting impacts). However, new lighting sources in the form of tall buildings, combined with the fact that most night-traveling migratory birds fly at heights lower than 1,640 feet,[372] has the potential to significantly heighten the risk of avian collisions over existing levels, particularly because the Plan would allow for substantially taller buildings than currently exist.

The Plan area is surrounded by other urban development and is not proximate to, nor does it contain, large expanses of open space or water representing potentially attractive migratory bird stopovers. Specific avian flight routes in and out of the area are not known, and there is little local data available on bird kills due to building collisions. However, both resident and migratory birds are known to use the area for breeding and foraging. Increases in building heights and density throughout the Plan area, as well as construction of new buildings, especially those with glass facades, or other large areas of glazing, could heighten the risk for avian collisions with buildings. These effects could be exacerbated by increasing areas of vegetated open space in proximity to buildings, as called for under the draft Plan. The potential for development under the draft Plan to increase the risk of avian collisions over the existing baseline is considered a significant impact.

San Francisco has a policy encouraging the installation of on-site renewable energy systems, such as wind generators, and Policy 6.11 of the draft Plan calls for use of "on-site renewable energy systems" to reduce fossil-fuel consumption. Wind generators can result in additional bird and bat mortality, including that of special-status species—a significant impact—and birds protected by the federal Migratory Bird Treaty Act and the *California Fish and Game Code*.[373]

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[372] Brown et al. *Op. cit*.
[373] This discussion is specific to the potential impact of wind generators; other policies and laws concerning biological resources are discussed in the Setting.

As stated in the Setting, the Board of Supervisors in September 2011 approved *Planning Code* amendments to incorporate bird-safe building standards into the Code, and adopted *Standards for Bird-Safe Buildings*.[374] The new *Planning Code* Section 139, Standards for Bird-Safe Buildings, focuses on buildings that create location-specific hazards and building feature-related hazards. Location-specific hazards apply to buildings within 300 feet of and having a direct line of sight to, an Urban Bird Refuge, including open spaces two acres and larger dominated by vegetation, wetlands, or open water. In such areas, 90 percent of glazing in the 60 feet above grade or above a vegetated roof two acres or larger be treated (fritted, stenciled, frosted, or covered with netting, screens, grids, or bird-visible UV patterns). Lighting must be minimized, and wind generators must be vertical, with a solid-blade appearance. Similar controls apply to certain building features citywide, including glass walls, wind barriers, skywalks, balconies, and rooftop greenhouses with 24 square feet of continuous glazing.

The *Standards for Bird-Safe Buildings* include guidelines for use and types of glass and façade treatments, wind generators and grates, and lighting treatments, for both location-related hazards and feature-related hazards, which are the same hazards identified in *Planning Code* Section 139. Required treatments are generally as specified in Section 139.

In the Plan area, because the City Park atop the new Transit Center will be considered an Urban Bird Refuge, buildings that would be subject to Section 139 and the *Standards for Bird-Safe Buildings* would likely include, in addition to the proposed Transit Tower, proposed buildings at 181 Fremont Street, 50 First Street (Mission Street tower and possibly First Street tower), on the Golden Gate University site, on TJPA Parcel F, and at 524 Howard Street. An approved but unbuilt project at 535 Mission Street could also be subject to Section 139 and the *Standards*, should it require re-authorization by the Planning Commission.

Compliance with *Planning Code* Section 139 and the adopted *Standards for Bird-Safe Buildings* would ensure that potential impacts related to bird hazards would be less than significant.

Mitigation Measures

Because no significant impacts were identified, no mitigation is required. However, the following improvement measure is identified to reduce potential effects on birds from night lighting at the site. Implementation of this measure would further reduce the draft Plan's less-than-significant impacts on resident and migratory birds.

I-BI-2: **Night Lighting Minimization.** In compliance with the voluntary San Francisco Lights Out Program, the Planning Department could encourage buildings developed pursuant to the draft Plan to implement bird-safe building operations to prevent and minimize bird strike impacts, including but not limited to the following measures:

- Reduce building lighting from exterior sources by:

[374] San Francisco Planning Department, *Standards for Bird-Safe Buildings*; see footnote *360*, p. 562.

  - Minimizing amount and visual impact of perimeter lighting and façade up-lighting and avoid up-lighting of rooftop antennae and other tall equipment, as well as of any decorative features;
  - Installing motion-sensor lighting;
  - Utilizing minimum wattage fixtures to achieve required lighting levels.
- Reduce building lighting from interior sources by:
  - Dimming lights in lobbies, perimeter circulation areas, and atria;
  - Turning off all unnecessary lighting by 11:00 p.m. through sunrise, especially during peak migration periods (mid-March to early June and late August through late October);
  - Utilizing automatic controls (motion sensors, photo-sensors, etc.) to shut off lights in the evening when no one is present;
  - Encouraging the use of localized task lighting to reduce the need for more extensive overhead lighting;
  - Scheduling nightly maintenance to conclude by 11:00 p.m.;
  - Educating building users about the dangers of night lighting to birds.

Level of Significance after Mitigation

Less than significant.

Transit Tower

Impact BI-3: Development of the Transit Tower has the potential to adversely impact species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service. (Less than Significant with Mitigation)

The Transit Tower project site is an urban parcel covered in asphalt and concrete, with some small landscaped areas containing trees and shrubs. As noted in the discussion of Plan effects in Impact BI-1, the surrounding environs are developed and covered with structures and other impermeable surfaces. As with Plan effects, because the project site is in a developed urban area with no natural vegetation communities remaining, development of the Transit Tower would not affect any special-status plants.

As with Plan effects described in Impact BI-1, construction of the Transit Tower project could likewise result in adverse impacts on special-status birds. Development of the Transit Tower could disturb nesting birds, including special-status birds and those protected by the federal Migratory Bird Treaty Act and the *California Fish and Game Code*. The loss of any active nest (i.e., removing a tree or shrub or demolishing a building containing a nest) would be potentially significant. However, there is no habitat for special-status bats at the Transit Tower project site.

Mitigation Measure

M-BI-3: Implement Mitigation Measure M-BI-1a, **Pre-Construction Bird Surveys**, for construction of the Transit Tower project.

Level of Significance after Mitigation

With implementation of Mitigation Measure M-BI-1a, to conduct pre-construction surveys for special-status nesting birds prior to construction of the Transit Tower, the impacts on special-status species from the Transit Tower would be less than significant.

Impact BI-4: Implementation of the Transit Tower Project could interfere substantially with the movement of native resident wildlife species and with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. (Less than Significant)

As stated in the Setting, bird strikes result in millions of bird deaths annually and are a leading cause of worldwide declines in bird populations. Direct effects from bird strikes include death or injury as the birds collide with lighted structures at night and/or with glass during the daytime, while indirect effects include delayed arrival at breeding or wintering grounds, and reduced energy stores necessary for migration, winter survival, or subsequent reproduction. Avian collisions are a potentially significant impact, inasmuch as they may affect special-status bird species. Moreover, as more research is undertaken with respect to bird collisions, the findings raise the potential that these collisions could be implicated in, and contribute to, the decline of some bird populations below self-sustaining levels or the substantial elimination of some bird communities in certain locales.

As with the remainder of the Plan area, the Transit Tower project site and vicinity is well lit by street lights and building lights and is located in a developed urban setting, and thus existing lighting sources already provide substantial nighttime illumination. Overall, development of the proposed Transit Tower would not change the fact that the area is well-lit at night. However, the proposed Transit Tower would be the tallest building in San Francisco, and would be taller than the current tallest structure in the City, which is Sutro Tower (although Sutro Tower's elevation of 834 feet means that the top of this communications tower would remain the highest built point in San Francisco). Because the Tower would be substantially taller than other structures, new lighting from a tall building has the potential to substantially increase the risk of avian collisions over existing baseline levels, which could affect both resident and migratory birds. The largely glass façade of the Transit Tower would mean that interior light from the building would be readily apparent to nearby birds and, as noted in the Setting, the glazing itself would likely result in bird collisions. Moreover, the proposed Transit Tower would be constructed adjacent to the planned City Park, a 5-acre open space atop the Transit Center that would include extensive landscaping.

As noted previously, the Planning Commission in July 2011 adopted *Standards for Bird-Safe Buildings*. The Standards impose requirements for both location-related hazards and feature-related hazards, as described above under Impact BI-2. In addition, the Planning Commission recommended approval of *Planning Code* amendments to incorporate Standards for Bird-Safe Buildings as a new Section 139 of the *Code*, and those amendments were approved by the Board of Supervisors in September 2011. That section would require treatment, as in the Standards, for both location-specific hazards and building feature-related hazards, as described above under Impact BI-2.

Compliance with *Planning Code* Section 139 and the adopted *Standards for Bird-Safe Buildings* would ensure that potential impacts related to bird hazards would be less than significant.

Mitigation Measures

Because no significant impacts were identified, no mitigation is required.

Additionally, although it is not part of the project analyzed in this EIR, the planned City Park atop the new Transit Center could create adjacent open space that increases the potential for bird collisions at the Transit Tower. As noted above, bird collisions with glass tend to occur in proximity to planted spaces. Accordingly, Improvement Measure I-BI-4 is identified to further reduce potential effects of bird collisions.

Improvement Measures

I-BI-4a: **Bird-Safe Standards for City Park.** The Transbay Joint Powers Authority, as sponsor of the Transit Center and City Park, could incorporate, as feasible, into the design of City Park bird-safe standards that are applicable to parks and open spaces, as described in the newly adopted *Standards for Bird-Safe Buildings*.

I-BI-4b: **Night Lighting Minimization.** The Transbay Joint Powers Authority, as sponsor of the Transit Center and City Park and the owner of the Transit Tower site, could incorporate, as feasible, into the design of City Park, and could require incorporation, as feasible, in the design of the proposed Transi*t* Tower, the light minimization features identified in Improvement Measure I-BI-2.

Cumulative Impacts

Impact C-BI: Implementation of the Transit Center District Plan and the Transit Tower project would not make a considerable contribution to adverse effects on biological resources. (Less than Significant)

Past projects, including the development of civic facilities, residences, commercial and industrial areas, and infrastructure have already caused substantial adverse cumulative changes to biological resources in the Plan area. The Plan area is a nearly fully developed urban district with no remaining natural communities, wetlands, riparian areas, or other sensitive habitat. In short, the biological environment of the Plan area has been substantially degraded since at least the mass arrival of Euro-Americans in mid-19th century. The same can be said for the Transit Tower project site.

Environmentally protective laws and regulations have been applied with increasing rigor since the early 1970s. These include the California Endangered Species Act, Federal Endangered Species Act, and the

Clean Water Act, as described in the Regulatory Setting section, above. The draft Plan, the Transit Tower project, and other likely future projects within the vicinity of the Plan area would be required to comply with local, state, and federal laws and policies and all applicable permitting requirements of the regulatory and oversight agencies intended to address potential impacts on biological resources. Additionally, future projects would be required to demonstrate that they would not have significant effects on these biological resources, although it is possible that some projects may be approved even though they would have significant, unavoidable impacts on biological resources.

The current impact analysis has shown that the draft Plan and the Transit Tower Project, after mitigation, would result in relatively minor, less-than-significant impacts on biological resources. When considered relative to the existing state of biological resources in the Plan area, the draft Plan and the Transit Tower Project would add only a minor, incremental contribution. Development of the planned 5-acre City Park atop the new Transit Center will create an Urban Bird Refuge within the meaning of the City's *Standards for Bird-Safe Buildings* and *Planning Code* Section 139, because City Park will be both a vegetation-dominated open space two acres or larger and a green roof of the same size. The new park will potentially contribute to cumulative effects with respect to bird-strike impacts, with respect to existing and future buildings. However, compliance by new buildings, including the Transit Tower and other buildings adjacent to City Park, with *Planning Code* Section 139 and the adopted *Standards for Bird-Safe Buildings* would ensure that potential cumulative impacts related to bird hazards would be less than significant.

In the context of the urbanized and developed Plan area, the draft Plan and the Transit Tower Project's contribution would not make a considerable contribution to impacts on biological resources, and therefore the cumulative effect of the draft Plan and the Transit Tower Project on biological resources would be less than significant, with mitigation measures identified in this section.

Mitigation: None required.

O. Geology, Soils, and Seismicity

This section addresses the geology and soils impacts that would result from implementation of the Transit Center District Plan and Transit Tower project. Construction-related impacts include potential erosion, excavation instability, settlement from excavation dewatering, and heave from pile installation. Potential seismic impacts related to the draft Plan include seismically induced groundshaking and ground failure. Evaluation of these impacts is based on and published geologic maps and reports cited in this section and an analysis of site geology and seismicity prepared in support of the proposed plan which included review of available subsurface data from previous investigations within the Transit Center District Plan area.[375]

Environmental Setting

Regional Physiography

The Plan area is in the northeast portion of the San Francisco Peninsula, within the California Coast Ranges geomorphic province which is characterized by a series of northwest trending ridges and valleys. San Francisco Bay and the San Francisco Peninsula result from tectonic forces developed along the margin between the Pacific Plate and the North American Plate where the Pacific Plate slowly creeps northward past the North American Plate on the San Andreas, Hayward, and subsidiary faults. The Bay and northern portion of the San Francisco Peninsula are within a structural down-dropped block between the Northern Santa Cruz Mountains to the west and Diablo Mountain Range to the east.

Site Geology

The Plan area is relatively flat, with ground slopes that are typically less than 2-percent grade.[376] The street with the steepest ground slope is the section of Second Street between Howard and Folsom Streets with a slope of approximately 4.5 percent. The location with the highest ground surface is at Folsom and Second Street with an approximate elevation 45 feet, San Francisco City Datum (SFD).[377] The area with the lowest ground surface is bound by Market, Spear, Howard, and Beale Streets, at an approximate elevation of 1 foot.

The Plan area is underlain by up to approximately 280 feet of Quaternary age sediments deposited in the last 1.8 million years, including (from youngest to oldest) Dune Sand, Bay Mud, Marsh Deposit, Marine Sand, the Colma formation, Old Bay Clay (also referred to as the Yerba Buena Mud or the San Antonio Formation), and the Alameda Formation. Bedrock beneath San Francisco consists of sedimentary and volcanic rocks of the Jurassic and Cretaceous age (approximately 65 to 213 million years old) Franciscan

375 Treadwell & Rollo. Geotechnical Consultation, EIR Preparation, Downtown San Francisco Developments, San Francisco, California. October 17, 2008.

376 *Ibid*

377 San Francisco City Datum establishes the City's zero point for surveying purposes at approximately 8.6 feet above the mean sea level established by 1929 U.S. Geological Survey datum, and approximately 11.3 feet above the current 1988 North American Vertical Datum. Because tides are measured from mean lower low water, which is about 3.1 feet below mean sea level (MSL), an elevation of 0, SFD, is approximately 8.2 feet above MSL.

complex. The bedrock outcrops on the hills and mountains surrounding the west side of the bay, including some locations in San Francisco such as Rincon Hill to the southeast of the Plan area. Since the mid-19th century, substantial amounts of fill have been placed around the bay margin to reclaim land.

As shown on **Figure 70** (Geologic Map), the entire Plan area is immediately underlain by artificial fill and Dune Sand, the youngest geologic units within the Plan area. These units are underlain by varying thickness of Quaternary age sediments and Franciscan Complex bedrock as shown in the cross section provided in **Figure 71**. The geologic units underlying the Plan area are described as follows:

- **Artificial Fill –** along Market Street and to the south the artificial fill comprises Dune Sand that was dumped randomly to fill Yerba Buena Cove and San Francisco Bay in the 19th century.[378] The fill varies in thickness between 0 and about 25 feet, and consists of loose to dense sand with varying amounts of silt and building debris.

- **Dune Sand –** primarily consists of yellow-brown to gray, fine- to medium-grained and relatively clean sand that is medium dense to dense. The Dune Sand generally underlies the artificial fill and is present beneath the western three-quarters of the Plan area, but is generally absent east of Fremont Street. The Dune Sand is approximately 10 to 20 feet thick at the western portion of the Plan area and become thinner toward the east.

- **Bay Mud –** is a highly compressible and weak clay, containing varying amounts of shells and organic matter (peat) as well as localized sand lenses. In the Plan area, Bay Mud was formed by marine deposition in the shallow waters of Yerba Buena Cove and subjected to consolidation by the presence of Dune Sand and fill. The Bay Mud is present beneath the eastern three-quarters of the Plan area and is highly variable in thickness and bottom elevation. Within the Plan area, the Bay Mud layer is up to approximately 80 feet thick; it is under to normally consolidated.[379] The Bay Mud overlies the Marine Sand layer, and to a limited extent the Colma formation, where the Marine Sand has been eroded away.

- **Marsh Deposit –** is an interbedded soft to stiff and loose to medium dense soil, consisting of high plasticity clay, sandy clay, sandy silt, and clayey sand with high organic content. Within the Plan area, the Marsh Deposit is up to about 10 feet thick and underlies the Dune Sand in the western one quarter of the Plan area.

- **Marine Sand –** is a gray or gray-green, loose to very dense sand, deposited under marine conditions. The Marine Sand underlies the Bay Mud. It is generally not present west of New Montgomery Street and thickens toward the east. Within the Plan area, the Marine Sand is up to approximately 40 feet thick.

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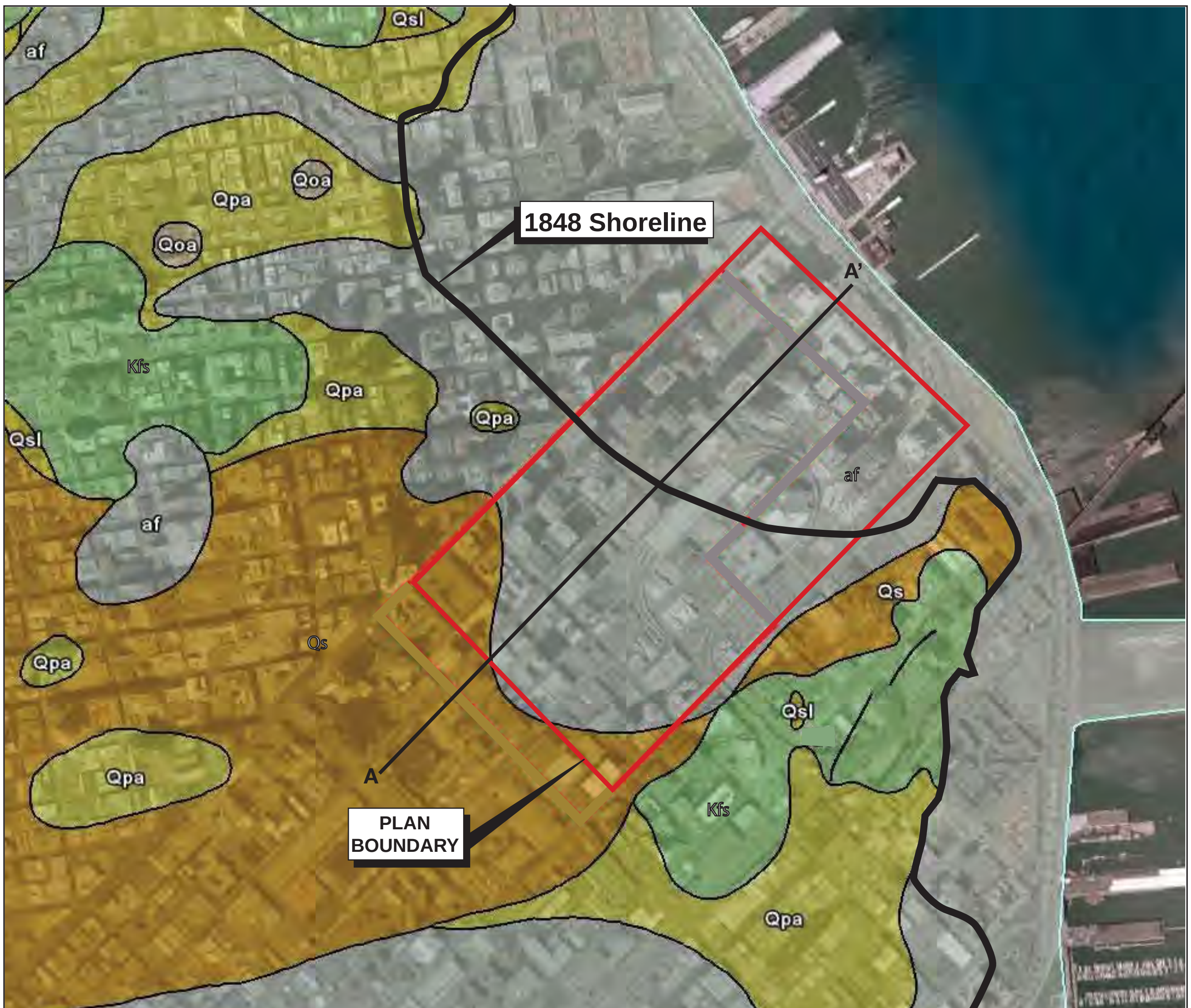
378 Yerba Buena Cove was located in the area at the foot of the present Market Street, northeast of the 1848 shoreline. At the time the City of San Francisco (then known as Yerba Buena) was founded, the cover extended from approximately the present-day intersection of First and Market Streets, inland to approximately Montgomery Street, between California and Clay Streets, and north to approximately the present-day intersection of Broadway and Battery Street.

379 Under-consolidated clay has not yet achieved equilibrium under the current overburden load. Normally consolidated clay has achieved equilibrium under the current overburden load. Over-consolidated clay has experienced a pressure greater than its current overburden load.



Base: Graymer, et al; 2006; Geologic Map of the San Francisco Bay Region.
Source: David Rumsey Historical Map Collection “Official Map of San Francisco 1849”.

EXPLANATION

af	- Artificial Fill
Qs	- Beach and Dune Sand (Holocene)
Qsl	- Hillslope Deposits (Holocene)
Qpa	- Alluvium (Pleistocene)
Qoa	- Alluvium (early Pleistocene)
Kfs	- Franciscan Complex sedimentary rocks (Jurassic/Cretaceous)

Geologic contact

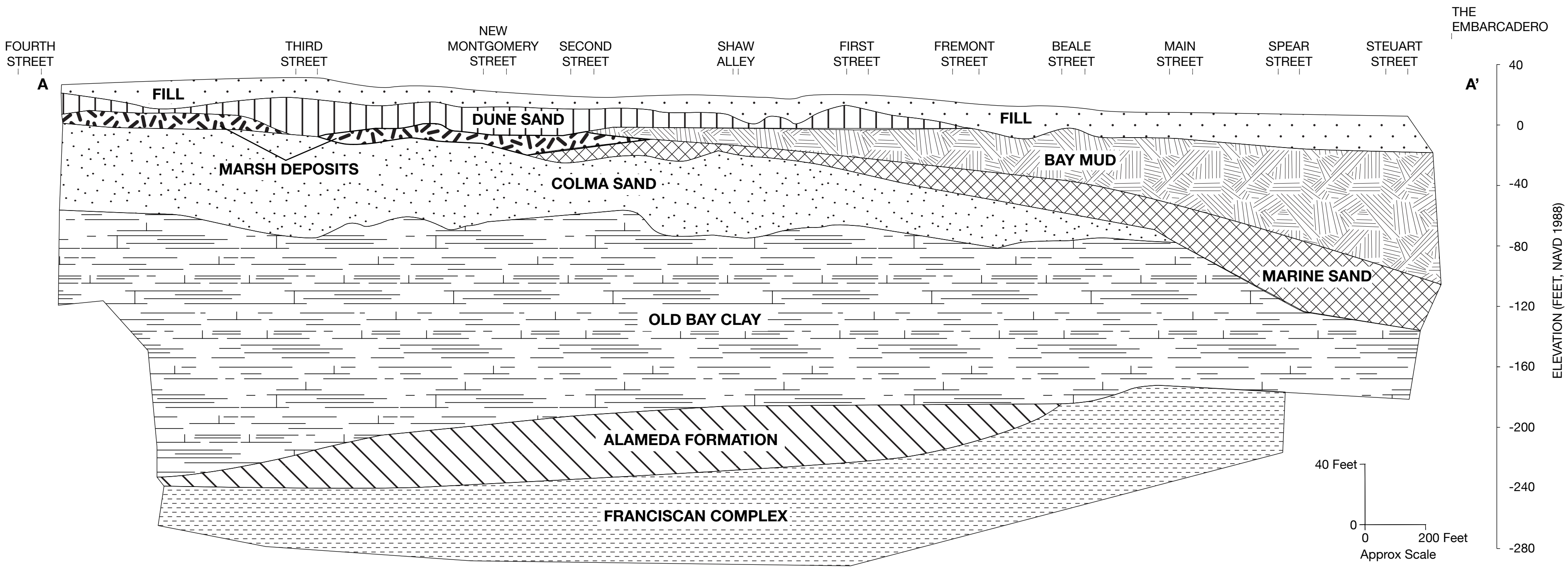
A —— A' Location of geologic cross-section shown on Figure N-2

Not to scale

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

SOURCE: Treadwell & Rollo

Figure 70
Geologic Map



FILL
SAND/SILTY SAND/GRAVEL (SP/SM/GP)
loose to dense, with brick, concrete and gravel fragments

DUNE SAND
SAND/SILTY SAND (SP/SM)
medium dense to dense

BAY MUD
CLAY/SANDY CLAY/SANDY SILT (CH/CL/ML)
soft to stiff

MARSH DEPOSIT
mixture of SILT, CLAY, and SAND with organics (ML/CL/SC/SM/OL/OH/PT)
soft to stiff/medium dense

MARINE SAND
CLAYEY SAND/SILTY SAND/SAND (SC/SM/SP)
loose to very dense

COLMA SAND
SAND/SILTY SAND/CLAYEY SAND (SP/SM/SC)
dense to very dense

OLD BAY CLAY
CLAY (CH/CL) with SAND layers
stiff to hard

ALAMEDA FORMATION
SAND/CLAY and Weathered Rock (SM/SC/CL)
very dense and hard

FRANCISCAN ROCK
SANDSTONE, SHALE, SERPENTINE
deeply to moderately weathered

SOURCE: Treadwell & Rollo; ESA

Figure 71
Generalized Geologic Cross-Section

- **Colma formation** – is typically brown and orange, dense to very dense sand, underlying the Marsh Deposit, Marine Sand, and Bay Mud, where present. Generally, the Colma formation is not present east of Main Street and thickens toward the west. It is approximately 60 feet thick in the western portion of the Plan area.

- **Old Bay Clay** –generally consists of over-consolidated, stiff to hard clay with layers of dense, alluvial sand. This moderately compressible clay layer underlies the Colma formation and Marine Sand, where present. It is relatively thick, and within the Plan area the thickness ranges from approximately 60 to 170 feet.

- **Alameda Formation** – is a very stiff gravelly clay or dense gravelly sand. The gravel-size particles are angular and are remnants of the parent bedrock. This formation is of colluvial (gravity deposited) origin. Within the Plan area, this formation is up to approximately 40 feet thick.

- **Franciscan Complex** – consists primarily of highly fractured and sheared sandstone and shale, usually at depths of over 200 feet below the existing ground surface. The bedrock surface dips toward the northwest, forming a trough approximately paralleling Mission Street, bounded by Rincon Hill to the southeast and Telegraph Hill/Russian Hill to the northwest. The borings reviewed for the analysis of site geology and seismicity prepared in support of the proposed plan encountered bedrock at elevations of -139 to -250 feet.

As indicated on Figure 70, the historic (1848) shoreline of San Francisco bisects the Plan area along a line located between First and Fremont Streets. The filling of Yerba Buena Cove, to the east of the historic shoreline, began in the late 1840s and was completed by 1900.[380] The depth to groundwater is expected to be 8 to 20 feet below ground surface.

Soils

Problematic soils, such as those that are expansive, can damage structures and buried utilities and increase maintenance requirements. Expansive soils are characterized by their ability to undergo significant volume change (i.e., to shrink and swell) due to variations in moisture content. Changes in soil moisture can result from rainfall, landscape irrigation, utility leakage, roof drainage, and/or perched groundwater.[381] Expansive soils are typically very fine grained and have a high to very high percentage of clay. Expansion and contraction of expansive soils in response to changes in moisture content can lead to differential and cyclical movements that can cause damage and/or distress to structures and equipment.

The U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) has mapped the surface and near-surface subsurface soils in the Plan area, and characterizes key properties for each soil type, including the shrink/swell potential. Based on the NRCS web soil survey, soils in the Plan area are

380 Treadwell & Rollo. Geotechnical Consultation, EIR Preparation, Downtown San Francisco Developments, San Francisco, California. October 17, 2008.
381 Perched groundwater is a local saturated zone above the water table that typically exists above an impervious layer (such as clay) of limited extent.

mapped as Urbanland-Orthents, reclaimed complex, 0 to 2 percent slopes, Unit ID 134.[382] This soil unit forms on reclaimed land and generally exhibits a low shrink/swell potential. However, soil conditions in the Plan area may have been altered by ground-disturbing activities, including construction of the existing buildings and infrastructure.

Regional Faulting and Seismic Hazards

Seismicity

The San Francisco Bay Area is situated near the boundary between two major tectonic plates, the Pacific Plate to the southwest and the North American Plate to the northeast. Since the Miocene epoch (approximately 23 million years ago), about 200 miles of right-lateral movement[383] has occurred along the San Andreas Fault Zone to accommodate the relative movement between these two plates. The movement between the Pacific Plate and the North American Plate generally occurs across a 50-mile zone extending from the San Gregorio fault in the southwest to the Great Valley Thrust Belt to the northeast. In addition to the right-lateral slip movement between the two tectonic plates, portions of the North American Plate have moved towards each other during the last 3.5 million years, resulting in compressional forces at the latitude of San Francisco Bay.[384]

Figure 72 shows the locations of active[385] and potentially active[386] faults in the San Francisco Bay region. The San Andreas, San Gregorio, Hayward, Rodgers Creek, Calaveras, and Greenville strike-slip faults[387] are active faults of the San Andreas system that predominantly accommodate lateral movement between the North American and Pacific tectonic plates. Active blind- and reverse-thrust faults[388] in the San Francisco Bay region that accommodate compressional movement include the Monte Vista–Shannon and Mount Diablo faults. The closest faults to the Plan area are the San Andreas, Hayward, San Gregorio, and Calaveras faults.

382 Natural Resources Conservation Service, Web Soil Survey. Accessed at http://websoilsurvey.nrcs.usda.gov on January17, 2010.

383 The Pacific Plate and the North American Plate are moving past each other along the San Andreas Fault Zone, “right-lateral movement” means that they are moving to the right relative to each other.

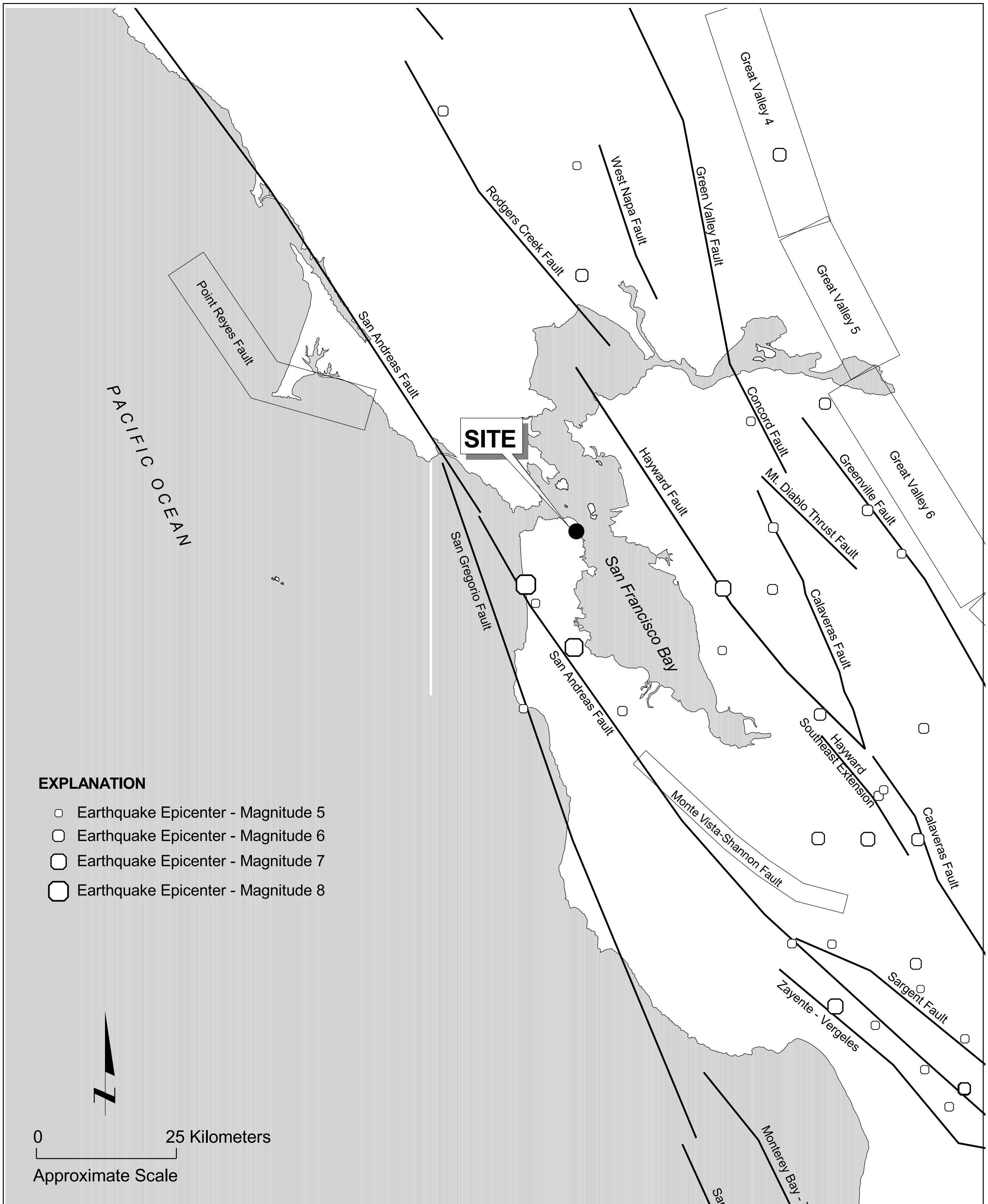
384 Fenton, C.H. and C.S. Hitchcock, Recent geomorphic and paleoseismic investigations of thrust faults in Santa Clara Valley, California, in H. Ferriz and R. Anderson (eds.), Engineering Geology Practice in Northern California: California Division of Mines and Geology Bulletin 210, 2001.

385 An active fault is one that shows geologic evidence of movement within Holocene time (approximately the last 11,000 years).

386 A potentially active fault is one that shows geologic evidence of movement during the Quaternary (approximately the last 1.6 million years).

387 Strike-slip faults involve the two blocks moving parallel to each other without a vertical component of movement.

388 A reverse fault is one with predominantly vertical movement in which the upper block moves upward in relation to the lower block; a thrust fault is a low-angle reverse fault. Blind-thrust faults are low-angled subterranean faults that have no surface expression.



NOTES:
Digitized data for fault coordinates and earthquake catalog was developed by the California Department of Conservation Division of Mines and Geology. The historic earthquake catalog includes events from January 1800 to December 2000.

SOURCE: Treadwell & Rollo, 2008

Case No. 2007.0558E: Transit Center District Plan and Transit Tower . 207439

Figure 72
Regional Fault Map

Table 43 summarizes the distance from the Plan area, direction to fault, and the estimated mean characteristic Moment magnitude (M_w)[389] for each fault located within approximately 30 miles (50 kilometers) of the Plan area. Figure 72 also shows the earthquake epicenters for events with magnitude greater than 5.0 on these faults from January 1800 through January 2000. Since 1800, four major earthquakes have been recorded on the San Andreas Fault. In 1836 an earthquake with an estimated M_w of 6.25 occurred east of Monterey Bay on the San Andreas Fault.[390] In 1838, an earthquake with an M_w of about 7.5 occurred.

TABLE 43
REGIONAL FAULTS AND SEISMICITY

Fault Name	Approximate Distance (miles)	Direction from Site	Mean Characteristic Moment Magnitude
San Andreas – 1906 Rupture	8	West	7.90
San Andreas – Peninsula	8	West	7.15
San Andreas – North Coast South	9	West	7.45
North Hayward	9	East	6.49
Total Hayward	9	East	6.91
Total Hayward-Rodgers Creek	9	East	7.26
South Hayward	10	East	6.67
Northern San Gregorio	11	West	7.23
Total San Gregorio	11	West	7.44
Rodgers Creek	21	North	6.98
Mt Diablo	21	East	6.65
Total Calaveras	21	East	6.93
Concord/Green Valley	23	East	6.71
Monte Vista-Shannon	25	Southeast	6.80
Point Reyes	26	West	6.80
West Napa	27	Northeast	6.50
Greenville	31	East	6.94

SOURCE: Treadwell & Rollo. Geotechnical Consultation, EIR Preparation, Downtown San Francisco Developments, San Francisco, California. October 17, 2008.

The San Francisco Earthquake of 1906 caused the most significant damage in the history of the Bay Area in terms of loss of lives and property damage. This earthquake created a surface rupture along the San Andreas Fault from Shelter Cove to San Juan Bautista, approximately 290 miles in length. It had a M_w of about 7.9, and was felt 350 miles away in Oregon, Nevada, and Los Angeles. The most recent large

389 An earthquake is classified by the amount of energy released, expressed as the magnitude of the earthquake. Traditionally, magnitudes have been quantified using the Richter scale. However, seismologists now use a moment magnitude (Mw) scale because it provides a more accurate measurement of the size of major and great earthquakes. Moment magnitude is directly related to the average slip and fault rupture area.

390 Treadwell & Rollo. Geotechnical Consultation, EIR Preparation, Downtown San Francisco Developments, San Francisco, California. October 17, 2008.

earthquake to affect the Bay Area was the Loma Prieta Earthquake on October 17, 1989, approximately 60 miles from the Plan area in the Santa Cruz Mountains, with an M_w of 6.9.

On the Hayward fault, an earthquake with an estimated M_w of 7.0 occurred in 1868 on the southern segment (between San Leandro and Fremont). In 1861, an earthquake of unknown magnitude (probably an M_w of about 6.5) was reported on the Calaveras Fault. The most recent significant earthquake on this fault was the 1984 Morgan Hill earthquake with an M_w of 6.2.

The United States Geological Survey (USGS) estimates that there is a 63 percent probability of a strong earthquake (M_w 6.7 or higher) occurring on one of the regional faults in the 30-year period between 2007 and 2036.[391] More specific estimates of the probabilities for different faults in the Bay Area are presented in **Table 44**.

TABLE 44
ESTIMATES OF THE 30-YEAR PROBABILITY OF A MAGNITUDE 6.7 OR GREATER EARTHQUAKE

Fault Name	Mean Characteristic Moment Magnitude
Hayward-Rodgers Creek	31
San Andreas	21
Calaveras	7
San Gregorio	6
Concord-Green Valley	3

SOURCE: U.S. Geologic Survey (USGS), The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF 2), by the Working Group on California Earthquake Probabilities, Open File Report 2007-1437, 2008.

Fault Rupture

Fault rupture almost always follows pre-existing faults, which are zones of weakness, and surface rupture occurs when movement on a fault deep within the earth breaks through to the surface. Surface ruptures associated with the 1906 San Francisco earthquake extended for more than 290 miles, with displacements of up to 21 feet. There is a low potential for fault rupture within the Plan area because no active faults cross the Plan area.

Groundshaking

The intensity of the seismic shaking, or strong ground motion, in the Plan area during an earthquake is dependent on the distance between the Plan area and the epicenter of the earthquake, the magnitude of the earthquake, and the geologic conditions underlying and surrounding the Plan area. Earthquakes occurring on faults closest to the Plan area would most likely generate the largest ground motions.

391 U.S. Geologic Survey (USGS), The Uniform California Earthquake Rupture Forecast, Version 2 (UCERF 2), by the Working Group on California Earthquake Probabilities, Open File Report 2007-1437, 2008.

The intensity of earthquake-induced ground motions and the potential forces affecting structures within the Plan area can be described in terms of "peak ground acceleration," which is represented as a fraction of the acceleration of gravity (g).[392] The California Geological Survey (CGS) estimates the peak ground accelerations for the 10 percent probability of exceedance in 50 years (475-year return period) at 0.47 to 0.49g.[393] However, these estimates of peak ground accelerations are used primarily for formulating building codes and for designing buildings, and are not intended for site-specific hazard analysis. Therefore, it would be necessary to conduct a site-specific evaluation to estimate peak ground accelerations at a level suitable for project design.

Based on shaking hazard mapping done by the Association of Bay Area Governments (ABAG), it is expected that the Plan area would experience very strong to violent ground shaking due to an earthquake along the peninsula segment of the San Andreas fault, and strong to very strong ground shaking due to an earthquake along the northern Hayward fault, which are the faults closest to the Plan area.[394]

Liquefaction

Liquefaction is a phenomenon in which saturated granular sediments temporarily lose their shear strength during periods of earthquake-induced, strong groundshaking. The susceptibility of a site to liquefaction is a function of the depth, density, and water content of the granular sediments and the magnitude of earthquakes likely to affect the site. Saturated, unconsolidated silts, sands, silty sands, and gravels within 50 feet of the ground surface are most susceptible to liquefaction. Liquefaction-related phenomena include vertical settlement from densification, lateral spreading, ground oscillation, flow failures, loss of bearing strength, subsidence, and buoyancy effects.

As shown on **Figure 73**, most of the Plan area is located within a potential liquefaction hazard zone identified by the CGS.[395] The analysis of site geology and seismicity prepared in support of the proposed plan concludes that the loose to medium dense sand present in the artificial fill, Dune Sand, Marsh Deposit, and Marine Sand beneath much of the Plan area could be subject to liquefaction in the event of a major earthquake on one of the nearby faults.[396] Within the western three quarters of the Plan area, between Third and Beale Streets, the settlement resulting from earthquake induced settlement (described below) and liquefaction could be up to about 6 inches. In the eastern one quarter of the Plan area,

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392 Acceleration of gravity (g) = 980 centimeters per second squared. 1.0 g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.

393 California Geologic Survey. Seismic Shaking Hazards in California, Based on the USGS/CGS Probabilistic Seismic Hazards Assessment (PSHA) Model, 2002 (revised April 2003). Accessed at http://redirect.conservation.ca.gov/cgs/rghm/pshamap/pshamap.asp, on January 17, 2010.

394 Association of Bay Area Governments, Hazard Maps, Shaking Maps, 2003, www.abag.ca.gov, accessed July 6, 2010.

395 California Geological Survey, State of California Seismic Hazard Zones, City and County of San Francisco, Official Map, November 17, 2000.

396 Treadwell & Rollo. Geotechnical Consultation, EIR Preparation, Downtown San Francisco Developments, San Francisco, California. October 17, 2008.

SOURCE: Treadwell & Rollo

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Figure 73
Liquefaction Hazard Zone

between Beale and Spear Street, the settlement could be up to about 12 inches, absent measures taken to improve soil stability and/or adequately support individual structures.[397]

Lateral Spreading

Of the liquefaction hazards, lateral spreading generally causes the most damage. This is a phenomenon in which large blocks of intact, non-liquefied soil move downslope on a liquefied substrate of large aerial extent.[398] The mass moves toward an unconfined area, such as a descending slope or stream-cut bluff, and this movement can occur on slope gradients as gentle as 1 degree. The analysis of site geology and seismicity prepared in support of the proposed plan concludes, based on previous studies, that the area within the old Yerba Buena Cove could experience lateral spreading during a major earthquake on the San Andreas fault. Lateral displacements within the area between Third and Beale Street would be small. However, between Beale and Spear Streets, lateral displacements may be up to 6 inches.[399] (It is noted that this eastern portion of the Plan area is largely built out and no new development is currently anticipated there.)

Earthquake-Induced Settlement

Settlement of the ground surface can be accelerated and accentuated by earthquakes. During an earthquake, settlement can occur as a result of the relatively rapid rearrangement, compaction, and settling of subsurface materials (particularly loose, non-compacted, and variable sandy sediments). Settlement can occur both uniformly and differentially (i.e., where adjoining areas settle at different rates). Areas are susceptible to differential settlement if underlain by compressible sediments, such as poorly engineered artificial fill or bay mud. The analysis of site geology and seismicity prepared in support of the proposed plan concludes that the loose to medium dense sand present in the artificial fill, Dune Sand, Marsh Deposit, and Marine Sand beneath much of the Plan area could be subject to earthquake-induced settlement in the event of a major earthquake on one of the nearby faults.[400] The degree of settlement would be the same as described above under Liquefaction.

Regulatory Framework

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. In accordance with this act, the state geologist established regulatory zones, called “earthquake fault zones,” around the surface traces of active faults and has published maps showing these zones. Within these zones, buildings for human occupancy cannot be constructed across the surface trace of active faults. Each earthquake fault zone extends approximately

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397 Typical construction techniques in areas of liquefiable soils include supporting new buildings on pile foundations or excavating below the level of the liquefiable soils.

398 Youd, T.L. and D.M. Perkins, “Mapping Liquefaction Induced Ground Failure Potential,” Proceedings of the American Society of Civil Engineers, Journal of the Geotechnical Engineering Division, 1978.

399 Treadwell & Rollo. Geotechnical Consultation, EIR Preparation, Downtown San Francisco Developments, San Francisco, California. October 17, 2008.

400 *Ibid*

200 to 500 feet on either side of the mapped fault trace because many active faults are complex and consist of more than one branch that may experience ground surface rupture. This act does not apply to the proposed project because no active faults cross the Plan area, or anywhere else in San Francisco. [401]

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was passed in 1990 following the Loma Prieta earthquake to reduce threats to public health and safety and to minimize property damage caused by earthquakes. The act directs the California Geological Survey to identify and map areas prone to the earthquake hazards of liquefaction and earthquake-induced landslides. For structures intended for human occupancy,[402] the act requires that project sponsors perform site-specific geotechnical investigations to identify potential seismic hazards and formulate mitigation measures prior to permitting most developments designed for human occupancy within the zones of required investigation. Projects proposed under the draft Plan would be subject to this act if they are located within a zone of required investigation. There are no earthquake-induced landslide zones of required investigation mapped within the Plan area, but as described above, much of the Plan area is located within a liquefaction zone of required investigation.[403]

California Building Code

The California Building Code (CBC), which is codified in Title 24, Part 2, of the California Code of Regulations, was promulgated to safeguard the public health, safety, and general welfare by establishing minimum standards related to structural strength, egress facilities, and general building stability. The purpose of the CBC is to regulate and control the design, construction, quality of materials, use/occupancy, location, and maintenance of all building and structures within its jurisdiction. Title 24 is administered by the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under state law, all building standards must be centralized in Title 24 or they are not enforceable.

The CBC is based on the International Building Code. The 2011 CBC is based on the 2009 International Building Code published by the International Code Conference. In addition, the CBC contains necessary California amendments that are based on the American Society of Civil Engineers (ASCE) Minimum Design Standards 7-05. ASCE 7-05 provides requirements for general structural design and includes means for determining earthquake loads as well as other loads (flood, snow, wind, etc.) for inclusion in building codes. The provisions of the CBC apply to the construction, alteration, movement, replacement, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout California.

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401 California Geological Survey, Table 4, Cities and Counties Affected by Alquist-Priolo Earthquake Fault Zones as of May 1, 1999, from http://www.conservation.ca.gov/cgs/rghm/ap/affected.htm, accessed July 24, 2006.
402 Title 14 of the California Code of Regulations, Section 3601(e), defines buildings intended for human occupancy as those that would be inhabited for more than 2,000 hours per year.
403 California Geological Survey, State of California Seismic Hazard Zones, City and County of San Francisco, Official Map, November 17, 2000.

The earthquake design requirements take into account the occupancy category of the structure, site class, soil classifications, and various seismic coefficients, all of which are used to determine a Seismic Design Category (SDC) for a project. The SDC is a classification system that combines the occupancy categories with the level of expected ground motions at the site and ranges from SDC A (very small seismic vulnerability) to SDC E/F (very high seismic vulnerability and near a major fault). Design specifications are then determined according to the SDC.

San Francisco Building Code

The *San Francisco Building Code* is an amendment to the CBC. It includes seismic safety performance standards that apply to all new construction in the City. In accordance with this code, the San Francisco Department of Building Inspection (DBI) could, in its review of building permit applications, require the project sponsor to prepare a geotechnical report pursuant to the State Seismic Hazards Mapping Act. The report would assess the nature and severity of the ground shaking hazard(s) on the site and recommend project design and construction features that would reduce the hazard(s). All new construction within the Plan area would be subject to the permitting requirements of DBI to ensure compliance with applicable laws and regulations.

As part of this permitting process, the final building plans would be reviewed by DBI. In reviewing building plans, DBI refers to a variety of information sources to determine existing hazards and assess requirements for reducing or avoiding those hazards. Sources reviewed include maps of Special Geologic Study areas and known landslide areas in San Francisco, as well as the building inspectors' working knowledge of areas of special geologic concern. If the need were indicated by available information, DBI would require that additional site-specific soils reports be prepared by a California-licensed geotechnical engineer prior to construction, and may require additional consultation with the project sponsor and peer review of the proposed design of the proposed project to ensure that it meets the seismic safety requirements of the *San Francisco Building Code*.

Project applicants can comply with *Building Code* requirements either prescriptively (by following exactly the requirements of the code), or non-prescriptively (designing buildings to perform to the standards specified in the code). A non-prescriptive design may specify alternative materials and/or methods of construction to meet the requirements of the *Building Code*, but cannot use an alternative method for establishing the seismic forces on the building or the distribution of those forces unless the corresponding internal forces and deformations in the building members are determined using a model that is consistent with adopted procedures. If a non-prescriptive design is used, then substantiating evidence is required to demonstrate that the proposed design and materials will be at least equivalent to what is prescribed in the *Building Code* regarding suitability, strength, effectiveness, fire resistance, durability, safety, and sanitation.

Administrative Bulletin 083 (AB-083), Requirements and Guidelines for the Seismic Design of New Tall Buildings using Non-Prescriptive Seismic-Design Procedures, implemented by DBI, specifies the requirements and guidelines for the non-prescriptive design of new tall buildings that are over 160 feet high to ensure that the design meets the standards of the *San Francisco Building Code*. AB-083 requires a three-step process to demonstrate that a non-prescriptive building design provides for a seismic performance of the building that is equivalent to the code-specific seismic performance. The first step of this process includes a code-level evaluation to identify any exceptions taken to the prescriptive requirements of the *Building Code* and to define the minimum required strength and stiffness for earthquake resistance. The second step is a service-level evaluation to demonstrate acceptable performance for moderate earthquakes, and the third step is an evaluation to verify that the structure has an acceptably low probability of collapse under severe earthquake ground motions. The design must be reviewed and approved by the Structural Design Reviewer and director of DBI, and the Structural Design Reviewer must provide a written statement that, in their professional opinion, the building elements under their review are equivalent in strength, durability, and seismic resistance of the building to those of a building designed according to the prescriptive provisions of the *Building Code*. DBI may also require a peer review of the proposed design to ensure adequacy of the non-prescriptive design. The details of any action granting approval of the non-prescriptive design are recorded and entered into the records of DBI. In the event of an earthquake, buildings designed to the requirements and guidelines of AB-083 would demonstrate a seismic performance at least equivalent to that of a building designed according to the code-prescriptive seismic standards of the San Francisco Building Code.

Impact Analysis

Significance Criteria

The proposed project would have a significant geology and soils impact if it were to:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? (Refer to Division of Mines and Geology Special Publication 42.)
  - Strong seismic ground shaking?
  - Seismic-related ground failure, including liquefaction?
  - Landslides?
- Result in substantial soil erosion or the loss of topsoil?
- Be located on geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code, creating substantial risks to life or property?
- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?
- Change substantially the topography or any unique geologic or physical features of the site?

Project Impacts

Neither the draft Plan nor the proposed Transit Tower would result in any adverse effect with respect to earthquake-induced landslides because the Plan area is located in a flat area that is not an area of mapped landslide susceptibility identified by the California Department of Conservation under the Seismic Hazards Mapping Act of 1990. Therefore, landslide risk is not discussed further below. Likewise, the presence of expansive soils is not an issue because the artificial fill and Dune Sand beneath the Plan area is sandy and would not be expansive, and because the Bay Mud and Marsh Deposits beneath the Plan area are generally below the groundwater table, and thus are permanently saturated. Therefore, impacts related to expansive soils are not discussed further below. Finally, because the Plan area is generally flat, with no unique topographic, geologic, or physical features, construction of individual development projects that could be proposed and approved pursuant to the proposed Plan, including the proposed Transit Tower, would not alter the topography of the Plan area. Therefore, the draft Plan would have no impact with respect to changes in topography or any unique geologic or physical features, and this issue is not discussed in more detail below.

Impact Analysis: Transit Center District Plan

Impact GE-1: The proposed Transit Center District Plan would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, seismic groundshaking, seismically induced ground failure, or landslides. (Less than Significant)

Fault Rupture

As discussed in the Setting, the Plan area is not located within an Alquist-Priolo Earthquake Fault Zone (defined in the Setting), and no active or potentially active faults exist on or in the immediate vicinity of the site. Therefore, the potential for surface fault rupture is low, and this impact is considered less than significant.

Groundshaking

As discussed in the Setting, the USGS concluded that there is a 63 percent probability of a strong earthquake (Mw 6.7 or higher) occurring in the San Francisco Bay region in the 30-year period between 2007 and 2036. The faults nearest the Plan area are the San Andreas fault, located within 8 miles; the Hayward fault, located within 9 miles; the San Gregorio fault, located within 11 miles; and the Calaveras, Mt. Diablo and Rodgers Creek faults, located within 21 miles. Based on shaking hazard mapping done by ABAG, the Plan area would experience very strong to violent ground shaking due to an earthquake along the peninsula segment of the San Andreas fault, and strong to very strong ground shaking due to an earthquake along the northern Hayward fault, which are the faults closest to the Plan area. Further, the CGS estimates that peak ground accelerations within the Plan area would range from 0.47 to 0.49g.

Although the Plan area would be subject to strong to violent ground shaking in the event of a major earthquake, the project would not expose people or structures to substantial adverse effects related to ground shaking. Development projects built within the Plan area would be designed and constructed in accordance with the most current *San Francisco Building Code*, which incorporates *California Building Code* requirements. The *Building Code* specifies definitions of seismic sources and the procedure used to calculate seismic forces on structures during groundshaking. During its review the Department of Building Inspection (DBI), in consultation with the project sponsor, would determine necessary engineering and design features for a structure to reduce potential damage to structures from groundshaking and to ensure compliance with all *San Francisco Building Code* provisions regarding structural safety. The proposed design could also be subject to compliance with AB-083 for non-prescriptive design and peer review. Incorporation of these features would ensure that the structure would not suffer substantial damage, substantial debris such as building exterior finishes or windows would not separate from the building, and that building occupants would be able to safely vacate the building following an earthquake, and that pedestrians and other bystanders would not be injured. While some damage could occur, building occupants could reoccupy the building after an earthquake and the completion of any necessary repairs. Therefore, impacts related to ground shaking are considered less than significant.

Liquefaction, Lateral Spreading, and Earthquake-Induced Settlement

Strong shaking during an earthquake can result in ground failure associated with soil liquefaction, lateral spreading, and seismically induced densification. As discussed in the Setting and shown on Figure 73, most of the Plan area is located in an area of liquefaction potential identified by the California Department of Conservation under the Seismic Hazards Mapping Act of 1990. The Plan area is primarily underlain by artificial fill containing loose and medium dense sand, as well as Dune Sand, Marsh Deposit, and Marine Sand. The western three quarters of the Plan area (between Third and Beale Streets) could be subject to up to about 6 inches of settlement due to earthquake-induced settlement and liquefaction. In the eastern one quarter of the Plan area (between Beale and Spear Streets), the settlement could be up to 12 inches. Further, the area of the former Yerba Buena Cove could experience up to about 6 inches of lateral displacement.

Soils that could liquefy or experience earthquake-induced settlement or lateral displacement would be removed during construction of the basement levels of Plan-area buildings, which would be supported on mat foundations or driven piles supported in the stiff clays, dense sands, and bedrock that underlie the site, as determined appropriate by site-specific geotechnical investigations that would be required by DBI. Removal potentially liquefiable materials and appropriate foundation design would reduce the potential for settlement within the building footprints, even if shallow groundwater levels were to rise as a result of global warming. However, adjacent streets and unimproved properties may experience settlements and lateral displacements which would affect utilities and surface improvements such as sidewalks.

To address the potential for liquefaction, earthquake-induced settlement, and lateral displacement, DBI would, in its review of the building permit application, refer to a variety of information sources to determine existing hazards and assess requirements for mitigation. Sources reviewed include maps of

Special Geologic Study Areas and known liquefaction areas in San Francisco as well as the building inspectors' working knowledge of areas of special geologic concern. If a subsequently proposed development project is located in an area of potential liquefaction, DBI would require the project sponsor to prepare a geotechnical report pursuant to the State Seismic Hazards Mapping Act. The report would assess the nature and severity of the hazard(s) on the site and recommend project design and construction features that would reduce the hazards(s). The building plans and geotechnical report would be reviewed by DBI to determine that the necessary engineering and design features are included in the project to reduce potential damage to structures from liquefaction, earthquake-induced settlement, and lateral displacement, and to ensure compliance with all *San Francisco Building Code* provisions regarding structural safety. The proposed design could also be subject to compliance with AB-083 for non-prescriptive design and peer review. Therefore, impacts related to liquefaction, earthquake-induced settlement, and lateral spreading are considered less than significant.

Mitigation: None required.

Impact GE-2: The proposed Transit Center District Plan would not result in substantial erosion or loss of top soil. (Less than Significant)

The Plan area is primarily built out and covered with impervious surfaces, including buildings, streets, and sidewalks that would have involved removal of any top soil during construction. Soil movement for foundation excavation could create the potential for wind- and water-borne soil erosion. However, the Plan area is relatively flat; therefore, substantial erosion and loss of soil would not be expected to occur during site preparation and construction. Furthermore, the project sponsors would be required to implement an erosion and sediment control plan for construction activities in accordance with Article 4.1 of the San Francisco Public Works Code (discussed in Section O, Hydrology and Water Quality) to reduce the impact of runoff from the construction site. The City must review and approve the erosion and sediment control plan prior to implementation, and would conduct periodic inspections to ensure compliance with the plan. Therefore, impacts related to soil erosion and the loss of top soil are considered less than significant.

Mitigation: None required.

Impact GE-3: Development sites within the proposed Transit Center District Plan area would not be located on a geologic unit or soil that is unstable, or that could become unstable as a result of the project. (Less than Significant)

Ground settlement could result from excavation for construction of subsurface parking or basement levels, from construction dewatering, from heave during installation of piles, and from long-term dewatering. These potential effects are described below, followed by Department of Building Inspection (DBI) procedures in place to ensure that unstable conditions do not result.

Excavation

As described in Chapter II, project description, excavation for the Transit Tower would be to a depth of approximately 60 feet below grade, consistent with the depth of the Transit Center. Some 72,000 cubic yards of soil would be removed to allow construction of subsurface parking and basement levels beneath the Transit Tower. During excavation, the artificial fill, Dune Sand, Marsh Deposit, and Marine Sand (described in Impact GE-1), could become unstable, potentially causing settlement of adjacent structures, including buildings, sidewalks, streets, and utilities. Shoring, such as rigid and water-tight internally braced secant walling,[404] would be required to prevent this soil from becoming unstable. Further, a monitoring program utilizing an inclinometer would be required to monitor for movement at the face of the excavation. The monitoring program would include a baseline survey and frequent surveying of the excavation as construction progresses to evaluate the effects of construction and ensure that the soil does not become unstable.

Construction-Related Dewatering

Groundwater is relatively shallow throughout the Plan area (encountered at a depth of 8 to 20 feet), which is near San Francisco Bay. Therefore, there is the potential for substantial water inflow into the excavations during construction of individual development projects that could be proposed and approved pursuant to the proposed zoning controls. Dewatering could potentially result in settlement of adjacent structures, including buildings, sidewalks, streets, and utilities. Although a water tight shoring system could be used during excavation of structures, dewatering of excavations for installation of utilities and compaction of soil could be required. For each development project in the Plan area, a site-specific dewatering plan could be necessary.

Heave as a Result of Pile Driving

Driving of displacement piles may cause the ground to heave up to several inches, and the heave could adversely affect adjacent structures. A preconstruction survey and monitoring during pile driving should be used to monitor these effects. The final building plans would be reviewed by DBI, which would determine if a preconstruction survey and subsequent monitoring would be required.

Permanent Dewatering

Groundwater could exert hydrostatic pressure on subsurface parking or basement levels constructed as part of the individual development projects that could be proposed and approved pursuant to the proposed Plan, and permanent dewatering could be required to relieve this pressure. Dewatering could

[404] A secant wall, in simplified form, is built by drilling a series of holes and filling them with concrete, resulting in a continuous series of concrete cylinders that form a water-tight barrier that retains soil behind it.

potentially result in settlement of adjacent structures, including buildings, sidewalks, streets, and utilities. For each development project, a site-specific dewatering plan could be necessary.[405]

DBI Requirements

DBI would require that the detailed geotechnical report address the potential settlement and subsidence impacts of excavation, dewatering, and pile driving. DBI would also require that the report include a determination as to whether a lateral movement and settlement survey should be done to monitor any movement or settlement of surrounding buildings and adjacent streets during construction. If a monitoring survey were recommended, the Department of Public Works would require that a Special Inspector be retained by the project sponsor to perform this monitoring. Groundwater observation wells could be required to monitor potential settlement and subsidence during dewatering. If, in the judgment of the Special Inspector, unacceptable movement were to occur during construction, corrective actions would be used to halt this settlement. Groundwater recharge could be used to halt settlement due to dewatering. Costs for the survey and any necessary repairs to service lines under the street would be borne by the project sponsor. Further, the final building plans would be reviewed by DBI, which would determine if additional site-specific reports would be required.

With implementation of the recommendations of the detailed geotechnical study, subject to review and approval by DBI, and monitoring by a DBI Special Inspector (if required), impacts related to the potential for settlement and subsidence due to construction on soil that is unstable, or could become unstable as a result of the project, are less than significant.

Mitigation: None required.

Impact GE-4: The proposed Transit Center District Plan would not be located on soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems. (Less than Significant)

Development projects that could be proposed and approved pursuant to the proposed zoning controls would connect to the combined sewer system which is the wastewater conveyance system for San Francisco, and would not use septic tanks or other on-site land disposal systems for sanitary sewage. However, stormwater controls implemented in accordance with the San Francisco Stormwater Design Guidelines (described in Section P, Hydrology and Water Quality) could include stormwater best management practices (BMPs) that would promote infiltration of stormwater that would otherwise be discharged to the combined sewer system. The design and performance of these BMPs would be subject to approval and inspection by the San Francisco Public Utilities Commission (SFPUC) to ensure that adverse effects do not occur. Some wastewater would also be reused for non-potable purposes, as

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405 As discussed in Section O, Hydrology and Water Quality, the draft Plan proposes that water pumped from permanent dewatering systems that are necessary be reused for non-potable uses such as irrigation and toilet flushing.

discussed in Impact HY-1 in Section O, Hydrology and Water Quality. However, this water would not be disposed of on-site, but would rather be reused. Therefore, impacts related to the presence of soils capable of supporting the use of septic tanks or alternative waste disposal systems are considered less than significant.

Mitigation: None required.

Impact Analysis: Transit Tower

Impact GE-5: The proposed Transit Tower would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, seismic groundshaking, seismically induced ground failure, or landslides. (Less than Significant)

Seismic impacts associated with construction of the Transit Tower are similar to those described above for development projects that could be proposed and approved pursuant to the draft Plan. The potential for fault rupture at the Transit Tower site would low because the no active faults cross the project site. The project site would be subject to strong to violent groundshaking in the event of an earthquake on one of the regional faults, and could also be subject to liquefaction, earthquake-induced settlement, or lateral displacement because it is located in an area of liquefaction potential identified by the California Department of Conservation under the Seismic Hazards Mapping Act of 1990. However, impacts related to these phenomena would be less than significant with compliance with the Seismic Hazards Mapping Act of 1990, the California Building Code, and the *San Francisco Building Code* as enforced by DBI through its permit review and approval process, which can include consultation with the project sponsor, compliance with AB-083 for non-prescriptive design, and peer review of the proposed design. Therefore, effects related to earthquake fault rupture, seismic groundshaking, seismically induced ground failure, and landslides would be less than significant.

Mitigation: None required.

Impact GE-6: The proposed Transit Tower would not result in substantial erosion or loss of top soil. (Less than Significant)

Similar to the development projects that could be proposed and approved pursuant to the proposed zoning controls, the Transit Tower would be constructed on a previously developed site that does not have a substantial top soil layer. Although construction-related erosion could occur, impacts related to soil erosion would be less than significant with implementation of an erosion and sediment control plan for construction activities in accordance with Article 4.1 of the San Francisco Public Works Code. Therefore, any erosion would result in a less-than-significant impact.

Mitigation: None required.

Impact GE-7: The proposed Transit Tower site would not be located on a geologic unit or soil that is unstable, or that could become unstable as a result of the project. (Less than Significant)

Similar to development projects that could be proposed and approved pursuant to the proposed zoning controls, ground settlement at the Transit Tower site could result from excavation for construction of subsurface parking or basement levels, from construction dewatering, from heave during installation of piles, and from long-term dewatering. However, these potential effects would be less than significant with implementation of DBI procedures described above, including preparation of a detailed geotechnical report and site specific reports as needed to address the potential settlement and subsidence impacts of excavation, dewatering, and pile driving; implementation of a lateral movement and settlement survey to monitor any movement or settlement of surrounding buildings and adjacent streets during construction and monitoring by a Special Inspector, if needed; and implementation of corrective actions, as necessary. Thus, the proposed Transit Tower would result in less-than-significant impacts with respect to soil stability.

Mitigation: None required.

Impact GE-8: The draft Plan would not result in development located on soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems. (Less than Significant)

Similar to development projects that could be proposed and approved pursuant to the proposed Plan, the Transit Tower would connect to the combined sewer system and would not use septic tanks or other on-site land disposal systems for sanitary sewage. The design and performance of stormwater BMPs that would promote infiltration of stormwater would be subject to approval and inspection by the SFPUC to ensure that adverse effects do not occur, and wastewater captured for reuse would not be disposed of. Therefore, impacts related to having soils capable of supporting the use of septic tanks or alternative waste disposal systems are considered less than significant for the Transit Tower.

Mitigation: None required.

Cumulative Impacts

Impact C-GE: The proposed Transit Tower, in combination with past, present, and reasonably foreseeable future projects in the site vicinity, would result in less-than-significant impacts related to geology and soils. (Less than Significant)

As discussed previously, implementation of the Transit Tower project and development projects that could be proposed and approved pursuant to the draft Plan could result in ground settlement from excavation for construction of subsurface parking or basement levels, from construction dewatering, from heave during installation of piles, and from long-term dewatering. However, these potential effects would be less than significant with implementation of DBI procedures described above, including preparation of a detailed geotechnical report and site specific reports as needed to address the potential settlement and subsidence impacts of excavation, dewatering, and pile driving; implementation of a lateral movement and settlement survey to monitor any movement or settlement of surrounding buildings and adjacent streets during construction and monitoring by a Special Inspector, if needed; and implementation of corrective actions, as necessary. With implementation of these requirements, the draft Plan would not contribute to cumulative impacts related to ground settlement.

With regard to seismically induced groundshaking and other earthquake hazards, development pursuant to the draft Plan, including development of the proposed Transit Tower, would contribute to an increase in the number of persons potentially exposed to seismic risks in the Plan area and in greater downtown San Francisco, compared to existing conditions. As noted above, the Plan area is not subject to fault rupture, as there are no known earthquake faults in the Plan area. The Plan area and the Transit Tower would be subject to strong to violent groundshaking in the event of an earthquake on a nearby fault. However, new buildings that would be permitted pursuant to the Plan, including the Transit Tower, would be developed in accordance with the most current building code requirements for seismic safety, providing for increased life-safety protection of residents and workers, compared to those in older buildings.

Mitigation: None required.

P. Hydrology and Water Quality

This section describes the existing hydrology and water quality conditions of the Plan area and evaluates potential physical environmental effects related to combine sewer overflows, flooding, drainage, and groundwater and surface water quality. This section also presents applicable water quality regulations and regulatory agencies.

Setting

Water Features and Uses

There are no natural surface water bodies or streams in the Plan area. San Francisco Bay, approximately one block to the northeast of the Plan area, is the only major water feature in the vicinity. Historically, there were small creeks flowing from the east side of the City to the Bay, but nearly all of these creeks were filled during development of the City; none of these creeks were in the Plan area (the nearest ran through what is now Hayes Valley, the Civic Center, and the South of Market, and emptied into Mission Bay near Fourth and Brannan Streets). The area of San Francisco Bay northeast of the Plan area is referred to as the Central Bay.

Freshwater flows into the Central Bay (including areas adjacent to the Plan area and portions of San Francisco to the north) from the Sacramento-San Joaquin Delta result in constant mixing of freshwater and ocean water. In contrast, areas generally south of San Francisco experience much less freshwater inflow and the limited circulation and mixing of waters here is governed mainly by tidal influence.

Average annual precipitation in the San Francisco Bay Area is about 21 inches, which primarily occurs from November through April.

Drainage and Combined Sewer System

Freshwater flow to the Bay from the City has been almost entirely diverted to the City's combined sewer and stormwater system, a system that collects and transports both sanitary sewage and stormwater runoff in the same set of pipes. San Francisco is roughly divided into two major drainages: the eastern and the western basins. Within the eastern basin, including the entire Plan area, combined stormwater and sewage flows are transported to the Southeast Water Pollution Control Plant (Southeast plant), located in the Bayview District. This plant treats up to 150 million gallons per day (mgd) of wastewater to a secondary level.[406] During dry weather, wastewater flows consist mainly of municipal and industrial sanitary sewage and wastewater and the annual average wastewater flow during dry weather is 65 to 70 mgd; therefore all dry weather wastewater flow is treated to a secondary level at the Southeast plant. The

406 Secondary treatment involves removal of organic matter using biological and chemical processes. This is a higher level of treatment than primary treatment, which is removal of floating and settleable solids using physical operations such as screening and sedimentation. Secondary treatment is less intensive than tertiary treatment, in which additional chemical and biological treatment processes are used to remove additional compounds that may be required for discharge or reuse purposes.

treated wastewater is then discharged to the Bay through the deep water outfall at Pier 80, located immediately to the north of the Islais Creek Channel.

During wet weather, the combined sewer and stormwater system collects large volumes of stormwater runoff in addition municipal and industrial sanitary sewage and wastewater, and the combined wastewater and stormwater flow is conveyed to treatment facilities before eventual discharge to the Bay. Depending on the amount of rainfall, wet weather flows are treated to varying levels before discharge. Up to 150 mgd of wet weather flows receive secondary treatment at the Southeast plant. The Southeast plant can also treat up to an additional 100 mgd to a primary treatment standard plus disinfection. Treated wet weather discharges of up to 250 mgd from the Southeast plant occur through the Pier 80 outfall directly to the Bay or through the Quint Street outfall to Islais Creek Channel, and thence to the Bay. Only wastewater treated to a secondary level is discharged at the Quint Street outfall.

Up to an additional 100 mgd of wet weather flows receive primary treatment plus disinfection at the North Point Wet Weather Facility, located on the north side of the City at Bay and Kearny Streets, which operates only during wet weather. Treated effluent from this facility is discharged through four outfalls approximately 800 feet out into the Bay.

The combined sewer system includes storage and transport boxes that, during wet weather, retain the combined stormwater and sewage flows that exceed the capacities of the Southeast and North Point treatment plants for later treatment. When rainfall intensity results in combined flows that exceed the total capacity of these facilities and the storage and transport structures themselves, the excess flows are discharged through 29 combined sewer overflow (CSO) structures located along the Bayside waterfront from Fisherman's Wharf to Candlestick Point. Discharges from the CSO structures, consisting of about 6 percent sewage and 94 percent stormwater, receive "flow-through treatment," which is similar to primary treatment, to remove settleable solids and floatable materials. Wet weather flows are intermittent throughout the rainy season, and combined sewer overflow events vary in nature and duration depending largely on the intensity of individual rainstorms.

The majority of the Plan area is located within Channel sub-basin of the eastern drainage, and a small portion of the Plan area along Mission Street and Second Street is located within the North Shore sub-basin. Nine CSO structures on the Bay shore discharge overflows from the Channel sub-basin. Two of these structures are located at Howard and at Brannan Streets, and seven discharge to Mission Creek. These structures are permitted for a total of10 overflow events per year. Six CSO structures located along the northern Bay shore discharge overflows from the North Shore sub-basin. These structures are located at Baker, Pierce, Laguna, Beach, Sansome, and Jackson Streets. They are permitted for a total of four overflow events per year. All discharges from the combined sewer system to the Bay, through either the outfalls or the CSO structures, are operated in compliance with the federal Clean Water Act and the State's Porter-Cologne Water Quality Control Act through permits issued by the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB).

The San Francisco Public Utilities Commission (SFPUC) Wastewater Enterprise manages the City's wastewater collection, treatment, and discharge system, and since 2005, has been conducting master planning efforts for the San Francisco sewer system and preparing a Sewer System Master Plan to update the 1974 master plan. The purpose of the master plan is to provide an assessment of the current conditions and a framework for future actions through 2030. Prepared with extensive input from the public, the Sewer System Master Plan focuses on providing reliable, efficient, sustainable and environmentally acceptable operation and management of the sewer system through addressing both critical near-term needs and long-term issues. It incorporates an integrated urban watershed management approach to guide the future operations and maintenance of the sewer system.

Recycled Water

To supplement primary water supplies and ensure reliable, high-quality drinking water in the event of a major earthquake, drought, or decline in the snow pack, the SFPUC is planning to diversify San Francisco's supplies and increase the use of available local water sources, such as recycled water. Developing recycled water in San Francisco will provide a drought-resistant and sustainable water source for non-potable uses such as irrigation of parks, golf courses, and other green spaces, toilet/urinal flushing, and other uses.

As part of its Recycled Water Program, the SFPUC is proposing to implement three projects within the City—the Westside Recycled Water Project, the Eastside Recycled Water Project, and the Harding Park Recycled Water Project:

- The Westside Recycled Water Project will produce and deliver highly treated recycled water to customers that include Golden Gate Park, the California Academy of Sciences, Lincoln Park and Golf Course, and potentially the Presidio Golf Course;
- The Eastside Recycled Water Project will produce and deliver recycled water to customers on the eastern side of the City, including existing and future buildings, parks and green spaces, and potentially some industrial/commercial customers; and
- The Harding Park Recycled Water Project is being implemented in partnership with the North San Mateo County Sanitation District. This project will irrigate the Harding Park Golf Course.

Surface Water Quality

Ambient offshore Bay water quality is not regularly monitored in the immediate vicinity of the Plan area. However, in 1993, the RWQCB initiated the Regional Monitoring Program for the San Francisco estuary for the general purposes of assessing regional water quality conditions and characterizing patterns and trends of contaminant concentrations and distribution in the water column, as well as identifying general sources of contamination to the Bay. The program has established a database of water quality and sediment quality in the estuary, particularly with regard to toxic and potentially toxic trace elements and organic contaminants. The most recent water quality data for the Central Bay, the monitoring locations closest to the Plan area, was collected in 2008.[407] The conditions monitored include conventional water quality parameters (ammonia, conductivity, dissolved oxygen, dissolved organic carbon, particulate organic carbon, silica, hardness, nitrate, nitrite, pH, phosphate, salinity, temperature, suspended sediments, pheophytin, and chlorophyll); trace elements (arsenic, cadmium, cobalt, copper, iron, lead, manganese, mercury, methylmercury, nickel, selenium, silver, and zinc); trace organics including polynuclear aromatic hydrocarbons, polychlorinated biphenyls (PCBs), and pesticides; polybrominated diphenylethers (PBDEs, a class of chemicals used as a flame retardant); pyrethroids (synthetic chemical compounds similar to the natural chemical pyrethins produced by the flowers of pyrenthums; these compounds now constitute a major proportion of the synthetic insecticide market and are common in commercial products such as household insecticides); and toxicity.

Mission Creek was identified by the RWQCB as a toxic hot spot in 1999 based on the presence of chromium, copper, mercury, lead, silver, zinc, chlordane, chlorpyrifos, dieldrin, mirex, PCBs, PAHs, and anthropogenically enriched hydrogen sulfide and ammonia.[408] The RWQCB concluded CSO discharges from the combined sewer system were the primary source of pollutants. These discharges were untreated and more frequent prior to construction of the transport and storage structures in 1982.

Flooding

The Federal Emergency Management Agency (FEMA) is preparing Flood Insurance Rate Maps (FIRMs) for the City and County of San Francisco for the first time. FIRMs identify areas that are subject to inundation during a flood having a one percent chance of occurrence in a given year (also known as a “base flood” or “100-year flood”). FEMA refers to the flood plain that is at risk from a flood of this magnitude as a special flood hazard area.

In September 2007, FEMA issued a preliminary FIRM of San Francisco for review and comment by the City. The City submitted comments that year, and FEMA anticipates publishing a revised preliminary FIRM by 2012, after completing a more detailed analysis of flood hazards associated with San Francisco Bay as requested by Port and City staff. FEMA will finalize the FIRM and publish it for flood insurance and floodplain management purposes after reviewing comments and appeals related to the revised preliminary FIRM.

As proposed, the FIRM would designate portions of waterfront piers, Mission Bay, Bayview Hunters Point, Hunters Point Shipyard, Candlestick Point, and Treasure Island as Zone A (areas subject to inundation by tidal surge) or Zone V (areas of coastal flooding subject to wave hazards).[409] The Plan area is not located within Zone A or Zone V or a Special Flood Hazard Area identified on San Francisco’s

[407] San Francisco Estuary Institute, 2008 RMP Annual Monitoring Results, March, 2010.
[408] Regional Water Quality Control Board, San Francisco Bay Region, Final Regional Toxic Hot Spot Cleanup Plan, March, 1999.
[409] City and County of San Francisco, Office of the City Administrator, San Francisco Floodplain Management Program Fact Sheet, January 25, 2001, at: http://sfgsa.org/Modules/ShowDocument.aspx?documentid=7520. Accessed March 8, 2011.

Interim Floodplain Map.[410,411] Furthermore, the Plan area is not located within an area identified by the SFPUC as prone to flooding due to combined sewer backups or flooding, which can affect locations—such as parts of the South of Market neighborhood west of the Plan area—where properties are developed at elevations below the water level in the combined sewer lines.[412] In these areas—generally between Fourth and Tenth Streets—SFPUC reviews potential projects to determine whether the project would result in ground-level flooding during storms.

The Mayor and the Board of Supervisors approved a Floodplain Management Ordinance in 2008 (and amended the Ordinance in 2010).[413] The Ordinance governs new construction and major improvements to existing buildings in flood-prone areas and designates the City Administrator's Office as the City's Floodplain Administrator. In general, the Ordinance requires the first floor of structures in designated flood hazard zones to be constructed above the floodplain or to be flood-proofed by improvements that reduce or eliminate the potential for flood damage.

Pending completion of the federal FIRM for San Francisco, the City has created an Interim Floodplain Map that identifies areas of flooding within the City. FEMA approved San Francisco's application for participation in the National Flood Insurance Program in April 2010, meaning that homeowners, renters, and business owners in the City are now eligible to purchase federally subsidized flood insurance to protect their property. The City Administrator's Office and the San Francisco Department of Emergency Management are also working to identify potential hazard mitigation projects for that may be eligible for grants from FEMA.

Future Flooding Risks

Globally, sea level has been rising for the past 10,000 years and, over the past 5,000 years, has averaged roughly 0.0039 feet per year.[414] However, there is evidence that the rate of sea level rise is accelerating on both a global and local scale due to ocean warming (thermal expansion), continental ice melt, increases in temperature, and land elevation changes.[415] From 1961 to 2003, the global rate of sea level rise was about 0.0059 feet per year.[416] Based on the San Francisco NOAA tide gage monthly mean sea level data from

410 Federal Emergency Management Agency, Preliminary Flood Insurance Rate Map, City and County of San Francisco, California, Panel 120 of 260, Map Number 06075C0120A, September 21, 2007, http://sfgsa.org/Modules/ShowImage.aspx?imageid=2672. accessed June 22, 2010.

411 City and County of San Francisco, Office of the City Administrator, Final Draft San Francisco Interim Floodplain Map, Northeast, July, 2008, http://www.sfgsa.org/Modules/ShowDocument.aspx?documentid=1785, accessed June 22, 2010.

412 San Francisco Planning Department, Review of Projects in Identified Areas Prone to Flooding, April 1, 2007.

413 Ordinance 56-10, approved March 25, 2010. Available at: http://www.sfbos.org/ftp/uploadedfiles/bdsupvrs/ordinances10/o0056-10.pdf.

414 Association of Bay Area Governments (ABAG), *Status and Trends Report on Land Use and Population. The Geomorphology, Climate, Land Use and Population Patterns in the San Francisco Bay, Delta and Central Valley Drainage Basins*, February 1991.

415 Intergovernmental Panel on Climate Change (IPCC), *Fourth Assessment Report, Climate Change 2007: Synthesis Report*, available online at www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf, 2007.

416 Intergovernmental Panel on Climate Change (IPCC), Fourth Assessment Report, Climate Change 2007: Synthesis Report, available online at: www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr.pdf, 2007

1887 to 2006, the current average rate of sea level rise in the Bay Area is 0.0066 feet per year at the San Francisco tide station.[417]

California Executive Order S-13-08, issued in 2008, is implemented by the California Resources Agency and calls for the completion of a Sea Level Rise Assessment Report, the consideration of sea level rise scenarios for the years 2050 and 2100 by state agencies, and development of a Climate Adaptation Strategy. A Sea Level Rise Assessment Report is expected to be completed by 2012.[418] The report will advise how California should plan future sea level rise, and will provide estimated values or a range of values for sea level rise along the West Coast for the years 2030, 2050, and 2100. A state task force has published an interim guidance document to inform and assist state agencies as they develop approaches for incorporating sea level rise into their planning processes prior to publication of the Sea Level Rise Assessment Report.[419] The guidance document relies upon the ranges of sea level rise presented in the December 2009 Proceedings of the National Academy of Sciences as a starting place, using the year 2000 as a baseline. Until 2050 there is generally good agreement in the amount of projected sea level rise among the various climate models assessed, but after 2050, projections of sea level rise become less certain because modeling results diverge and there are differences in estimations of the degree that the international community will decrease greenhouse gas emissions. Further, the guidelines recommend that analysis of sea level rise should consider the future mean sea level combined with the effects of tides and storm surge.

In 2006, the Bay Conservation and Development Commission (BCDC) released a series of maps depicting the lands vulnerable to a sea level rise of 16 inches by mid-century and 55 inches by the end of the century.[420] BCDC mapping, and maps of projected sea level rise produced by the Pacific Institute, an Oakland-based non-profit research organization, indicate that the eastern portion of the Plan area—essentially the area east of Beale Street—is located within the area of potential inundation from the 100-year flood a 55-inch increase in sea level.[421] BCDC notes that its mapping is not intended to provide a block-by-block evaluation of the potential inundation risk due to sea level rise; rather, analysis to date has been intended to provide a forecast of potential regional effects of sea level rise around San Francisco Bay. BCDC is currently involved in a more detailed planning and mapping process through the Adapting to Rising Tides (ART) program, in cooperation with the National Oceanic and Atmospheric

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417 National Oceanic and Atmospheric Administration (NOAA), NOAA Tides and Currents. *Mean Sea Level Trend 9414290 San Francisco, California*, tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=9414290, accessed March 25, 2011.

418 Department of Water Resources, California (DWR), Climate Change Characterization and Analysis in California Water Resources Planning Studies, www.water.ca.gov/climatechange/docs/DWR_CCCStudy_FinalReport_Dec23.pdf, December 2010.

419 Sea-Level Rise Task Force of the Coastal and Ocean Working Group of the California Climate Action Team, *State of California Sea-Level Rise Interim Guidance Document*, October, 2010. http://www.slc.ca.gov/Sea_Level_Rise/SLR_Guidance_Document_SAT_Responses.pdf.

420 San Francisco Bay Conservation and Development Commission, Shoreline Areas Vulnerable to Sea Level Rise: Central Bay, 2006.

421 Pacific Institute, "California Flood Risk: Sea Level Rise; San Francisco North Quadrangle," 2009. Funded by the California Energy Commission's Public Interest Energy Research Program, CalTrans, and the California Ocean Protection Council. Available on the internet at: http://www.pacinst.org/reports/sea_level_rise/index.htm. Reviewed November 30, 2010.

Administration.[422] Nevertheless, low-lying areas, such as the Plan area, or at least its lowest-elevation parts, are at least potentially susceptible to increased flooding as a result of anticipated increases in sea level and the level of San Francisco Bay. Under current conditions, for example, waves can overtop the seawall along the Embarcadero when storm conditions coincide with high tides.

The Port of San Francisco conducted a detailed study of potential flooding of Port properties north of Pier 64 in 2011. The report used a base year of 2010, and evaluated potential flooding with a sea level rise of 15 inches by the year 2050 and 55 inches by the year 2100.[423] Areas that would be inundated by flooding associated with a 55-inch sea level rise by 2100 are generally consistent with the BCDC maps referred to above; that is, the portion of the Plan area generally east of Beale Street would be inundated in a 100-year flood. When wave runup is added, total water levels would be as much as 5 feet higher, at least at the shoreline. In the nearer term, with a 15-inch sea level rise by 2050, flooding during a 100-year storm would affect limited areas, primarily along the Embarcadero.

Groundwater

The Plan area is underlain by the downtown San Francisco Groundwater Basin, one of five groundwater basins in the eastern part of San Francisco.[424] This basin is separated from the surrounding groundwater basins by bedrock ridges. The groundwater basin is made up of shallow unconsolidated sediments underlain by less permeable bedrock. Bedrock outcrops form much of the northeastern and southern basin boundaries. In general, groundwater flow is towards the northeast, following the topography. Groundwater within the Downtown San Francisco Groundwater Basin is known to contain elevated concentrations of nitrates, chloride, boron, and total dissolved solids.

Tsunamis and Seiches

Tsunamis (seismic sea waves) are long period waves that are typically caused by underwater seismic disturbances, volcanic eruptions, or submerged landslides. Tsunamis, which travel at speeds up to 700 miles per hour, are typically only 1 to 3 feet high in open ocean water but may increase in height to up to 90 feet as they reach coastal areas, causing potentially large amounts of damage when they reach land.[425] Low-lying coastal areas such as tidal flats, marshlands, and former bay margins that have been artificially filled but are still at or near sea level are generally the most susceptible to tsunami inundation.

A seiche is caused by oscillation of the surface of an enclosed body of water, such as San Francisco Bay, during an earthquake. Inside the Bay, the area of potential inundation from a seiche extends from the

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[422] Steve Goldbeck, BCDC, personal communication, November 30, 2010.

[423] URS Corporation, *Sea Level Rise and Adaptation Study Coastal Inundation Report*, prepared for Port of San Francisco, May 11, 2011. This report is available at the Planning Department, 1650 Mission Street, Suite 400, in Case File No. 2007.0558E.

[424] California Department of Water Resources. California's Groundwater, Bulletin 118. February 27, 2004.

[425] URS Corporation, City and County of San Francisco Hazard Mitigation Plan, December, 2008.

Palace of Fine Arts south to the Central Basin.[426] The easternmost portion of the Plan area is within an area that could be subjected to an approximately 8-foot seiche.

Since 1850, 51 tsunamis have been recorded or observed in San Francisco Bay. Nine of these tsunamis originated in Alaska and were caused by an earthquake, earthquake and landslide, or volcano and earthquake. Only one tsunami has been recorded as originating along the central California Coast: a 4-inch runup that was recorded at the Presidio gauge station shortly after the 1906 earthquake.

The National Oceanic and Atmospheric Administration (NOAA) operates the Tsunami Warning System with centers located in Hawaii and Alaska. The National Warning System provides warnings to the West Coast (including California) and Alaska. These warning centers are linked to the Advanced National Seismic System that monitors earthquakes in the United States, to the international seismic monitoring systems, and to a system of tide gauges and buoys. The California Integrated Seismic Network also provides information regarding the magnitude and location of California earthquakes and a quick link to the West Coast/Alaska Tsunami Warning Center.

Based on the level of threat, a Tsunami Advisory, Watch, or Warning would be issued. In San Francisco, occupants would be notified of the Advisory, Watch, or Warning via the Outdoor Public Warning System, notification of the local media, Public Address Systems, and the Alert SF public notification system. The notification would include instructions for walking to higher ground or evacuating and for obtaining basic services such as shelter, food, water, and medical services. Once the area is deemed safe for reentry, an all clear public safety message would be broadcast.

The Tsunami Warning System takes an average of 7 to 10 minutes to identify a tsunami threat and communicate it to the media and state warning systems. The initial notification is based on seismic data. However, distant source events may provide up to 3 hours of warning, while local-source events have less than 60 minutes lead time. During this time, the initial notification is normally updated once additional information is available, at least every 30 minutes. The status of an Advisory, Watch, or Warning can be upgraded, downgraded, or the impact area expanded based on the new information.

Regulatory Framework

Water Quality Regulations

The federal Clean Water Act and subsequent amendments, under the enforcement authority of the U.S. Environmental Protection Agency (EPA), was established "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The Act established the basic structure for regulating discharges of pollutants into the waters of the United States. It gave the EPA the authority to implement pollution control programs such as setting wastewater standards for industry. The Clean Water Act also set water quality standards for all contaminants in surface waters and made it unlawful for any person to

[426] City and County of San Francisco, Emergency Response Plan, Tsunami Response Annex, September, 2008.

discharge any pollutant from a point source into navigable waters, unless a permit was obtained under its provisions.

The federal Clean Water Act established the National Pollutant Discharge Elimination System (NPDES) program to protect water quality of receiving waters. Under the Clean Water Act, Section 402, discharge of pollutants to receiving waters is prohibited unless the discharge is in compliance with an NPDES permit. In California, the EPA has determined that the State's water pollution control program had sufficient authority to manage the NPDES program under California law in a manner consistent with the Clean Water Act. Therefore, implementation and enforcement of the NPDES program is conducted through the California State Water Resources Control Board (SWRCB) and the nine RWQCBs.

The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code) regulates water quality within California and established the authority of the SWRCB and the nine regional water boards. The San Francisco Bay waters are under the jurisdiction of the RWQCB (San Francisco Bay Region). The RWQCB established regulatory standards and objectives for water quality in the Bay in the *San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan)*, most recently updated in 2007 and commonly referred to as the "Basin Plan."[427] The Basin Plan identifies existing and potential beneficial uses and provides numerical and narrative water quality objectives designed to protect those uses.

Water Quality Criteria

The Clean Water Act established ambient water quality criteria for the protection of aquatic life and human health that serve as guidance for states to use in adopting water quality standards. In 1980, the EPA published water quality criteria for 64 pollutants and pollutant classes and considered non-cancer, cancer, and taste and odor effects. Additional criteria were adopted under the 1992 National Toxics Rule, and criteria specific to California were adopted under the 2000 California Toxics Rule. In 2002, the EPA revised its recommended water quality criteria for 83 chemicals based on a revised methodology adopted in 2000 in order to protect human health, and in 2003 the EPA published an additional 15 revised human health criteria.[428] Human health criteria are based on the assumption that a person could eat fish and drink water from a water body, or only eat fish from a water body. The 2002 revisions incorporate new toxicity information on compounds and other changes in the calculation method.

Statewide measures to implement water quality criteria, specified by the National Toxics Rule, the California Toxics Rule, and the Basin Plan are addressed in the SWRCB *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (referred to as the State Implementation Plan), most recently updated by the SWRCB in 2005. The State Implementation Plan provides a basis for establishing water quality-based effluent limitations for discharges to inland waters and methods for demonstrating compliance with these effluent limitations. In accordance with the State

[427] California Regional Water Quality Control Board, San Francisco Bay Region, San Francisco Bay Basin (Region 2) Water Quality Control Plan (Basin Plan), incorporating all amendments approved by the Office of Administrative Law as of January 18, 2007.
[428] United States Environmental Protection Agency. National Recommended Water Quality Criteria Table, Fact Sheet, May 2005

Implementation Plan, the effluent limitations are enforced through NPDES permits, issuance or waiver of waste discharge requirements, or other relevant regulatory approaches. During the permit application or renewal process, the State Implementation Plan is used to determine if (1) water quality-based effluent limits are required, and (2) if an effluent limit is required, the maximum allowable discharge concentration. The State Implementation Plan does not apply to wet weather discharges from the combined sewer system, including combined sewer overflows, but does apply to dry weather discharges from the Pier 80 outfall.

Beneficial Uses

Applicable water quality criteria for a specific water body, specified by the National Toxics Rule or the California Toxics Rule, are determined on the basis of the beneficial use(s) of the water. The Basin Plan identifies the following existing beneficial uses for the Central Bay portion of San Francisco Bay: ocean, commercial and sport fishing; estuarine habitat; industrial service supply; industrial process supply; fish migration; navigation; preservation of rare and endangered species; fish spawning; water contact recreation; non-contact water recreation; shellfish harvesting; and wildlife habitat. No "potential" beneficial uses are identified for this portion of the Bay.

The Basin Plan identifies municipal and domestic supply as well as agricultural supply as existing beneficial uses for the Downtown San Francisco Groundwater Basin. Industrial service supply and industrial process supply are listed as "potential" beneficial uses.

Impaired Water Bodies and Total Maximum Daily Loads

In accordance with Section 303(d) of the Clean Water Act, states must present the EPA with a list of "impaired water bodies," defined as those water bodies that do not meet water quality standards. The RWQCB has listed Central Bay portion of the San Francisco Bay as well as Mission Creek as impaired water bodies.[429] The Central Bay is listed as an impaired water body for chlordane, dichlorodiphenyltrichloroethane (DDT), dieldrin, dioxin compounds, furan compounds, mercury (water and sediment), polynuclear aromatic hydrocarbons (PAHs), PCBs, dioxin-like PCBs, selenium, and exotic species. Mission Creek is listed as an impaired water body for ammonia, chlordane (sediments), dieldrin (sediments), hydrogen sulfide, lead (sediments), mercury (sediments), silver (sediments), zinc (sediments), PAHs, and PCBs (sediments).

The law requires the development of actions, known as total maximum daily loads (TMDLs), to improve water quality of impaired water bodies. The first step of the TMDL process is development of a TMDL report describing the water quality problem addressed, detailing the pollutant sources, and outlining the solutions. An implementation plan, included in the TMDL report, describes how and when pollution prevention, control, or restoration activities will be accomplished and who will be responsible for these actions. The final step of the TMDL process is adopting and amending the Basin Plan to legally establish

[429] San Francisco Regional Water Quality Control Board, 2006 CWA 303(d) List of Water Quality Segments Requiring TMDLs. Approved by the United States Environmental Protection Agency on June 28, 2007.

the TMDL and to specify regulatory requirements for compliance. As part of the Basin Plan Amendment, wasteload allocations are specified for entities that have permitted discharges.

TMDLs for San Francisco Bay PCBs and Mercury have been approved by the EPA and officially incorporated into the Basin Plan. The RWQCB also adopted the San Francisco Bay Watershed Permit (Order No. R2-2007-0077) addressing mercury discharges from municipal and industrial wastewater dischargers.[430] In accordance with this permit, the mercury allocation for the Southeast plant is 2.1 kilograms per year by 2017 and 1.6 kilograms per year by 2027, reduced from an estimated annual load of 2.7 kilograms per year in 2003. The Basin Plan establishes an allocation of 0.3 kilograms per year of PCBs for the Southeast plant.

NPDES Waste Discharge Regulations

The federal Clean Water Act, Section 402, established the NPDES program to protect water quality of receiving waters. The NPDES program requires all facilities which discharge pollutants into waters of the United States to obtain a permit. The permit provides two levels of control – technology-based limits and water-quality-based limits – to control discharge of pollutants for the protection of water quality. Technology-based limits are based on the ability of dischargers in the same category to treat wastewater, while water-quality based limits are required if technology-based limits are not sufficient to provide protection of the water body. Water quality-based effluent limitations required to meet water quality criteria in the receiving water are based on criteria specified in the National Toxics Rule, the California Toxics Rule, and the Basin Plan. NPDES permits must also incorporate TMDL wasteload allocations when they are developed.

The regulations initially focused on municipal and industrial wastewater discharges in 1972, followed by stormwater discharge regulations, which became effective in November 1990. NPDES permits for wastewater and industrial discharges specify discharge prohibitions and effluent limitations and also include other provisions (such as monitoring and reporting programs) deemed necessary to protect water quality. In California, the SWRCB and the RWQCBs implement and enforce the NPDES program.

Southeast Plant, North Point, and Bayside Facilities NPDES Permit

The City currently holds an NPDES permit adopted by the RWQCB in June 2002 that covers the Southeast plant, the North Point Wet Weather Facility, and all of the Bayside wet-weather facilities, including discharges from the CSOs to the Bay.[431] The permit specifies discharge prohibitions, dry-weather effluent limitations, wet-weather effluent performance criteria, receiving water limitations, sludge management practices, and monitoring and reporting requirements. The permit prohibits overflows from the CSO structures during dry weather, and requires wet-weather overflows to comply

430 Regional Water Quality Control Board, San Francisco Bay Region, SF Mercury Watershed Permit, Municipal and Industrial Wastewater Dischargers, Order No. R2-2007-0077, adopted November 1, 2007.

431 Regional Water Quality Control Board, San Francisco Bay Region, National Pollutant Discharge Elimination System (NPDES) Permit No. CA0037664, Order No.2002-0073, for City and County of San Francisco Southeast Water Pollution Control Plant, North Point Wet Weather Facility, and Bayside Wet Weather Facilities, adopted June 19, 2002.

with the nine minimum controls specified in the federal Combined Sewer Overflow Control Policy, described below.

Federal Combined Sewer Overflow Control Policy

On April 11, 1994 the EPA adopted the Combined Sewer Overflow Control Policy (CSO Control Policy), which became part of the Clean Water Act in December 2000. This policy establishes a consistent national approach for controlling discharges from combined sewers to the nation's water. Using the NPDES permit program, the policy initiates a two-phased process with higher priority given to more environmentally sensitive areas. During the first phase, the permittee is required to implement the following nine minimum controls that constitute the technology-based requirements of the Clean Water Act and can reduce the frequency of CSOs and their effects on receiving water quality:

1. Conduct proper operation and regular maintenance programs for the combined sewer system and CSO outfalls;
2. Maximize the use of the collection system for storage;
3. Review and modify pretreatment programs to ensure that CSO impacts are minimized;
4. Maximize flow to the treatment plant for treatment;
5. Prohibit CSOs during dry weather;
6. Control solids and floatable materials in CSOs;
7. Develop and implement pollution prevention programs that focus on contaminant reduction activities;
8. Notify the public; and
9. Monitor to effectively characterize CSO impacts and the efficacy of CSO controls.

The City is currently implementing these controls as required by the CSO Control Policy. This includes development of a Water Pollution Prevention Program which focuses on minimizing pollutants from entering the City's combined sewer system and addresses pollutants from residential, commercial, industrial, and nonpoint pollutant sources.

During the second phase, the permittee is required to continue implementation of the nine minimum controls, properly operate and maintain the completed CSO controls in accordance with the operational plan, and implement the post-construction monitoring program. In conformance with the CSO Control Policy, the City has developed a long-term control plan to select CSO controls to comply with water quality criteria and to protect the beneficial uses of the receiving waters. The plan utilizes the presumptive approach for the protection of water quality. In accordance with the CSO Control Policy, this approach must meet one of these criteria:

- An average of four CSO events per year;
- Elimination or capture no less than 85 percent by volume of the combined sewage collected in the combined sewer system during precipitation events on a system-wide average basis; or
- Removal of the mass of any contaminant causing water quality impairment that would be otherwise removed by eliminating or capturing the flow as specified above.

The CSO Control Policy requires that any CSOs that occur after implementation of the nine minimum control measures should receive a minimum of primary clarification (removal of floatables and settleable solids), solids and floatable disposal, and disinfection (if necessary to meet water quality standards and protect the beneficial uses of the receiving water). The San Francisco Wastewater Control Program exceeds the specifications of the presumptive approach because 100 percent of the combined sewer flows are captured and treated rather than the required 85 percent. As defined in the CSO Control Policy, San Francisco has no remaining untreated overflow events because the overflows that occur in San Francisco currently receive the equivalent of primary treatment within the storage/transport boxes, consisting of removal of floatables and settleable solids.

The City is currently in full compliance with the CSO Control Policy. In 1997, the City completed construction of a 20-year, $1.6 billion Wastewater Master Plan which included extensive storage, transport and treatment upgrades to the combined sewer system that meet approved design criteria for overall protection of beneficial uses. Operation and implementation of these facilities satisfies the CSO Control Policy, including maximizing use of the system during wet weather.

Wastewater Discharges

Discharges of non-sewage wastewater to the combined sewer system, including groundwater produced during construction dewatering, are subject to the permit requirements specified in Article 4.1 of the *San Francisco Public Works Code* and supplemented by Department of Public Works Order No. 158170. The permit requirements include compliance with the federal CSO Control Policy minimum controls, including development and implementation of a pollution prevention program. The San Francisco pollution prevention program includes requirements for best management practices to minimize the amount of pollutants carried by stormwater to the combined sewer system from industrial uses, and the City conducts periodic inspections to ensure compliance.

Stormwater Management

In accordance with the San Francisco Stormwater Management Ordinance, approved in April 2010, development projects that discharge stormwater to the combined sewer system—which covers the Plan area—must comply with the San Francisco Stormwater Design Guidelines developed by the SFPUC and the Port of San Francisco.[432] The Guidelines offer five tools to help project developers achieve compliance with stormwater management requirements:

- A step-by-step guide describing how to manage stormwater on site;
- A set of stormwater Best Management Practices (BMP) Fact Sheets;
- A vegetation palette to assist in BMP-appropriate plant selection;

[432] San Francisco Public Utilities Commission and Port of San Francisco, San Francisco Stormwater Design Guidelines, November, 2009. Adopted by the SFPUC Commission January 12, 2010. http://sfwater.org/mto_main.cfm/MC_ID/14/MSC_ID/361/MTO_ID/543. Stormwater Management Ordinance: Ordinance 83-10, approved by the Board of Supervisors April 13, 2010, and signed by the Mayor April 22, 2010: http://www.sfbos.org/ftp/uploadedfiles/bdsupvrs/ordinances10/o0083-10.pdf.

- Sizing calculators to determine the required size of each BMP; and
- Maintenance checklists explaining the types and frequencies of the maintenance activities associated with each BMP.

In accordance with the San Francisco Stormwater Design Guidelines, developers of projects that disturb more than 5,000 square feet of ground must implement BMPs to reduce the flow rate and volume of stormwater going into the combined sewer system by achieving Leadership in Energy and Environmental Design (LEED®) Sustainable Sites Credit 6.1 (Stormwater Management Rate and Quantity). Development projects must also comply with Article 4.2 of the *San Francisco Public Works Code* and must submit a stormwater control plan (including an operations and maintenance plan). The SFPUC reviews the plan and certifies compliance with the San Francisco Stormwater Design Guidelines. Examples of BMPs that may be implemented include rainwater harvesting, rain gardens, green roofs, and permeable paving. (Separate requirements exist for parts of the City that have separate storm sewer systems.)

The SFPUC inspects stormwater BMPs once they are constructed, and any issues noted by the inspection must be corrected before the Certificate of Occupancy can be issued for the building. The owner is responsible for completing an annual self-certification inspection, and must submit completed checklists and maintenance logs for the year to the SFPUC. In addition, the SFPUC will inspect all stormwater BMPs every third year. Any issues identified by either inspection must be resolved before the SFPUC can renew the certificate of compliance.

Projects that are required to implement the San Francisco Stormwater Design Guidelines are also subject to review by the San Francisco Department of Building Inspection, and subject to building codes that include provisions for managing drainage for new construction. Specifically, Section 306.2 of the *San Francisco Plumbing Code* and Section 1503.4 of the *San Francisco Building Code* allow roofs and other building areas to drain to locations other than the combined sewer. In 2008, the SFPUC, Department of Building Inspection, and Department of Public Health also entered into a Memorandum of Agreement concluding that applicants can safely harvest rainwater for used in non-potable applications such as toilet flushing, irrigation, and vehicle washing without treating it to potable standards.

Implementation of the low impact development measures described above helps to reduce and delay the volumes of discharge entering the combined sewer system, thereby reducing the frequency of combined sewer overflows, minimizing flooding effects, and protecting water quality. Other plans and ordinances also contribute to reducing the frequency of combined sewer overflows by addressing stormwater management. The Sewer Master Improvement Program will include collection system projects to upgrade the aging sewer system and better handle the City's sewage and stormwater flows by providing both grey and green infrastructure solutions. The Better Streets Plan identifies innovative methods for reducing stormwater runoff from streets and sidewalks to create a more attractive and sustainable public realm in San Francisco. The Green Building Ordinance expands the scope of the green building standards to apply to private developments and redevelopment projects in addition to public buildings; it fosters environmentally sensitive design and sustainability in new development projects. The stormwater management performance standards specified in the San Francisco Stormwater Design Guidelines were developed as part of this ordinance, and the ordinance provides the regulatory authority to implement stormwater management requirements in combined sewer areas.

Construction Stormwater Discharges

Construction-related stormwater discharges are subject to the requirements of Article 4.1 of the *San Francisco Public Works Code*, which incorporates and implements the City's NPDES permit and the nine minimum controls described in the federal CSO Control Policy. The minimum controls include development and implementation of a pollution prevention program. At a minimum, the City requires that the project sponsor develop and implement an erosion and sediment control plan to reduce the impact of runoff from the construction site. The erosion and sediment control plan must be reviewed and approved by the City prior to implementation, and the City conducts periodic inspections to ensure compliance with the erosion and sediment control plan.

Recycled Water

San Francisco's Reclaimed Water Ordinance, contained in Article 22 of the *San Francisco Public Works Code*, specifies that, in designated areas of the City new buildings 40,000 square feet or larger must install a recycled water system. All but the very northwestern corner of the Plan area is within the Eastside Reclaimed Water Use Area designated by the Ordinance, and therefore all development projects greater 40,000 square feet in size must provide for the construction and operation of a reclaimed water system for the transmission of the reclaimed water within buildings and structures. That is, unless granted an exemption, these new buildings would need to be designed with separate plumbing to service uses that could employ reclaimed water (e.g., toilets). The Ordinance also requires that owners, operators, or managers of all development projects register their projects with the SFPUC. The SFPUC issues a certificate exempting compliance in cases in which reclaimed water is not available, an alternative water supply is to be used, or the sponsor has shown that the use of reclaimed water is not appropriate. The SFPUC may inspect any recycled water operations to ensure compliance with the Ordinance, including mandatory use of recycled water. Currently, however, there is no source of recycled water for this area, but recycled water could eventually be provided through the Eastside Recycled Water Project or through the creation of a local facility constructed within the Plan area. The draft Plan includes a number of policies directing the creation of or otherwise securing source(s) of non-potable water, infrastructure for its distribution and use, and development practices to maximize use of non-potable water and reduce use of potable water (see **Appendix B**).

San Francisco Green Building Ordinance

The City of San Francisco's Green Building Ordinance, described in Section IV.H, Greenhouse Gas Emissions, requires newly constructed commercial buildings greater than 5,000 square feet in size and all residential developments to implement the San Francisco Stormwater Design Guidelines (described above). Newly constructed commercial buildings over 5,000 square feet and residential buildings over 75 feet in height including five or more units must also reduce the amount of potable water used for landscaping by 50 percent and must reduce indoor use of potable water by 30 percent (as of 2011). Implementation of these measures are estimated to reduce wastewater and stormwater discharges by 90 million gallons citywide.[433]

Impact Analysis

Significance Criteria

The proposed project would have a significant hydrology and water quality impact if it were to:

- Violate any water quality standards or waste discharge requirements.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion of siltation on- or off-site.
- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in flooding on- or off-site.
- Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.
- Otherwise substantially degrade water quality.
- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other authoritative flood hazard delineation map.
- Place within a 100-year flood hazard area structures that would impede or redirect flood flows.
- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.

Impact Analysis: Transit Center District Plan

Impact HY-1: The proposed Transit Center District Plan would not violate water quality standards or otherwise substantially degrade water quality. (Less than Significant).

Construction

Stormwater Discharges

Construction of individual development projects that could be proposed and approved pursuant to the proposed zoning controls could affect water quality, but the effects would be less than significant with compliance with applicable permits and regulations. Water quality could be affected by grading and earthmoving operations, use of fuels and other chemicals for construction equipment, and demolition

[433] Green Building Ordinance, Ordinance 180-08, approved August 4, 2008. Available on the internet at: http://www.sfbos.org/ftp/uploadedfiles/bdsupvrs/ordinances08/o0180-08.pdf.

and construction. Grading and earthmoving would expose soil during construction and could result in erosion and excess sediments carried in stormwater runoff to the combined sewer system. Stormwater runoff from temporary on-site use and storage of vehicles, fuels, wastes and other hazardous materials could also carry pollutants to the combined sewer system if these materials were improperly handled.

However, the federal Clean Water Act effectively prohibits discharges of stormwater from construction projects unless the discharge is in compliance with a NPDES permit. Construction stormwater discharges to the City's combined sewer system would be subject to the requirements of Article 4.1 of the San Francisco Public Works Code (supplemented by Department of Public Works Order No. 158170), which incorporates and implements the City's NPDES permit, and the federal CSO Control Policy described above. At a minimum, the City requires that a project sponsor develop and implement an erosion and sediment control plan to reduce the impact of runoff from a construction site. The plan must be reviewed and approved by the City prior to implementation, and the City conducts periodic inspections to ensure compliance with the plan. Any stormwater drainage during construction would flow to the City's combined sewer system, where it would receive treatment at the Southeast plant or other wet weather facilities and would be discharged through an existing outfall or overflow structure in compliance with the existing NPDES permit. Therefore, water quality impacts related to violation of water quality standards or degradation of water quality due to discharge of construction related stormwater runoff would be less than significant with compliance with applicable permits.

Groundwater Dewatering

As noted in Section O, Geology, Soils, and Seismicity, the groundwater level in the Plan area is expected at about 8 to 20 feet below ground surface. Because individual development projects that could be proposed and approved pursuant to the proposed zoning controls would include construction of foundations and/or below ground parking garages that could extend below this depth, dewatering likely would be necessary for some projects during construction. However, the draft Plan would allow for capture of this groundwater and reuse for non-potable uses, provided this water is suitable for these purposes. If any groundwater produced during construction dewatering required discharge to the combined sewer system, the discharge would be conducted in accordance with Article 4.1 of the *San Francisco Public Works Code*, as supplemented by Order No. 158170, which regulates the quantity and quality of discharges to the combined sewer system. This permit would contain appropriate discharge standards and may require installation of meters to measure the volume of the discharge. Although the groundwater could contain contaminants related to past site activities, as discussed in Section IV.Q, Hazards and Hazardous Materials, as well as sediment and suspended solids, the groundwater would be treated as necessary to meet permit requirements prior to discharge. With reuse of the groundwater produced during dewatering or discharge to the combined sewer system in accordance with regulatory requirements, water quality impacts related to violation of water quality standards or degradation of water quality due to discharge of groundwater would be less than significant.

Operation

Combined Sewer Overflows

Two aspects of the project could result in long-term beneficial changes to the wastewater flows to the City's combined sewer system: (1) implementation of San Francisco's Green Building Ordinance by individual projects that could be proposed and approved pursuant to the proposed zoning controls would locally decrease year-round sanitary sewage flows to the combined sewer system, and (2) implementation of stormwater BMPs in accordance with the San Francisco Stormwater Guidelines would decrease the volume of stormwater runoff to the combined sewer system. The effects of these factors on the combined sewer system are closely related, and the combined effect would result in a decreased volume and/or frequency of CSO discharges to the Bay.

Changes in Sanitary Sewage Flows

The proposed Plan would accommodate new development in the Plan area, which would, in turn, result in an increase of about 2,200 residents and about 25,000 jobs in the Plan area. Growth in the Plan area would contribute to a citywide population increase of almost 135,000, as well as a citywide employment increase of close to 200,000 by 2030. Most of the citywide growth would be on the City's eastern side, which is served by the Southeast treatment plant (and the North Point plant in wet weather); in addition to the Plan area, substantial growth would occur in the Market-Octavia and Balboa Park Better Neighborhood Plan areas; Candlestick Point and Hunters Point; Visitacion Valley; Mission Bay; and elsewhere in the greater Downtown, as well as, to a lesser degree, other areas such as transit corridors on Van Ness Avenue and Geary Street.

During dry weather (typically, May 1 to October 15), all sanitary sewage generated in the Plan area would be treated at the Southeast plant, which currently operates at about 80 percent of its design capacity. If additional dry weather flow associated with development occurred, they could be accommodated within the system's existing capacity.

During wet weather (typically, October 16 to April 30), however, there is a wide variation in volume of wet weather flow due to the addition of stormwater. The volume of wet weather flows is directly related to the rainfall intensity, and treatment of the wet weather flows varies depending on the characteristics of any individual rainstorm. While the system is in compliance with current regulations and permits, an incremental increase in sanitary sewage volume could affect the overall system's wet weather operations. Any net increase in combined sewage could cumulatively contribute to an increase in average volume of CSO discharges to the Bay, either in the Plan area or elsewhere along the Bay shore. An increase in the volume of CSO discharges could be a concern because the RWQCB has designated Mission Creek and Central Bay as impaired water bodies under Section 303(d) of the Clean Water Act, which indicates water quality standards are not expected to be met after implementation of technology-based effluent limitations, and because CSO discharges contain pollutants for which these water bodies are impaired.

However, in accordance with San Francisco's Green Building Ordinance (described in the Setting), newly constructed commercial buildings over 5,000 square feet and residential buildings over 75 feet in height including five or more units must reduce the amount of potable water used for landscaping by 50 percent and must reduce indoor use of potable water by 30 percent (as of 2011), compared to conventional development (defined as plumbing fixture performance required by the federal Energy Policy Act of 1992). To support these goals, Policy 6.19 of the draft Plan calls for individual development projects that could be proposed and approved pursuant to the proposed Plan to minimize potable water usage; identify on-site sources of water that could be reused for non-potable purposes; install on-site collection, treatment, storage, and conveyance systems for non-potable needs; and meet all other non-potable demands using non-potable water from within the Plan area or a municipal supply of recycled water. Reduction of water use and reuse of water that would otherwise be discharged to the combined sewer system for non-potable purposes would contribute to a decrease in sanitary sewage and associated combined sewer overflows, compared to conditions that would be expected without these measures. In addition, as discussed in the Setting, the City is developing a Wastewater Master Plan that will include measures by the City to reduce the quantity and frequency of overflows and improve the water quality of overflows. Still, projects that could be approved pursuant to the draft Plan would generate up to about 1.1 million gallons per day of wastewater, and other anticipated development in the Plan area (Zone 1 of the approved Transbay Redevelopment Plan and other assumed growth) would add another 600,000 gallons per day. The total wastewater flow of 1.7 million gallons per day would represent about 2.5 percent of the daily wastewater flow to the Southeast Plant, and about 0.4 percent of the combined wet-weather capacity of the Southeast and North Point treatment plants.[434]

Changes in Stormwater Runoff

Stormwater runoff in an urban location such as the Plan area is a known source of pollution. Runoff from development projects that could be undertaken pursuant to the proposed zoning controls may contain many types of pollutants including polynuclear aromatic hydrocarbons from vehicle emissions; heavy metals, such as copper from brake pad wear and zinc from tire wear; dioxins as products of combustion; and mercury resulting from atmospheric deposition. All of these materials, and others, may be deposited on paved surfaces and rooftops as fine airborne particles, thus yielding stormwater runoff pollution that is unrelated to the particular activity or use associated with a given project. In addition, subsequent individual development projects could contribute specific pollutants including car maintenance wastes, pesticides, household hazardous wastes, pet wastes, sediments, nutrients, oil and grease, organics, and trash which can be washed into the combined sewer system. These pollutants can all affect water quality.

The Plan area is almost entirely covered by impervious surfaces at present and the vast majority of development projects in the Plan area that could be undertaken pursuant to the proposed zoning controls would be located on sites that are already developed. With implementation of stormwater control measures as required by San Francisco's Stormwater Design Guidelines (described in the Setting) and Policy 6.20 of the draft Plan, implementation of individual development projects that could be proposed and approved pursuant to the proposed zoning controls would contribute to a decrease in stormwater flows from the Plan area, compared to existing conditions, as more pervious surfaces, such as landscaped

434 To fully offset 1.7 million gallons in wastewater entering the combined sewer system during a storm would require capturing and detaining or reusing the equivalent of almost one-half inch of rainfall

areas of sidewalks, are created, and to the extent that impervious streets and sidewalks are replaced with permeable surfaces. Individual development projects would be required to incorporate low-impact design techniques into the project design and to implement stormwater BMPs to reduce the flow rate and volume of stormwater entering the combined sewer system. Appropriate stormwater management using low-impact design features would also improve the water quality of stormwater discharges from the district by capturing some contaminants in runoff that would otherwise travel to the combined sewer system. Examples of some low impact design features include use of permeable pavement, incorporating green roofs and green walls on buildings, including rain storage facilities, and providing landscaping or rain gardens into open space.

Projects that disturb more than 5,000 square feet of land would be required to submit a Stormwater Control Plan describing the BMPs that would be implemented and a plan for post construction operation and maintenance of the BMPs. Specifically, the plan would include the following elements:

- Site characterization
- Design and development goals
- Site plan
- Site design
- Source controls
- Treatment BMPs
- Comparison of design to established goals
- Operations and maintenance plan

For the Plan area, the site design would address several goals specified in the San Francisco Stormwater Design Guidelines, including minimizing impervious surfaces and disconnecting these surfaces from the combined sewer system; treating stormwater as a resource and not a waste product; treating storm water at its source; and using treatment trains (a combination of stormwater BMPs) to address a broad array of stormwater pollutants.

Implementation of source control BMPs such as covering and hydraulically isolating pollutant generating activities, implementing maintenance activities such as regular sweeping of exposed areas, and using non-polluting building and maintenance materials (including pesticides) would prevent or reduce the generation and discharge of pollutants and would improve the quality of stormwater for reuse or discharge to the combined sewer system. The selection of treatment BMPs to further reduce pollutant loads in stormwater runoff is guided by existing site conditions, design and development goals, and the pollutants of concern at the site. Treatment BMPs would reduce the pollutant loads stormwater via infiltration (e.g. permeable pavement or infiltration basins or trenches), detention (constructed wetlands, detention pond or vault, or wet pond), bioretention (e.g. flow through planter or rain garden), or biofiltration (e.g. vegetated areas; media, sand, or vegetated rock filters; swirl separators, water quality inlets, or drain inserts). One or more treatment BMPs could be required to address each of the potential stormwater pollutants of concern.

Project sponsors for individual development projects would be required to achieve the standards specified in LEED® SS6.1 (Stormwater Design: Quantity Control) to minimize the flow and volume of stormwater into the combined sewer system. For sites with less than 50 percent impervious surfaces, this standard requires project sponsors to implement a stormwater management plan to prevent the post-development peak discharge rate and quantity from exceeding the pre-development peak discharge rate and quantity for the one and two-year 24-hour design storms. For sites with greater than 50 percent impervious surfaces, the project sponsor must implement a stormwater management plan that results in a 25 percent decrease in the volume of storm water runoff from the two-year 24-hour design storm, compared to conditions without a management plan. Recommended BMPs to achieve these goals include infiltration methods such as vegetated roofs, pervious paving, and other measures to minimize impervious surfaces. Reuse of stormwater for non-potable uses such as landscape irrigation, toilet and urinal flushing, and custodial uses is also recommended.

Reduction in stormwater volume could be achieved through an increase in pervious surfaces (i.e., replacing asphalt or concrete with pervious asphalt or concrete or other hard surface that allows rainwater to percolate into the ground and/or with planted or otherwise unsurfaced areas. Stormwater volume can also be decreased through the alternative use of rainwater, such as by collecting the water in tanks and using it for toilet flushing and landscape irrigation. Reduction in peak stormwater volume can also avoid ultimate combined sewer overflows by detaining rainfall to keep it from entering the combined sewer until after the largest amount of water from other sites has passed through the system. Such retention strategies can include green roofs (on which plants permanently capture a portion of the rainfall and delay the arrival to the sewer of another portion) and holding tanks.[435] As an example, if a 10,000-square-foot area were converted from conventional asphalt to pervious paving, about 3,700 gallons of water per inch of rain would be diverted to groundwater infiltration for every inch of rain. A 25 percent decrease in runoff, as required by the Stormwater Design Guidelines, would be 1,250 gallons per inch of rain. If all rainfall were collected and held for later discharge, more than 6,000 gallons of runoff would be retained from the same site per inch of rainfall.[436]

The Stormwater Control Plan would also include an Operations and Maintenance Plan that would identify who has the operational responsibility for the facility, applicable maintenance requirements for each stormwater control, detailed requirements for each treatment and control BMP, required maintenance of facilities. These requirements would transfer to any new owner, occupant, or lessee of the facility.

The Stormwater Control Plan must be reviewed and stamped by a licensed landscape architect, architect, or engineer. The SFPUC reviews the plan and certifies compliance with the Guidelines and inspects stormwater BMPs once they are constructed. Any issues noted by the inspection must be corrected before the Certificate of Occupancy can be issued for the building. Following occupancy, the owner is responsible for completing an annual self-certification inspection, and must submit completed checklists

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435 Retention (or detention) basins are used to hold rainfall, and sometimes to allow it to percolate to groundwater, in less developed areas but are less feasible in urban areas.

436 Based on 27,154 gallons per acre-inch runoff coefficients of 0.8 and 0.2, per SFPUC Stormwater guidelines.

and maintenance logs for the year to the SFPUC. In addition, the SFPUC will inspect all stormwater BMPs every third year and any issues identified by either inspection must be resolved before the SFPUC can renew the certificate of compliance.

Net Impact to CSO Discharges

Based on the above discussion, implementation of the draft Plan would facilitate new development that would minimize year-round sanitary sewage flows and decrease stormwater runoff to the combined sewer system through compliance with San Francisco's Green Building Ordinance, Stormwater Design Guidelines, and policies included in the draft Plan. Implementation of stormwater BMPs in compliance with the Stormwater Design Guidelines would also increase the water quality for discharges of stormwater to the sewer system. Therefore, water quality impacts related to violation of water quality standards or degradation of water quality associated with changes in combined sewer overflow discharges to the Bay would be less than significant.

Long-Term Groundwater Dewatering

Development projects that include construction below the water table could also require groundwater dewatering year round. However, the draft Plan calls for capture of this groundwater and reuse for non-potable uses (Policy 6.15). If any groundwater produced during dewatering required discharge to the combined sewer system, the discharge would be conducted in accordance with Article 4.1 of the *San Francisco Public Works Code*, as supplemented by Department of Public Works Order No. 158170, which regulates the quantity and quality of discharges to the combined sewer system. This permit would contain appropriate discharge standards and may require installation of meters to measure the volume of the discharge. Although the groundwater could contain contaminants related to past site activities, as discussed in Section IV.Q, Hazards and Hazardous Materials, as well as sediment and suspended solids, the groundwater would be treated as necessary to meet permit requirements prior to discharge. With reuse of the groundwater produced during permanent dewatering or discharge to the combined sewer system in accordance with regulatory requirements, water quality impacts related to violation of water quality standards or degradation of water quality due to discharge of groundwater would be less than significant for permanent groundwater dewatering. Further, if development projects in the Plan area used groundwater produced from dewatering at existing facilities in the downtown core (currently discharged to the combined sewer system) for non-potable purposes like irrigation, as proposed in the draft Plan, the Plan could further contribute to a reduction in combined sewer overflows, a beneficial impact.

Mitigation: None required.

Impact HY-2: The proposed Transit Center District Plan would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level. (Less than Significant)

Development projects constructed under the draft Plan would use potable water from the SFPUC. If and when a supply of recycled water becomes available through the Eastside Recycled Water Project or a local facility constructed within the Plan area, these developments would use recycled water for non-potable uses such as toilet flushing and irrigation. Although groundwater dewatering could be required during construction and operation of individual projects that include construction below the water table, groundwater from the Downtown San Francisco Groundwater Basin is not used as a drinking water supply and there are no plans for development of this basin for groundwater production. The draft Plan area is almost completely covered with impervious surfaces under existing conditions, and projects constructed pursuant to the Plan would not increase impervious surface coverage or otherwise reduce infiltration or groundwater recharge. Further, stormwater controls implemented pursuant to the San Francisco Stormwater Design Guidelines (described in Impact HY-1) could include stormwater BMPs to promote infiltration of stormwater—such as through incrementally decreasing the amount of existing impervious surface—which would in turn recharge the groundwater basin. At any rate, because groundwater is not used as a potable water supply, and because there would be no net increase in impervious surface, impacts related to depletion of groundwater resources or interference with groundwater recharge would be less than significant.

Mitigation: None required.

Impact HY-3: The proposed Transit Center District Plan would implement stormwater control measures that would reduce the quantity and rate of stormwater runoff to the combined sewer system, decreasing the potential for erosion or flooding. (Less than Significant)

As discussed in Impact HY-1, development projects that could be proposed and approved pursuant to the proposed Plan would implement stormwater control measures as required by San Francisco's Stormwater Design Guidelines (described in the Setting) and Policy 6.20 of the draft Plan. This would reduce the peak quantity and peak rate of stormwater runoff to the city's combined sewer system, decreasing the potential for erosion and flooding, and would result in a less-than-significant impact.

Mitigation: None required.

Impact HY-4: The proposed Transit Center District Plan would not contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. (Less than Significant)

As discussed in Impact HY-1, development projects that could be proposed and approved pursuant to the proposed Plan would implement stormwater control measures as required by San Francisco's Stormwater Design Guidelines (described in the Setting) and Policy 6.20 of the draft Plan. This would reduce the quantity and rate of stormwater runoff to the city's combined sewer system and improve the water quality of those discharges. Therefore, impacts related to contributing runoff water that would exceed the capacity of the combined sewer system or provide substantial additional sources of polluted runoff would be less than significant.

Mitigation: None required.

Impact HY-5: The proposed Transit Center District Plan would not expose people, housing, or structures, to substantial risk of loss due to flooding. (Less than Significant)

Development in the City and County of San Francisco must account for flooding potential. Areas located on fill or bay mud can subside to a point at which the sewers do not drain freely during a storm (and sometimes during dry weather) and there can be backups or flooding near these streets and sewers. As described in Section IV.O, Geology, Soils, and Seismicity, most the Plan area is underlain by artificial fill, and approximately the eastern half of the Plan area is bayward of the historic shoreline. Although the SFPUC has specifically identified potential flooding hazards related to the depth of sewer lines relative to properties they serve in locations west of the Plan area, areas east of Fourth Street, including the Plan area, have not been called out by SFPUC for the additional review required west of Fourth Street.

As discussed in the Setting, the Plan area is not located within a Zone A or Zone V flood zone identified on the preliminary FIRM prepared by FEMA, or in a Special Flood Hazard Area identified on San Francisco's Interim Floodplain Map. However, portions of the Plan area are within an area identified by the BCDC as potentially vulnerable to future flooding if the level of the bay increases as expected due to sea level rise. The projected 55-inch sea level rise by 2100 would not move the Bay shore closer to the Plan area because the Embarcadero seawall is a hard barrier (as opposed, for example, to marshland that presents a gradual slope up from the Bay). However, under the BCDC-forecast scenario for sea level rise, portions of the Plan area could potentially be susceptible to storm surge in the future (beyond approximately 2050). New developments would be constructed to more current seismic safety standards, which would also provide better protection from damage due to storm surge. As explained in the setting, sea level rise by 2050 is anticipated to approximate 15 inches and, while the rates of sea level rise is anticipated to increase beyond that time, the projections are less certain. Moreover, time beyond 2050 is beyond the planning horizon for the draft Plan. Thus, conclusions regarding sea level rise beyond the year 2050 would be speculative, and therefore, impacts related to development within a 100-year flood zone or risk due to flooding would be less than significant.

Mitigation: None required.

Impact HY-6: The proposed Transit Center District Plan would not expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow. (Less than Significant)

The project site is not in an area subject to reservoir inundation hazards and is not located in a volcanic area that could be subject to mudflow.[437] Therefore, there is no impact related to these hazards.

The easternmost portion of the Plan area is within an area that could be subjected to an approximately 8 foot seiche, as discussed in the Setting, and additional areas along the easternmost portion of the Plan area could be subjected to a seiche in the event of a future sea level rise due to global warming. In the event that an earthquake occurred that would be capable of producing a tsunami that could affect San Francisco, the National Warning System would provide warning to the City. The San Francisco outdoor warning system (sirens and loudspeakers, tested each Tuesday at 12:00 noon) would then be initiated which would sound an alarm alerting the public to tune into local TV, cable TV, or radio stations, which would carry instructions for appropriate actions to be taken as part of the Emergency Alert System. Police would also canvas the neighborhoods sounding sirens and bullhorns, as well as knocking on doors as needed, to provide emergency instructions. Evacuation centers would be set up if required. The advance warning system would allow for evacuation of people prior to a seiche and would provide a high level of protection to public safety.

Although people would be evacuated in the event of a seiche, there could be property damage due to inundation. However, tsunamis are extremely rare. Moreover, with implementation of the proposed Plan, there would not be a substantial change from existing conditions with regard to the number of buildings constructed within the potential zone of inundation from a seiche. Furthermore, new developments would be constructed to more current seismic safety standards which would also provide better protection from damage due to inundation by a seiche. Therefore, impacts related to exposure of people or structures to risk from inundation by seiche and tsunami are less than significant.

Mitigation: None required.

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[437] URS Corporation, City and County of San Francisco Hazard Mitigation Plan, December, 2008. Map C-14.

Impact Analysis: Transit Tower

Impact HY-7: The proposed Transit Tower would not violate water quality standards or otherwise substantially degrade water quality. (Less than Significant)

Construction

Water quality impacts associated with construction of the Transit Tower would be similar to those described in Impact HY-1, above, for development projects that could be proposed and approved pursuant to the draft Plan. Water quality impacts related to construction-related stormwater runoff and groundwater dewatering discharges would be less than significant with implementation of the requirements of Article 4.1 of the San Francisco Public Works Code (supplemented by Department of Public Works Order No. 158170). Further, groundwater produced during construction dewatering could potentially be captured for reuse on-site.

Operation

Similar to the development projects that could be proposed and approved pursuant to the proposed zoning controls, the Transit Tower would also contribute to a decrease in combined sewer overflows during operation through implementation of the San Francisco's Green Building Ordinance requirement to reduce the amount of potable water used for landscaping by 50 percent and indoor use by 30 percent (as of 2011), compared to conventional development, and implementation of Policy 6.19 of the draft Plan requiring projects to minimize water usage; identify on-site sources of water that could be reused for non-potable purposes; and install on-site collection, treatment, storage, and conveyance systems for non-potable needs. Stormwater flows would be decreased, compared to existing conditions, and their quality improved through implementation of the San Francisco Stormwater Design Guidelines and required stormwater control plan. Groundwater produced during long-term groundwater dewatering would be captured for reuse, or discharge would comply with requirements of Article 4.1 of the San Francisco Public Works Code (supplemented by Department of Public Works Order No. 158170).

With implementation of the above project proposals and City requirements, water quality impacts related to violation of water quality standards or degradation of water quality due to construction and operation of the Transit Tower would be less than significant.

Mitigation: None required.

Impact HY-8: The proposed Transit Tower would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level. (Less than Significant)

As with all development projects that could be proposed and approved pursuant to the draft Plan, the Transit Tower would use SFPUC system water and, if and when available, recycled water (for non-potable uses such as toilet flushing and landscape irrigation) as a water supply. The Transit Tower would include stormwater BMPs that would increase stormwater infiltration, compared to existing conditions, under which the Transit Tower site allows for no such infiltration. Although the Transit Tower would likely require dewatering of groundwater, there are no existing or planned uses of groundwater within the Downtown San Francisco Groundwater Basin. Therefore, impacts related to depletion of groundwater resources or interference with groundwater recharge would be less than significant with respect to the Transit Tower.

Mitigation: None required.

Impact HY-9: The proposed Transit Tower would implement stormwater control measures that would reduce the quantity and rate of stormwater runoff to the combined sewer system, decreasing the potential for erosion or flooding. (Less than Significant)

As with other development projects that could be proposed and approved pursuant to the draft Plan, the Transit Tower would include stormwater control measures as required by San Francisco's Stormwater Design Guidelines (described in the Setting) and Policy 6.20 of the Plan. Although the proposed Transit Tower would be built at nearly full site coverage, the building would comply with City requirements by reducing the volume and rate of peak stormwater discharge. As stated in Chapter II, Project Description, the TJPA is developing plans to substantially decrease the use of potable water for non-potable use at the Transit Center. These measures would be employed in the proposed Transit Tower project as well.[438] They will include some or all of the following: collection of greywater from restroom sinks (but not in retail spaces); directing "blackwater" (sewage) directly to the City's sewer system; collection of stormwater runoff and piping it to the storage system after pretreatment; and reuse of greywater for toilet flushing (including in retail spaces) following collection, storage, filtering and treatment. Additionally, the adjacent City Park—to be built atop the Transit Center—and Mission Square open spaces would provide opportunities for stormwater retention through plantings and permeable pavement surface in Mission Square. This would reduce the quantity and rate of stormwater runoff to the city's combined sewer system, decreasing the potential for erosion and flooding, and would result in a less-than-significant impact.

Mitigation: None required.

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[438] Rana Creek, Atelier 10, and Flack & Kurtz, *Transbay Transit Center Water Systems Report, 25% Design Development*, July 1, 2010. This report is available for review at the Planning Department, 1650 Mission Street, Suite 400, in Case File No. 2007.0553E.

Impact HY-10: The proposed Transit Tower would not contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. (Less than Significant)

Similar to the development projects that could be proposed and approved pursuant to the proposed zoning controls, the Transit Tower would include stormwater control measures as required by San Francisco's Stormwater Design Guidelines (described in the Setting) and Policy 6.20 of the draft Plan. This would reduce the quantity and rate of stormwater runoff to the city's combined sewer system, compared to existing conditions, and improve the water quality of those discharges. Therefore, impacts related to contributing runoff water that would exceed the capacity of the combined sewer system or provide substantial additional sources of polluted runoff would be less than significant for the Transit Tower.

Mitigation: None required.

Impact HY-11: The proposed Transit Tower would not expose people, housing, or structures, to substantial risk of loss due to flooding. (Less than Significant)

As with all development projects that could be proposed and approved pursuant to the proposed Plan, the Transit Tower site is not located within a Zone A or Zone V flood zone identified on the preliminary FIRM prepared by FEMA, or in a Special Flood Hazard Area identified on San Francisco's Interim Floodplain Map. As discussed with respect to Plan effects in Impact HY-5, portions of the Plan area are within an area identified by the BCDC as potentially vulnerable to future flooding if the level of the bay increases as expected due to sea level rise. As explained in the setting, sea level rise by 2050 is anticipated to approximate 15 inches and, while the rates of sea level rise is anticipated to increase beyond that time, the projections are less certain. Moreover, time beyond 2050 is beyond the planning horizon for the draft Plan. Thus, conclusions regarding sea level rise beyond the year 2050 would be speculative, and therefore, impacts related to development within a 100-year flood zone or risk due to flooding would be less than significant for the Transit Tower.

Mitigation: None required.

Impact HY-12: The proposed Transit Tower would not expose people or structures to a significant risk of loss, injury or death involving inundation by seiche, tsunami, or mudflow. (Less than Significant)

Similar to the development projects that could be proposed and approved pursuant to the proposed zoning controls, the Transit Tower site is not in an area subject to reservoir inundation hazards[439] and is not located in a volcanic area that could be subject to mudflow. In addition, the Transit Tower site is located

[439] URS Corporation, City and County of San Francisco Hazard Mitigation Plan, December, 2008. Map C-14.

outside of the area that would be subject to a seiche. Therefore, there is no impact related to these hazards for the Transit Tower.

Mitigation: None required.

Cumulative Impacts

Impact C-HY: The proposed Transit Center District Plan and Transit Tower, in combination with past, present, and reasonably foreseeable future projects in the site vicinity, would result in less-than-significant cumulative impacts to hydrology and water quality. (Less than Significant)

As discussed above, implementation of the draft Plan would allow for new development that would increase year-round sanitary sewage flows, but would be expected to decrease stormwater runoff peak rate and total volume to the combined sewer system through compliance with San Francisco's Green Building Ordinance and Stormwater Design Guidelines. Moreover, sanitary sewage volumes would be decreased on a building-by-building and per-person basis, compared to historical trend, because of low-water-use requirements in the Green Building Ordinance. Implementation of stormwater BMPs in compliance with the Stormwater Design Guidelines might also improve the water quality for discharges of stormwater to the sewer system. Other development projects in the City would also be required to implement these standards and collectively, all new development would contribute to a decrease in combined sewer overflows and contribute to an improvement in the water quality of those discharges. Associated risks of flooding and exceeding the capacity of the combined sewer system would also be cumulatively decreased over time as stormwater is diverted from the combined sewer system. Therefore, potential cumulative impacts related to hydrology and water quality would be less than significant.

Mitigation: None required.

Q. Hazards and Hazardous Materials

Introduction and Methodology

This section presents the existing setting and potential impacts related to hazards and hazardous materials associated with the implementation of the Transit Center District Plan and Transit Tower. The Setting includes a definition of hazardous materials and waste, an overview of general environmental conditions in the Transit Center District Plan area with respect to the presence of hazardous materials and wastes, a general description of hazardous building materials likely to be present within the Plan area, and an overview of the relevant hazardous materials regulations that are applicable to the Plan area. Based on this information, impacts associated with the potential to be exposed to hazardous materials during construction and as a result of future land use changes due to implementation of the project are identified.

Environmental Setting

Hazardous materials, defined in Section 25501(o) of the California Health and Safety Code, are materials that, because of their "quantity, concentration, or physical or chemical characteristics, pose a significant present or potential hazard to human health and safety or to the environment if released to the workplace or environment." Hazardous materials have been and are commonly used in commercial, agricultural, and industrial applications as well as in residential areas to a limited extent.

A waste is any material that is relinquished, recycled, or inherently waste-like. Title 22 of the CCR, Chapter 11 (Identification and Listing of Hazardous Waste) contains regulations for the classification of hazardous wastes (22 CCR 66261.1, et seq.). A waste is considered a hazardous waste if it is toxic (causes human health effects), ignitable (has the ability to burn), corrosive (causes severe burns or damage to materials), or reactive (causes explosions or generates toxic gases) in accordance with the criteria established in Article 3 of Chapter 11. Articles 4 and 4.1 also list specific hazardous wastes and Article 5 identifies specific waste categories, including federal Resource Conservation and Recovery Act (RCRA) hazardous wastes, non-RCRA hazardous wastes, extremely hazardous wastes, hazardous wastes of concern, and special wastes. If improperly handled and if released to the soil, groundwater, or air (in the form of vapors, fumes, or dust), hazardous materials and wastes can result in public health hazards.

The following potential sources of hazardous materials are present in the Plan area:

- fill materials, including those placed east of the historic high tide line;
- historic and existing uses of hazardous materials, and permitted handling of hazardous wastes;
- identified sites where soil or groundwater has been affected by a chemical release(s) from past or present land uses (referred to as "environmental cases" or "spill sites"); and
- hazardous building materials that were historically used in construction.

Fill Materials

As described Section IV.O, Geology and Soils, the majority of the Plan area is underlain by up to 25 feet of artificial fill. Filling of the Plan area began in the mid 1800s when development began. The Plan area is with the limits of the area destroyed by the fire following the 1906 earthquake. During reconstruction following the fire, many portions of the Plan area were covered with an additional layer of fill, locally known as earthquake fill. This earthquake fill generally consists of loose to dense sand with varying amounts of silt and building debris (including concrete, wood, and brick debris) and is present beneath most, if not all, of the Plan area. The fill materials were primarily obtained from dune sands and quarried rock (including serpentinite bedrock found in many areas of San Francisco), and also includes industrial refuse and building debris from the 1906 earthquake.

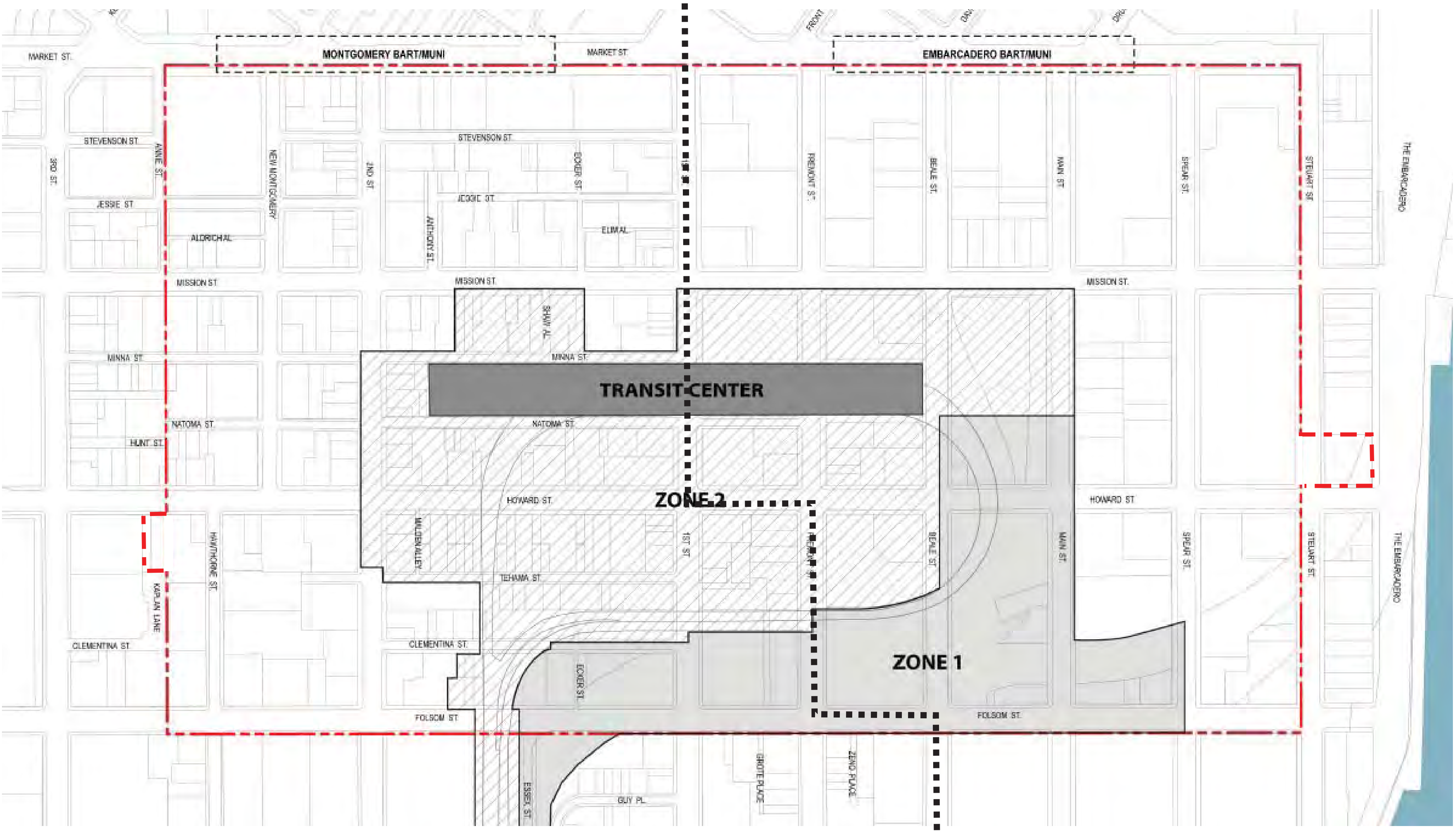
Hazardous materials used in the industries that were destroyed during the 1906 fire and earthquake were commonly incorporated into the building debris, which was then incorporated into the earthquake fill, and built upon during reconstruction. Because of this historical practice, the 1906 earthquake fill commonly contains polynuclear aromatic hydrocarbons,[440] heavy metals, oil and grease, and volatile organic compounds.[441] The existence of hazardous materials in the earthquake fill is one of the reasons for enactment of Article 22A of the *San Francisco Health Code* (previously referred to as the Maher Ordinance), which is described below under Regulatory Framework. Article 22A requires site assessments at specified sites located eastward of the historic high tide line where the land has been filled, unless a waiver is granted by the Director of the Department of Public Health (or designee). Depending on the results of the site assessments, mitigation can be required to clean up hazardous materials identified in the soil. The portion of the Plan area generally located east of First Street, including the proposed Transit Tower site and a portion of the planned new Transit Center itself, are located eastward of the historic high tide line as indicated in **Figure 74**, and development projects in these portions of the Plan area would be subject to the requirements of Article 22A.

Land Uses

Many of the historical uses of properties in the Plan area included hazardous materials, either in the building materials or in specific activities. Historical land uses in the Plan area, including foundries, lumber yards, metal working facilities, printing shops, gasoline service stations, auto repair shops, are commonly associated with the use of petroleum products, metals, solvents, creosote, and polychlorinated

[440] Polynuclear aromatic hydrocarbons (PAHs) are group of chemicals that are formed during the incomplete burning of coal, oil, gas, wood, garbage, or other organic substances, such as tobacco and charbroiled meat. PAHs usually occur naturally, but they can be manufactured. A few PAHs are used in medicines and to make dyes, plastics, and pesticides. Others are contained in asphalt used in road construction. They can also be found in substances such as crude oil, coal, coal tar pitch, creosote, and roofing tar. They are found throughout the environment in the air, water, and soil. They can occur in the air, either attached to dust particles or as solids in soil or sediment.

[441] Volatile organic compounds (VOCs) are emitted as gases from certain solids or liquids, such as paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials and furnishings, office equipment (i.e., copiers and printers, correction fluids and carbonless copy paper, graphics and craft materials including glues and adhesives, permanent markers, and photographic solutions).



Plan Area

Historic High Tide Line (Area Bayward of Line is Subject to Article 22A)

SOURCE: San Francisco Planning Department; San Francisco Department of Public Works

Case Nos. 2007.0558E and 2008.0789E: Transit Center District Plan & Transit Tower . 207439

Figure 74

Area Subject to Article 22A of the San Francisco Health Code biphenyls (PCBs).[442] Other historic land uses in the area include coal yards and coal gasification plants and coal storage yards. Historic coal yards or coal storage warehouses are a potential source of metals and polycyclic nuclear hydrocarbons. Manufactured gas plant (coal gasification) sites are also potential sources of crude oil, manufactured gas, ammonia, cyanide, and hydrogen.

Based on review of historical photographs, most of the Plan area was built out by the 1930s or earlier. Existing land uses area include primarily office and retail uses, as well as cultural and institutional uses and some residential buildings. There are no existing major industrial uses, and none of the Plan area is any longer zoned for industrial uses. No automobile service stations remain in the Plan area, and existing Plan area office, retail, and other uses are not typically associated with large-scale use of hazardous materials other than cleaning supplies, prepackaged materials for resale, photo-processing chemicals, or similar materials.

Permitted Hazardous Materials Uses

Permitted uses of hazardous materials include those facilities that historically used hazardous materials or currently use hazardous materials or handle hazardous wastes in accordance with current hazardous materials and hazardous waste regulations. Because the use and handling of hazardous materials at permitted sites are subject to strict regulation, the potential for a release of hazardous materials from these sites is considered low unless there is a documented chemical release at that same site. In such cases, the site would also be tracked in the environmental databases as an environmental case (described separately below). Permitted sites without documented releases are nevertheless potential sources of hazardous materials in the soil and/or groundwater (compared to sites where there are no hazardous materials) because of the potential for accidental spills, incidental leakage, or spillage that may have gone undetected.

An environmental database review[443] conducted for the Plan area identified over two hundred permitted users of hazardous materials, the vast majority of which have submitted hazardous wastes manifests to the California Department of Toxic Substances Control (DTSC) for off-site disposal of hazardous wastes such as photo-processing wastes. There are about 14 existing facilities with permitted underground storage tanks (USTs) in the Plan area (UST database), six facilities with above ground storage tanks (AST database) and five facilities that manufacture or import chemical substances (TSCA database). Permitted uses associated with handling of hazardous wastes include one large quantity generator, 30 small quantity generators and eight generators that do not currently generate hazardous wastes, permitted under RCRA (RCRA-LGQ, RCRA-SQG, and RCRA-NonGen databases), and about 210 facilities that have submitted hazardous waste manifests to DTSC for off-site disposal (HAZNET database). Finally, the database reported 37 facilities that report emissions to the Bay Area Air Quality Management District (AIRS database).

[442] PSC Associates, Inc., Phase I Environmental Site Assessment, Transbay Redevelopment Plan, San Francisco, California. April 23, 1997.

[443] Environmental Data Resources, 2008. The *EDR Radius Map Report with GeoCheck, 1st Street/Mission Street, San Francisco, CA, 94105*. June 11, 2008.

Environmental Cases and Spill Sites

Environmental cases relate to those sites that are suspected of releasing hazardous materials or have had cause for hazardous materials investigations and are identified on regulatory agency lists. Identification of hazardous materials in the soil or groundwater at these sites is generally due to site disturbance activities, such as removal or repair of a UST, a spill of hazardous materials, or excavation for new construction. The status of each environmental case varies and can be either active (ongoing investigations or remediation), closed (remediation or cleanup completed and approved by the regulatory agency), or unknown. However, the status can change with time, and new cases are periodically added to the databases. This discussion also identifies sites where a spill of hazardous materials was reported to state or federal agencies. Historic uses of hazardous materials noted in the database review for the Plan area, [444] including historic USTs, automobile service stations, dry cleaners, and manufactured gas plants are also included in this discussion because they were not subject to the same level of regulatory oversight as current uses and could have potentially resulted in historic release of hazardous materials.

The large majority of environmental cases identified by the environmental database review[445] conducted for the Plan area include 36 sites with leaking underground storage tanks (LUST database), which would generally involve a release of petroleum products. Many of these cases have been closed by the regulatory agencies, but could still include residual levels of petroleum products in the soil or groundwater depending on the cleanup levels approved by the regulatory agencies. Although the potential to encounter petroleum in the soil and/or groundwater near these sites depends on the extent of the release, remedial status of the individual site, and approved cleanup levels for closed sites, standard treatment and disposal methods are available for remediation of the petroleum products and these sites would not normally present a substantial barrier to development or an ongoing health risk once remediated.

The database review also identified two sites under the jurisdiction of the California Regional Water Quality Control Board (SLIC database), one site that has entered a voluntary cleanup agreement with DTSC[446] (VCP database), two potential hazardous waste sites identified by DTSC (Envirostor database), and six sites with administrative, enforcement, or compliance actions related to the Federal Insecticide, Fungicide, and Rodenticide Act (FTTS and HIST FTTS databases). Ten spill sites were identified in the Plan area (ERNS and CHRIMS databases). Historic uses of hazardous materials include nearly 50 sites with historic USTs (CA FID UST, HIST UST, and SWEEPS databases), 34 historical automobile service stations (EDR Historical Auto Stations database), 22 historical dry cleaners (EDR Historical Cleaners database), and a former manufactured gas plant (Manufactured Gas Plant database).

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444 *Ibid.*
445 *Ibid.*
446 Voluntary cleanup agreements are a tool that allow responsible parties and others to remediate low-risk properties quickly and efficiently without the issuance of a regulatory order. They establish requirements for investigation and cleanup of a site. With a voluntary cleanup agreement, the responsible party must be able to fund these activities as well as the costs for DTSC oversight which allows the DTSC to prioritize low risk sites for future development.

The former manufactured gas plant site is located on the southern portion of the block bounded by First, Howard, Fremont, and Mission Streets. Although this site is not listed as under investigation by a regulatory agency, residues from former manufactured gas plant sites typically contain polynuclear aromatic hydrocarbons, petroleum hydrocarbons, benzene, cyanide, metals, and phenols which could have remained at the site and affected soil and groundwater quality.[447] The former manufactured gas plant (the San Francisco Gas Company, which operated at this site from 1854 until the 1890s) historically disposed of residual or waste material known as coal tar directly to the shallow waters of the old Yerba Buena Cove and fill material was deposited directly on top of the discharged coal tar during the filling of the cove. Coal tar residues are believed to be present in soil throughout the entire area of the former Yerba Buena Cove from First Street to The Embarcadero. This material is often encountered during excavations in areas near the former manufactured gas plant. Coal tar is known to exist on top of Bay Mud deposits along Beale Street from approximately Mission to Folsom Streets. The approximate depth to the top of the deposit is 10 to 12 feet at Beale Street, shallowing to the west and deepening to the east, although shallow deposits have also been encountered near The Embarcadero at Howard Street. The thickness of the coal tar deposits ranges from near zero along the fringes of the deposit and up to seven to 10 feet in the area of Beale and Howard Streets.

Within the Plan area, coal tar and coal tar residues have been encountered during investigation and construction of the two high-rise buildings along the southern side of the intersection of Howard and Beale Streets and beneath the foundation of the building on Fremont Street between Howard and Folsom Streets.

Environmental Conditions at Developer-Proposed Sites

Known environmental conditions at sites in the Plan area, based on an environmental assessment prepared for the Plan area,[448] include earthquake fill that is expected at many potential development sites. In addition, existing USTs are noted at 2 New Montgomery Street and USTs have been removed or closed at 148 Natoma Street, Mission and Main Streets, and 125 Stevenson Street. A soil investigation at 41 Tehama Street identified lead at concentrations requiring disposal of excavated soil as a hazardous waste. Hazardous materials have been left in place at 148 Natoma Street, and a hazardous materials management plan is in place to prevent human contact within these hazardous materials.

Environmental Conditions at Transit Tower Site

Based on the environmental database review and historical data reports prepared in support of the environmental assessment for the Plan area, historic land uses in 1887 (prior to the 1906 earthquake) included a mechanics mill, iron works, forge shop, brass works, machine shops, cabinet shop and lumber

[447] United States Environmental Protection Agency, 1999. *A Resource for MGP Site Characterization and Remediation, Expedited Site Characterization and Source Remediation at Former Manufactured Gas Plant Sites.* May, 1999.

[448] Treadwell & Rollo. Draft Environmental Assessment, Proposed EIR Development, Transit Center District Plan, San Francisco, California. September 1, 2008.

facility, and coppersmith. [449] All of these uses could have involved the use of hazardous materials such as petroleum products, metals, solvents, creosote, and PCBs. The site is also located approximately one block north of the former manufactured gas plant at First, Howard, Fremont and Natoma Streets. [450] In 1939, the site was converted to use as the passenger waiting and loading area in front of the then-new Transbay Terminal, as well as the Muni drop off/lay over area, and this use continued until demolition of the Transbay Terminal began in 2010. Review of city directory data from 1910 to 2005 does not indicate that there were land uses at this site during the intervening period that would have involved the use of hazardous materials.[451]

The Transit Tower site is partially located on the site of the former Transbay Terminal, which was identified as a leaking underground storage tank site (LUST database) and has also manifested hazardous wastes for off-site disposal (HAZNET database). [452] The leaking underground storage tank case involved a release of diesel from an underground storage tank that was contained in an intact 8-inch thick concrete vault. Soil affected by the release was removed and the case was closed in 1999. Hazardous wastes manifested for off-site disposal from the Transbay Terminal include liquids with a pH less than 2, other organic solids, other inorganic solid wastes, asbestos-containing waste, and a unspecified solvent mixture. A release of 6 gallons of muriatic acid was also reported at the terminal in 1994 (CHMIRS and ERNS databases).

Hazardous Building Materials

Hazardous building materials are included in this discussion because future development may involve demolition or renovation of existing structures that may contain hazardous building materials. Some building materials commonly used in older buildings could present a public health risk if disturbed during an accident or during demolition or renovation of an existing building. Hazardous building materials include asbestos, electrical equipment such as transformers and fluorescent light ballasts that contain PCBs or di (2 ethylhexyl) phthalate (DEHP), fluorescent lights containing mercury vapors, and lead-based paints. Asbestos and lead-based paint may also present a health risk to existing building occupants if they are in a deteriorated condition. If removed during demolition of a building, these materials would also require special disposal procedures.

Asbestos is a common name for a group of naturally occurring fibrous silicate minerals that are made up of thin but strong, durable fibers. Because of its physical properties, asbestos was commonly used until the 1970s as a building material, including use as insulation materials, shingles and siding, roofing felt, floor tiles, and acoustical ceiling material. Asbestos is a known carcinogen and presents a public health

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449 Environmental Data Resources, 1st Street/Mission Street, San Francisco, CA, 94105. Certified Sanborn Map Report. Inquiry Number: 2241174.3s. June 12, 2008.
450 Environmental Data Resources, 1st Street/Mission Street, San Francisco, CA, 94105, The EDR Radius Map Report with GeoCheck Inquiry Number: 2241174.2s. June 11, 2008.
451 Environmental Data Resources, 1st Street/Mission Street, San Francisco, CA, 94105.The EDR-City Directory Abstract. Inquiry Number: 2241174.6. June 12, 2008.
452 Environmental Data Resources, 1st Street/Mission Street, San Francisco, CA, 94105, The EDR Radius Map Report with GeoCheck. Inquiry Number: 2241174.2s. June 11, 2008.

hazard if it is present in friable (easily crumbled) form. Long-term, chronic inhalation of high levels of asbestos can cause lung diseases such as asbestosis, mesothelioma, and/or lung cancer.[453] Friable, finely divided and powdered waste containing greater than 1 percent asbestos is classified in the California Code of Regulations (CCR) as a hazardous waste that requires disposal at a licensed landfill (22 CCR 66261.24). Wastes containing non-friable asbestos are not considered hazardous and are not subject to regulation under 22 CCR 66001, et seq.

PCBs are mixtures of synthetic organic chemicals with physical properties ranging from oily liquids to waxy solids. Because of their nonflammability, chemical stability, high boiling point, and electrical insulating properties, PCBs were used historically in hundreds of industrial and commercial applications, including use in electrical, heat transfer, and hydraulic equipment; as plasticizers in paints, plastic, and rubber compounds; in pigments, dyes, and carbonless copy paper; and many other applications. PCBs are a known human carcinogen; they are highly toxic substances that remain persistent in the environment, accumulate in biological systems, interfere with the reproductive system, and act as immuno-suppressants. Under Section 6(e) of the Toxic Substance Control Act (TSCA) (15 USC 2601, et seq.), Congress began regulating the use and manufacturing of PCBs in 1976, legislating “cradle to grave” (i.e., from manufacture to disposal) management of PCBs in the United States. Under the TSCA, the U.S. Environmental Protection Agency (EPA) began to impose bans on PCB manufacturing and sales and on most PCB uses in 1978. TSCA requires incineration or an alternative destruction method for oils containing PCB concentrations greater than 50 parts per million (ppm) and requires that free liquids be drained from electrical equipment prior to disposal, and that the liquids are appropriately disposed of. In California, PCB wastes are regulated as hazardous waste if the PCB concentration exceeds 50 ppm or the soluble concentration exceeds 5 ppm as oily liquid (22 CCR 66261.24).

Most fluorescent light ballasts manufactured before 1978 contain PCBs in their capacitor and potting material. Ballasts manufactured after January 1, 1978, do not contain PCBs and should be labeled as such on the ballast. Approved disposal methods for PCB-containing ballasts depend on the condition of the ballast and the PCB content of the potting material and capacitor oil. If the PCB concentration of the potting material is less than 50 ppm and the ballast contains a small, intact, non-leaking capacitor, the ballast may be disposed of at a municipal landfill. In general, all leaking ballasts and ballasts containing potting material with PCB concentrations greater than or equal to 50 ppm must be incinerated or destroyed by alternative methods, disposed of in a hazardous waste landfill, or decontaminated using approved methods.

Between 1979 and the early 1990s, DEHP was used in place of PCB as a dielectric fluid in some fluorescent light ballasts and other electrical equipment.[454] DEHP is classified as a probable human carcinogen by the U.S. Department of Health and Human Services and as a hazardous substance by the

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[453] Agency for Toxic Substances and Disease Registry. Asbestos. Available online at <www.atsdr.cdc.gov/asbestos/asbestos/health_effects/>. December 12, 2010.

[454] Green Lights Recycling, Inc. Ballasts Facts. Accessed at www.greenlightsrecycling.com/ballast%20Facts.htm. December 12, 2010.

EPA. Because of this, ballasts containing DEHP must be legally disposed of; ballast incineration or a combination of ballast recycling and incineration are recommended for complete destruction of DEHP.

Spent fluorescent lamps and tubes commonly contain mercury vapors and are considered a hazardous waste in California (22 CCR 66261.50). In 2004, new regulations classified all fluorescent lamps and tubes in California as a hazardous waste because they contain mercury. When these lamps or tubes are placed in the trash and collected for disposal, they can be broken and release mercury to the environment. The mercury can be absorbed through the lungs into the bloodstream of people nearby and can be washed by rain into waterways. The mercury in urban storm water sediment results in part from improperly discarded fluorescent lamps and tubes.[455] Approximately 370 pounds of mercury were released in California in 2000 due to electric lamps and tubes breaking during storage and transportation. It is estimated that nearly 75 million waste fluorescent lamps and tubes are generated annually in California and these lamps and tubes contain more than half a ton of mercury. Because they are considered a hazardous waste, all fluorescent lamps and tubes must be recycled or taken to a so-called “universal waste” handler.

Lead-based paint was commonly used prior to 1960 and is likely present in buildings constructed before 1960. Lead is toxic to humans, particularly young children, and can cause a range of human health effects, depending on the level of exposure. When adhered to the surface of the material on which it is painted, lead-based paint poses little health risk. Where the paint is delaminated or chipping, the paint can cause a potential threat to the health of young children or other building occupants who may ingest the paint. Lead dust could also present public health risks during demolition of a structure with lead-based paint. Lead-based paint that has separated from a structure may also contaminate nearby soil. Lead-based paint is defined by 17 CCR 35033 as paint containing lead at a concentration of 5,000 mg/kg (0.5 percent) or greater. Separated paint would be considered a hazardous waste if the lead concentration exceeds the total threshold limit of 1,000 mg/kg, if the soluble lead concentration exceeds the soluble threshold limit concentration of 5 mg/L, or the federal toxicity regulatory level of 5 mg/L (22 CCR 66261.24).

Regulatory Framework

Hazardous materials and hazardous wastes are subject to extensive federal, state, and local regulations, with the major objective of protecting public health and the environment. In general, these regulations define hazardous materials; establish reporting requirements; set guidelines for handling, storage, transport, remediation, and disposal of hazardous wastes; and require health and safety provisions for workers and the public. The major federal, state, and regional agencies enforcing these regulations include the EPA (federal); the Department of Toxic Substances Control (DTSC), the State Water Resources Control Board and the California RWQCB (state); and the Bay Area Air Quality Management District (BAAQMD) (regional). The San Francisco Department of Public Health (DPH) often acts as lead agency to ensure proper remediation of LUST sites and other contaminated sites in San Francisco.

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455 California Integrated Waste Management Board. *Waste Prevention Information Exchange: Fluorescent Lamps and Tubes*. Accessed at http://www.calrecycle.ca.gov/ReduceWaste/FluoresLamps. December 12, 2010.

City Hazardous Materials Regulations

Local regulations that have been enacted to address the potential to encounter hazardous materials in the soil at development sites and the safe handling of hazardous materials (including hazardous wastes). The following sections of the *San Francisco Health Code*, briefly summarized below, could apply to sites to be developed or reused in the Plan area. These include Article 22A (Analyzing the Soil for Hazardous Waste, formerly the Maher Ordinance), Article 21 (Hazardous Materials), Article 21A (Risk Management Program), and Article 22 (Hazardous Waste Management).

Under Article 22A, construction of projects located bayward of the historic high tide line that would involve excavation of greater than 50 cubic yards of soil requires preparation a site history to identify whether past uses might have cause contamination, characterization of on-site soils, and preparation of a site mitigation plan if contamination is identified. The soil analysis report is submitted to the San Francisco Department of Public Health (DPH), California Department of Toxic Substances Control (DTSC) and California Regional Water Quality Control Board (RWQCB). The measures recommended in the site mitigation plan must be completed during construction. If hazardous materials remain in the soil or groundwater, DPH approval of the site mitigation may be conditioned upon submittal of a Risk Management Plan, Health and Safety Plan, and possibly a Cap Maintenance Plan to prevent exposure to hazardous materials in the soil or groundwater after construction of the project. DPH may also require compliance with Article 22A at sites westward of the historic high tide line if the department has reason to believe that hazards wastes may be present in the soil at the property.

Article 21 of the *Health Code* provides for safe handling of hazardous materials in the City. It requires any person or business that handles, sells, stores, or otherwise uses specified quantities of to keep a current certificate of registration and to implement a hazardous materials business plan. A special permit is required for USTs. (This article also incorporates state tank regulations.).

Article 21A of the *Health Code* provides for safe handling of federally regulated hazardous, toxic, and flammable substances in the City, requiring businesses that use these substances to register with DPH and prepare a Risk Management Plan that includes an assessment of the effects of an accidental release and programs for preventing and responding to an accidental release.

Article 22 of the *Health Code* provides for safe handling of hazardous wastes in the City. It authorizes DPH to implement the state hazardous waste regulations, including authority to conduct inspections and document compliance.

In addition, construction, demolition, or renovation work that results in disturbance of lead-based paint or asbestos must comply with Section 3423 of the San Francisco Building Code (Work Practices for Lead-Based Paint on Pre-1979 Buildings and Steel Structures) and Section 3424 of the San Francisco Building Code (Asbestos Information and Notice).

Brownfields Reuse

Properties with abandoned, idled, or underused industrial and commercial facilities are referred to as brownfields, where redevelopment or expansion is complicated by suspected or identified past pollution. Historically, the development potential of these sites has adversely affected the unknown costs associated with cleanup of existing contamination and because of the potential for assuming the long-term liability associated with contamination at a property. Both the federal government and the state have developed "Brownfield Initiatives" to reduce or eliminate barriers to development of these properties, including the California Land Reuse and Revitalization Act, which took effect, for five years only, on January 1, 2005. This law allows some landowners to obtain immunity from liability for certain hazardous materials response costs and other damages if they assess and clean up the property as necessary and enter into an agreement with a regulatory oversight agency for the implementation of assessments and response actions. Specific public participation requirements apply to response actions conducted. Senate Bill 143 extended the repeal date for this act to January 1, 2017.[456]

Impact Analysis

Significance Criteria

The proposed project would have a significant hazardous materials impact if it were to:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment;
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school;
- Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment;
- For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area;
- For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area;
- Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan; or
- Expose people or structures to a significant risk of loss, injury or death involving fires.

[456] California Department of Toxic Substances Control, *Legislative Mandates 2009, A Compilation of New Mandates and Statutory Changes Affecting DTSC Programs.* November, 2009.

Project Impacts

Neither the draft Plan nor the proposed Transit Tower are located within two miles of an airport or private air strip and therefore would not interfere with air traffic or create safety hazards in the vicinity of an airport. Therefore, these two criteria are not applicable, and are not further discussed below. There are no schools elementary, middle, or high schools within one-quarter mile of the Plan area. Therefore, the criterion concerning hazardous emissions and materials within one-quarter mile of an existing or planned school is not applicable. (However, see Section IV.G, Air Quality, concerning effects related to emissions of toxic air contaminants.)

Impact Analysis: Transit Center District Plan

Impact HZ-1: Implementation of the Transit Center District Plan would not create a significant hazard through routine transport, use, or disposal of hazardous materials. (Less than Significant)

The draft Plan would result in new planning policies and controls for land use, including the potential creation of a district-wide combined heat and power (cogeneration) system. Most of the new land uses developed as a result of Plan implementation would likely handle common types of hazardous materials, such as cleaners, disinfectants, and chemical agents required to maintain the sanitation of the residential areas, and commercial bathrooms and food preparation areas. These commercial products are labeled to inform users of potential risks and to instruct them in appropriate handling procedures. However, the cogeneration facility, if implemented, could involve the use of additional hazardous materials such as petroleum products and solvents. Because this system is not designed, subsequent CEQA review would be required.

Similar to existing conditions, any business that handles or stores hazardous materials or petroleum products above threshold quantities would be required to comply with the requirements of the City's hazardous materials handling requirements specified in Article 21 of the *San Francisco Health Code* (discussed in the Setting). In accordance with this article, any facility that handles hazardous materials in excess of specified quantities would be required to obtain a Certificate of Registration from DPH and to implement a Hazardous Materials Business Plan that includes inventories, a program for reducing the use of hazardous materials and generation of hazardous wastes, site layouts, a program and implementation plan for training all new employees and annual training for all employees, and emergency response procedures and plans.

Facilities that store petroleum products in USTs would be required to obtain a permit for the UST in compliance with Article 21 of the *Health Code* and to comply with the regulatory requirements for inspection, monitoring, and secondary containment of USTs. Facilities that store petroleum products in above-ground tanks (ASTs) beyond a specified size would be required to submit a storage statement to the State Water Resources Control Board and prepare a Spill Prevention Control and Countermeasure Plan. In the unlikely event of a leak or tank rupture from a UST or AST, the spill would likely be contained within the secondary containment system for the tank.

In addition, DPH implements its Risk Management and Prevention Program specified in Article 21A of the *Health Code* and requires businesses that handle regulated substances to prepare a written Risk Management Plan. Similarly, any new businesses that handle hazardous waste must comply with the City's hazardous waste handling requirements specified in *Health Code* Article 22.

Compliance with the *San Francisco Health Code*, which incorporates state and federal requirements, would minimize potential exposure of site personnel and the public to any accidental releases of hazardous materials or waste and would also protect against potential environmental contamination. In addition, transportation of hazardous materials is well regulated by the California Highway Patrol and the California Department of Transportation. Therefore, the potential impacts related to the routine use, transport, and disposal of hazardous materials associated with plan implementation would be less than significant.

Mitigation: None required.

Impact HZ-2: Excavation in the Transit Center District Plan area would require the handling of potentially contaminated soil and groundwater, potentially exposing workers and the public to hazardous materials, or resulting in a release to the environment during construction. (Less than Significant with Mitigation)

As discussed in the Setting, most if not all of the Plan area is underlain by 1906 earthquake fill which commonly contains polynuclear aromatic hydrocarbons, heavy metals, oil and grease, and volatile organic compounds. In addition, many of the historical uses of properties in the Plan area would have involved the use of hazardous materials, including foundries, lumber yards, metal working facilities, printing shops, gasoline service stations, auto repair shops, that are commonly associated with the use of petroleum products, metals, solvents, creosote, and PCBs. There are also historic coal yards and coal storage warehouses that are a potential source of metals and polycyclic nuclear hydrocarbons, and a former manufactured gas plant sites that is a potential source of crude oil, manufactured gas, ammonia, cyanide, and hydrogen. Other historic land uses identified by the environmental database review for the project include nearly 50 sites with historic USTs (CA FID UST, HIST UST, and SWEEPS databases), 34 historical automobile service stations (EDR Historical Auto Stations database), 22 historical dry cleaners (EDR Historical Cleaners database).

The former manufactured gas plant site at First, Howard, Fremont and Natoma Streets disposed of residual or waste material known as coal tar directly to the shallow waters of the old Yerba Buena Cove and fill material was deposited directly on top of the discharged coal tar during the filling of the cove. Coal tar residues are believed to be present in soil throughout the entire area of the former Yerba Buena Cove from First Street to The Embarcadero. Therefore, this material is often encountered during excavations in areas near the former manufactured gas plant. Coal tar is known to exist on top of Bay Mud deposits along Beale Street from approximately Mission to Folsom Streets. The approximate depth to the top of the deposit is 10 to 12 feet at Beale Street, shallowing to the west and deepening to the east, although shallow deposits have also been encountered near The Embarcadero at Howard Street. The thickness of the coal tar deposits varies. The thickness is near zero along the fringes of the deposit, and is 7 to 10 feet in the area of Beale and Howard Streets.

In addition to these historic land uses and fill practices that could have resulted in contamination of soil and groundwater and deposits of waste within the Plan area, there are a number of environmental cases with documented soil or contamination, including 36 sites with leaking underground storage tanks (LUST database), which would generally involve a release of petroleum products; two sites under the jurisdiction of the California Regional Water Quality Control Board (SLIC database); one site that has entered a voluntary cleanup agreement with DTSC (VCP database); two potential hazardous waste sites identified by DTSC (Envirostor database); and six sites with administrative, enforcement, or compliance actions related to the Federal Insecticide, Fungicide, and Rodenticide Act (FTTS and HIST FTTS databases). Ten spill sites were identified in the Plan area (ERNS and CHRIMS databases). The potential to encounter soil and/or groundwater contamination near these sites depends on the extent of the release, remedial status of the individual site, and approved cleanup levels for closed sites.

Existing permitted hazardous materials uses could also potentially contribute to soil or groundwater contamination in the Plan area, including 14 facilities with permitted underground storage tanks (UST database), six facilities with above ground storage tanks (AST database), five facilities that manufacture or import chemical substances (TSCA database); and hazardous waste handlers permitted under RCRA (one large quantity generator, 30 small quantity generators and eight generators that do not currently generate hazardous wastes; RCRA-LGQ, RCRA-SQG, and RCRA-NonGen databases).

Workers and the public could be exposed to hazardous materials during closure of hazardous materials handling facilities and USTs, during construction within contaminated materials, and during disposal of contaminated materials as a result of Plan implementation. Impacts related to these activities are discussed below.

Closure of hazardous materials handling facilities and USTs. Impacts related to closure of hazardous materials handling facilities and USTs would be less than significant with compliance with regulations. Facilities undergoing closure would be required to comply with Article 21 of the *San Francisco Health Code* to reduce the potential for hazardous materials to be left in place. Compliance would include preparation and implementation of a closure plan addressing the need for further maintenance of the closed facility; methods to ensure that the threat to public health and the environment from residual hazardous materials is eliminated; and methods to ensure that hazardous materials used at the facility are appropriately removed, disposed of, neutralized, or reused. The closure plan would be submitted to DPH for approval and upon submittal; DPH may add additional requirements for closure. Where a release is discovered, investigation and cleanup could be required under the oversight of the Local Oversight Program. In this case, a corrective action plan may be required and DPH would determine the adequacy of the plan and may also request state or federal agency review. The DPH findings would be published for public review.

If removal of a permitted or previously unidentified abandoned or no longer used UST is required, the tank would be closed in accordance with Article 21 of the *San Francisco Health Code*. A closure plan, identifying appropriate requirements for disposition of any remaining hazardous materials in the tank and the tank, would be submitted to the City for approval prior to removal of the UST. Soil from the UST excavation, and possibly the groundwater, would also be sampled in accordance with Article 21. Upon completion of closure, a release or contamination report would be submitted to DPH if a release were indicated on the basis of visual observations or sampling, and a final report documenting tank removal activities and any residual contamination left in place would be submitted to the City. Upon approval of this report, the City would issue a Certificate of Completion. If a release were indicated, the site owner would be required to submit a corrective action plan, including a community health and safety plan, to DPH and RWQCB, and remediation would be required in accordance with federal, state and local regulations. Alternatively, the tank could be abandoned in place if removal were infeasible.

Construction within contaminated materials. Based on the number of historic and current land uses in the Plan area that involved hazardous materials, the presence of earthquake fill throughout most of the area, the documented presence of coal tar wastes throughout portions of the area, and the number of environmental cases within the area, there is a high potential to encounter soil and groundwater contamination during construction activities associated with implementation of the draft Plan. Without implementation of proper precautions, workers or the community could be exposed to hazardous materials during excavation, grading, and dewatering, or during related site investigation and remediation. Vapors, if present, could also accumulate in structures constructed as a result of Plan implementation, causing nuisance vapors, adverse health effects, or flammable or explosive conditions. Therefore, impacts associated with construction within contaminated soil and groundwater are potentially significant. Implementation of **Mitigation Measure M-HZ-2, Site Assessment and Corrective Action**, would reduce this impact to a less-than-significant-level by requiring appropriate assessment of the potential for contaminated soil or groundwater, and requiring implementation of site investigation and remediation activities should the potential for contamination be identified.

Disposal of contaminated materials. Where remediation or tank removal requires off-site transport of contaminated soil or groundwater, these materials could be classified as a restricted or hazardous waste under state or federal regulations depending on the specific characteristics of the materials. However, the generator of the hazardous wastes would be required to follow state and federal regulations for manifesting the wastes, using licensed waste haulers, and disposing the materials at a permitted disposal or recycling facility. With compliance with these regulatory requirements, impacts related to disposal of hazardous wastes would be less than significant.

As noted in Section O, Geology, Soils, and Seismicity, the groundwater level in the Plan Area is expected at about 8 to 20 feet below ground surface. Because individual development projects that could be proposed and approved pursuant to the proposed zoning controls would include construction of foundations and/or below ground parking garages that could extend below this depth, dewatering likely would be necessary for some projects during construction. However, the draft Plan would allow for capture of this groundwater and reuse for non-potable uses. If any groundwater produced during construction dewatering required discharge to the combined sewer system, the discharge would be conducted in compliance with Article 4.1 of the *San Francisco Public Works Code*, as supplemented by Order No. 158170, which specifies conditions and criteria for discharge of groundwater (see Section O., Hydrology and Water Quality for further discussion of Article 4.1 and Order No. 158170). This article also prohibits discharge of hazardous wastes into the combined sewer system. The discharged water would have to be sampled during dewatering to demonstrate that discharge limitations in the ordinance are met. If the groundwater does not meet discharge requirements, on-site pretreatment may be required before discharge to the sewer system. If standards could not be met with on-site treatment, off-site disposal by a certified waste hauler would be required. With implementation of these regulatory requirements, impacts related to the discharge of contaminated groundwater would be less than significant.

Mitigation Measures

Many of the potential development sites are located bayward of the historic high tide line, and would be subject to Article 22A of the *San Francisco Health Code* and many are not (see Figure 74, p. 627). While the assessment of the potential for contamination and implementation of corrective actions at all sites would be similar, they would differ slightly based on specific regulatory requirements. Therefore, the following mitigation measures specify requirements that apply differently to sites that are located bayward of the high tide line and those that are not. In addition, these measures specify requirements for the assessment of vapors that apply to all sites within the Plan area.

M-HZ-2a: **Site Assessment and Corrective Action for Sites Located Bayward of Historic Tide Line.** For any project located bayward of the historic high tide line the project sponsor shall initiate compliance with, and ensure that the project fully complies with, Article 22A of the *San Francisco Health Code*. In accordance with this article, a site history report shall be prepared, and if appropriate, a soil investigation, soil analysis report, site mitigation plan, and certification report shall also be prepared. If the presence of hazardous materials is indicated, a site health and safety plan shall also be required. The soil analysis report is submitted to DPH. If required on the basis of the soil analysis report, a site mitigation plan shall be prepared to 1) assess potential environmental and health and safety risks; 2) recommend cleanup levels and mitigation measures, if any are necessary, that would be protective of workers and visitors to the property; 3) recommend measures to mitigate the risks identified; 4) identify appropriate waste disposal and handling requirements; and 5) present criteria for on-site reuse of soil. The recommended measures would be completed during construction. Upon completion, a certification report shall be prepared documenting that all mitigation measures recommended in the site mitigation report have been completed and that completion of the mitigation measures has been verified through follow-up soil sampling and analysis, if required.

If the approved site mitigation plan includes leaving hazardous materials in soil or the groundwater with containment measures such as landscaping or a cap to prevent exposure to hazardous materials, the project sponsor shall ensure the preparation of a risk management plan, health and safety plan, and possibly a cap maintenance plan in accordance with DPH requirements. These plans shall specify how unsafe exposure to hazardous materials left in place would be prevented, as well as safe procedures for handling hazardous materials should site disturbance be required. DPH could require a deed notice, for example, prohibiting or limiting certain future land uses, and the requirements of these plans and the deed restriction would transfer to the new property owners in the event that the property was sold.

M-HZ-2b: **Site Assessment and Corrective Action for Projects Landward of the Historic High Tide Line.** For any project that is not located bayward of the historic high tide line, the project sponsor shall ensure that a site-specific Phase I environmental site assessment is prepared prior to development. The site assessment shall include visual inspection of the property; review of historical documents; and review of environmental databases to assess the potential for contamination from sources such as underground storage tanks, current and historical site operations, and migration from off-site sources. The project sponsor shall ensure that the Phase I assessment and any related documentation is provided to the Planning Department's Environmental Planning (EP) division and, if required by EP, to DPH for review and consideration of potential corrective action.

Where the Phase I site assessment indicates evidence of site contamination, additional data shall be gathered during a Phase II investigation, including sampling and laboratory analysis of the soil and groundwater for the suspected chemicals to identify the nature and extent of contamination. If the level(s) of chemical(s) would create an unacceptable risk to human health or the environment, appropriate cleanup levels for each chemical, based on current and planned land use, shall be determined in accordance with accepted procedures adopted by the lead regulatory agency providing oversight (e.g., the DTSC, the RWQCB, or DPH). At sites where there are ecological receptors such as sensitive plant or animal species that could be exposed, cleanup levels shall be determined according to the accepted ecological risk assessment methodology of the lead agency, and shall be protective of ecological receptors known to be present at the site.

If agreed-upon cleanup levels were exceeded, a remedial action plan or similar plan for remediation shall be prepared and submitted review and approval by the appropriate regulatory agency. The plan shall include proposed methods to remove or treat identified chemicals to the approved cleanup levels or containment measures to prevent exposure to chemicals left in place at concentrations greater than cleanup levels.

Upon determination that a site remediation has been successfully completed, the regulatory agency shall issue a closure letter to the responsible party. For sites that are cleaned to levels that do not allow unrestricted land use, or where containment measures were used to prevent exposure to hazardous materials, the DTSC may require a limitation on the future use of the property. The types of land use restriction include deed notice, deed restriction, or a land use restriction that binds current and future owners. A risk management plan, health and safety plan, and possibly a cap maintenance plan could be required. These plans would specify procedures for preventing unsafe exposure to hazardous materials left in place and safe procedures for handling hazardous materials should site disturbance be required. The requirements of these plans and the land use restriction shall transfer to the new property owners in the event that the property is sold.

● **M-HZ-2c:** **Site Assessment and Corrective Action for All Sites.** The project sponsor shall characterize the site, including subsurface features such as utility corridors, and identify whether volatile chemicals are detected at or above risk screening levels in the subsurface. If so, a screening evaluation shall be conducted in accordance with guidance developed by the DTSC[457] to estimate worst case risks to building occupants from vapor intrusion using site specific data and conservative assumptions specified in the guidance. If an unacceptable risk were indicated by this conservative analysis, then additional site data shall be collected and a site specific vapor intrusion evaluation, including fate and transport modeling, shall be required to more accurately evaluate site risks. Should the site specific evaluation identify substantial risks, then additional measures shall be required to reduce risks to acceptable levels. These measures could include remediation of site soil and/or groundwater to remove vapor sources, or, should this be infeasible, use of engineering controls such as a passive or active vent system and a membrane system to control vapor intrusion. Where engineering controls are used, a deed restriction shall be required, and shall include a description of the potential cause of vapors, a prohibition against construction without removal or treatment of contamination to approved risk-based levels, monitoring of the engineering controls to prevent vapor intrusion until risk-based cleanup levels have been met, and notification requirements to utility workers or contractors who may have contact with contaminated soil and groundwater while installing utilities or undertaking construction activities. In addition, if remediation is necessary, the project sponsor shall implement long-term monitoring at the site as needed. The frequency of sampling and the duration of monitoring will depend upon site-specific conditions and the degree of volatile chemical contamination.

The screening level and site-specific evaluations shall be conducted under the oversight of DPH and methods for compliance shall be specified in the site mitigation plan prepared in accordance with this measure, and subject to review and approval by the DPH. The deed restriction, if required, shall be recorded at the San Francisco Office of the Assessor-Recorder after approval by the DPH and DTSC.

Level of Significance after Mitigation

Implementation of Mitigation Measure M-HZ-2 would reduce impacts related to contamination at sites of future development under the draft Plan to a less-than-significant level.

● [457] California Department of Toxic Substances Control, *Final Guidance for the Evaluation and Mitigation of Subsurface Vapor Intrusion to Indoor Air.* October 2011.

Impact HZ-3: Demolition and renovation of buildings in the Transit Center District Plan area could potentially expose workers and the public to hazardous building materials including asbestos-containing materials, lead-based paint, PCBs, DEHP, and mercury, or result in a release of these materials to the environment during construction. (Less than Significant with Mitigation)

As discussed in the Setting, most of the Plan area was developed by the 1930s or earlier; therefore, many of the existing buildings may contain hazardous building materials including asbestos-containing materials, lead-based paint, and electrical equipment containing PCBs. Most of the buildings could also include fluorescent light ballasts containing PCBs or DEHP, and fluorescent light tubes containing mercury vapors. All of these materials were commonly employed until the second half of the 20th century. If a building is demolished or renovated as a result of plan implementation, workers and the public could be exposed to hazardous building materials if they were not abated prior to demolition. However, as discussed below, there is a well established regulatory framework for the abatement of asbestos-containing materials and lead-based paint, and impacts related to exposure to these hazardous building materials would be less than significant with compliance with regulatory requirements. Impacts related to exposure to other hazardous building materials would be potentially significant, and mitigation to reduce this impact to a less-than-significant level is identified below.

Asbestos Containing Materials. Section 19827.5 of the *California Health and Safety Code* requires that local agencies not issue demolition or alteration permits until an applicant has demonstrated compliance with notification requirements under applicable Federal regulations regarding hazardous air pollutants, including asbestos. The Bay Area Air Quality Management District (BAAQMD) is vested by the California legislature with authority to regulate airborne pollutants, including asbestos, through both inspection and law enforcement, and is to be notified ten days in advance of any proposed demolition or abatement work.

Notification includes the names and addresses of operations and persons responsible; description and location of the structure to be demolished/altered including size, age and prior use, and the approximate amount of friable asbestos; scheduled starting and completion dates of demolition or abatement; nature of planned work and methods to be employed; procedures to be employed to meet BAAQMD requirements; and the name and location of the waste disposal site to be used. The District randomly inspects asbestos removal operations. In addition, the District will inspect any removal operation when a complaint has been received.

The local office of the State Occupational Safety and Health Administration (Cal-OSHA) must be notified of asbestos abatement to be carried out. Asbestos abatement contractors must follow state regulations contained in 8CCR1529 and 8CCR341.6 through 341.14 where there is asbestos-related work involving 100 square feet or more of asbestos-containing material. Asbestos removal contractors must be certified as such by the Contractors Licensing Board of the State of California. The owner of the property where abatement is to occur must have a Hazardous Waste Generator Number assigned by and registered with the Office of the California Department of Health Services in Sacramento. The contractor and hauler of the material are required to file a Hazardous Waste Manifest which details the hauling of the material from the site and the disposal of it. Pursuant to California law, DBI would not issue the required permit until the applicant has complied with the notice and abatement requirements described above.

These regulations and procedures, already established as a part of the permit review process, would ensure that any potential impacts due demolition or renovation of structures with asbestos-containing materials would be less than significant.

Lead-based Paint. Work that could result in disturbance of lead paint must comply with Section 3423 of the *San Francisco Building Code*, Work Practices for Lead-Based Paint on Pre-1979 Buildings and Steel Structures. Where there is any work that may disturb or remove lead paint on the exterior of any building built prior to 1979, Section 3423 requires specific notification and work standards, and identifies prohibited work methods and penalties. (The reader may be familiar with notices commonly placed on residential and other buildings in San Francisco that are undergoing re-painting. Generally affixed to a drape that covers all or portions of a building, these notices are a required part of the Section 3423 notification procedure.)

Section 3423 applies to the exterior of all buildings or steel structures on which original construction was completed prior to 1979 (which are assumed to have lead-based paint on their surfaces, unless demonstrated otherwise through laboratory analysis), and to the interior of residential buildings, hotels, and childcare centers. The ordinance contains performance standards, including establishment of containment barriers, at least as effective at protecting human health and the environment as those in the U.S. Department of Housing and Urban Development Guidelines (the most recent Guidelines for Evaluation and Control of Lead-Based Paint Hazards) and identifies prohibited practices that may not be used in disturbances or removal of lead-based paint. Any person performing work subject to the ordinance shall, to the maximum extent possible, protect the ground from contamination during exterior work; protect floors and other horizontal surfaces from work debris during interior work; and make all reasonable efforts to prevent migration of lead paint contaminants beyond containment barriers during the course of the work. Clean-up standards require the removal of visible work debris, including the use of a High Efficiency Particulate Air Filter (HEPA) vacuum following interior work.

The ordinance also includes notification requirements and requirements for signs. Prior to the commencement of work, the responsible party must provide written notice to the Director of DBI, of the address and location of the project; the scope of work, including specific location; methods and tools to be used; the approximate age of the structure; anticipated job start and completion dates for the work; whether the building is residential or nonresidential, owner-occupied or rental property; the dates by which the responsible party has or will fulfill any tenant or adjacent property notification requirements; and the name, address, telephone number, and pager number of the party who will perform the work. (Further notice requirements include Sign when containment is required, Requirements for sign when containment is required; Notice to occupants, Availability of pamphlet related to protection from lead in the home, and Early Commencement of Work [Requested by Tenant]). The ordinance contains provisions regarding inspection and sampling for compliance by DBI, and enforcement, and describes penalties for non-compliance with the requirements of the ordinance.

These regulations and procedures of the *Building Code* would ensure that potential impacts of demolition or renovation of structures with lead-based paint would be less than significant.

Other Hazardous Building Materials. Other hazardous building materials that could be present within the Plan area include electrical transformers that could contain PCBs, fluorescent light ballasts that could contain PCBs or DEHP, and fluorescent light tubes that could contain mercury vapors. Disruption of these materials could pose health threats for construction workers if not properly disposed of, a potentially significant impact. However, implementation of **Mitigation Measure M-HZ-3, Hazardous Building Materials Abatement**, would require that the presence of such materials be evaluated prior to demolition or renovation and, if such materials were present, that they be properly handled during removal and building demolition or renovation. This would reduce the potential impacts of exposure to these hazardous building materials to a less-than-significant level.

Mitigation Measure

M-HZ-3: **Hazardous Building Materials Abatement.** The project sponsor of any development project in the Plan area shall ensure that any building planned for demolition or renovation is surveyed for hazardous building materials including PCB-containing electrical equipment, fluorescent light ballasts containing PCBs or DEHP, and fluorescent light tubes containing mercury vapors. These materials shall be removed and properly disposed of prior to the start of demolition or renovation. Old light ballasts that are proposed to be removed during renovation shall be evaluated for the presence of PCBs and in the case where the presence of PCBs in the light ballast cannot be verified, they shall be assumed to contain PCBs, and handled and disposed of as such, according to applicable laws and regulations. Any other hazardous building materials identified either before or during demolition or renovation shall be abated according to federal, state, and local laws and regulations.

Level of Significance after Mitigation

Implementation of Mitigation Measure M-HZ-3 would reduce impacts related to hazardous building materials under the draft Plan to a less-than-significant level.

Impact HZ-4: Implementation of the Transit Center District Plan would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. (Less than Significant)

Occupants of new buildings that would be constructed as a result of implementation of the draft Plan could contribute to congestion if an emergency evacuation of the Downtown neighborhood were required. However, Section 12.202(e)(1) of the *San Francisco Fire Code* requires that all owners of high-rise buildings (over 75 feet) "shall establish or cause to be established procedures to be followed in case of fire or other emergencies. All such procedures shall be reviewed and approved by the chief of division."

Additionally, project construction would have to conform to the provisions of the *Building Code* and *Fire Code* which require additional life-safety protections for high-rise buildings.

Although not “adopted” by legislative action, the City has a published Emergency Response Plan, prepared by the Department of Emergency Management as part of the City’s Emergency Management Program, which also includes plans for hazard mitigation and disaster preparedness and recovery.[458] The Emergency Response Plan identifies hazards to which San Francisco is particularly susceptible as earthquake, hurricane, tsunami, flood, winter storm, and act of terrorism, including use of chemical, biological, radiological, nuclear, and explosive weapons. The Emergency Response Plan complies with several relevant state and federal directives for emergency planning, including the California Standardized Emergency Management System and the Incident Command System. The Plan includes sections on operations, including management and procedures; staffing, operations, and logistics regarding the City’s emergency operations center; and mutual aid involving other agencies. The Plan assigns responsibilities for disaster planning, operations (including fire and rescue, law enforcement, human services, infrastructure, transportation, communications, and community support), and logistics, as well as finance and administration, to City agencies and departments. The Plan also identifies volunteer agencies, such as the American Red Cross, that are integral to disaster response efforts.

The Emergency Response Plan contains 16 “annexes” (similar to appendices), consistent with a federally established framework, that cover topics including firefighting, public works and engineering, mass casualty care, and earthquakes, among numerous others. The Earthquake Annex, in particular, sets forth planning assumptions for a series of earthquakes of varying magnitudes on different faults, and sets forth procedures for assessment of damage and injuries, and operational response and strategies in the event of a major earthquake.

Development pursuant to the draft Plan would increase both the residential population and, in particular, the daytime employment population in the City that would be subject to a potential disaster, including a major earthquake or any of the other hazards identified in the Emergency Response Plan. With regard to earthquake hazards, in particular, the Plan area, like other parts of San Francisco and the Bay Area, is subject to ground shaking from potentially large earthquakes on the San Andreas and Hayward faults, as well as on other faults in the region. Relatively more of the Plan area is subject to stronger groundshaking intensity than the rest of the City because much of the eastern edge of the area is built on filled land. New buildings that would be developed pursuant to the draft Plan are subject to more stringent building and structural standards than most existing buildings, particularly older structures. Therefore, persons living and working in new buildings would be relatively safer than those in some older existing buildings.[459] However, during a major earthquake, glass, and in some cases building cladding, may endanger those on the streets and sidewalks. Bridges leading to and from San Francisco may be damaged, as was the case

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[458] San Francisco Department of Emergency Management, *City and County of San Francisco Emergency Response Plan*, December 2009. Available at: http://www.sfdem.org/Modules/ShowDocument.aspx?documentid=1154. Reviewed September 9, 2011.

[459] *San Francisco Building Code* requirements with respect to tall buildings are discussed in Section O, Geology, Soils, and Seismicity, p. 589.

with the Bay Bridge east span in the 1989 Loma Prieta Earthquake (although the new east span now nearing completion will perform better in an earthquake). BART, Muni, and Caltrain rail service could be interrupted, and power outages would likely occur. However, the draft Plan would not obstruct implementation of the City's Emergency Response Plan, nor would it necessarily interfere with emergency evacuation planning. With compliance with the legal requirements noted above and implementation of the Emergency Response Plan, impacts related to emergency response or evacuation plans would be less than significant.

Mitigation: None required.

Impact HZ-5: Implementation of the Transit Center District Plan would not expose people or structures to a significant risk of loss, injury or death involving fires. (Less than Significant)

San Francisco ensures fire safety primarily through provisions of the *Building Code* and the *Fire Code*. Existing and new buildings are required to meet standards contained in these codes. In addition, the final building plans for any new residential project greater than two units would be reviewed by the San Francisco Fire Department (as well as DBI) to ensure conformance with these provisions. Construction that would occur as a result of implementation of the draft Plan would conform to these standards, which (depending on the building type) may also include development of an emergency procedure manual and an exit drill plan. Development projects in the Plan area would be required conform to these standards, which (depending on the building type) may include development of an emergency procedure manual and an exit drill plan.

The proposed Plan, an area plan that would include adoption of changes in the City's *Planning Code* and *General Plan*, would not directly result in any direct physical changes. Although the draft Plan would facilitate development projects within the Plan area, all such development would occur in the developed area of San Francisco, where fire, medical, and police services are available and provided. The existing street grid provides ample access for emergency responders and egress for residents and workers, and the proposed Plan would neither directly nor indirectly alter that situation to any substantial degree. Moreover, the Fire Department reviews building permits for multi-story structures. Therefore, the draft Plan would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. Finally, for the reasons just set forth, the draft Plan would not directly or indirectly result in any additional exposure of residents or workers to fire risk. Any development and/or redevelopment in the Plan area would occur in a fully urbanized area, which lacks the "urban-wildland interface" that tends to place new development at risk in undeveloped areas of California. Therefore, the proposed Plan would not expose people or structures to a significant risk of loss, injury or death involving fires.

As noted in Section IV.M, Public Services, the proposed relocation of Fire Station No. 1 from the Plan area to 935 Folsom Street, between Fifth and Sixth Streets, would not result in any significant effects with respect to Fire Department response times in the Plan area.

Compliance with the *San Francisco Building Code* and *Fire Code* through the City's ongoing permit review process would ensure that potential fire hazards related to development activities (including those associated with hydrant water pressure and emergency access) would be minimized during the permit review process and that future projects would not interfere with an existing emergency response or emergency evacuation plan. Therefore, this impact would be less than significant.

Additionally, construction of high-rise buildings (taller than 75 feet), such as the Transit Tower and other tall buildings, both those with applications on file and other anticipated development, must conform to the provisions of the *Building Code* and *Fire Code* which require additional life-safety protections for such structures. With compliance with these legal requirements, impacts related to emergency response or evacuation plans would be reduced to a less-than-significant level.

Mitigation: None required.

Impact Analysis: Transit Tower

Impact HZ-6: The proposed Transit Tower would not create a significant hazard through routine transport, use, or disposal of hazardous materials. (Less than Significant)

Similar to other projects that would be constructed with implementation of the draft Plan, operation of the Transit Tower would likely involve handling of common types of hazardous materials, such as cleaners, disinfectants, and chemical agents required to maintain the sanitation of the commercial bathrooms and food preparation areas. These commercial products are labeled to inform users of potential risks and to instruct them in appropriate handling procedures. If hazardous materials were used above threshold quantities, the owner would be required to comply with the requirements of the City's hazardous materials handling requirements specified in Article 21 of the *San Francisco Health Code* (discussed in the Setting) and obtain a Certificate of Registration from DPH and implement a Hazardous Materials Business Plan. Compliance with the *San Francisco Health Code*, which incorporates state and federal requirements, would minimize potential exposure of site personnel and the public to any accidental releases of hazardous materials or waste and would also protect against potential environmental contamination. In addition, transportation of hazardous materials is well regulated by the California Highway Patrol and the California Department of Transportation. Therefore, the potential impacts related to the routine use, transport, and disposal of hazardous materials associated with the Transit Tower would be less than significant.

Mitigation: None required.

Impact HZ-7: Excavation for the proposed Transit Tower would require the handling of potentially contaminated soil and groundwater, potentially exposing workers and the public to hazardous materials, or resulting in a release to the environment during construction. (Less than Significant with Mitigation)

As discussed in the Setting, the proposed Transit Tower site is underlain by 1906 earthquake fill which commonly contains polynuclear aromatic hydrocarbons, heavy metals, oil and grease, and volatile organic compounds. In addition, many of the historical uses of properties at the site would have involved the use of hazardous materials, including a mechanics mill, iron works, forge shop, brass works, machine shops, cabinet shop and lumber facility, and coppersmith. All of these uses could have involved the use of hazardous materials such as petroleum products, metals, solvents, creosote, and PCBs. The site is also located approximately one block north of the former manufactured gas plant at First, Howard, Fremont and Natoma Streets which historically disposed of residual or waste material known as coal tar directly to the shallow waters of the old Yerba Buena Cove. Based on the historic land uses at the site, and the proximity to the former manufactured gas plant, there is a high potential to encounter soil and groundwater contamination during construction. Without implementation of proper precautions, workers or the community could be exposed to hazardous materials during excavation, grading, and dewatering, or during related site investigation and remediation. Vapors, if present, could also accumulate in the below ground parking structures, causing nuisance vapors, adverse health effects, or flammable or explosive conditions. Therefore, impacts associated with construction within contaminated soil and groundwater are potentially significant. However, similar to the draft Plan, implementation of **Mitigation Measures M-HZ-2a, 2b, and 2c, Site Assessment and Corrective Action**, would reduce this impact to a less-than-significant-level by requiring appropriate assessment of the potential for contaminated soil or groundwater, and requiring implementation of site investigation and remediation activities should the potential for contamination be identified. Because this site is partially located bayward of the high tide line, all three mitigation measures noted above would apply, as would the requirements of Article 22A.

Similar to the draft Plan, impacts related to the disposal of hazardous wastes produced during construction of the Transit Tower would be less than significant with compliance with regulatory requirements, and impacts related to discharge of contaminated water produced during construction dewatering to the City's combined storm and sanitary sewer system would be less than significant with compliance with Article 4.1 of the *San Francisco Public Works Code*, as supplemented by Order No. 158170.

Mitigation Measure

M-HZ-7: Implement Mitigation Measures M-HZ-2a, 2b, and 2c, **Site Assessment and Corrective Action**, for construction of the Transit Tower project.

Level of Significance after Mitigation

With implementation of Mitigation Measure M-HZ-2a, 2b, and 2c, to investigate and, where applicable, remediate soil and/or groundwater that may be contaminated prior to construction of the Transit Tower, the impacts related to contamination at the Transit Tower site would be less than significant

Impact HZ-8: Workers and the public would not be exposed to hazardous building materials as a result of construction of the proposed Transit Tower. (No Impact)

There would be no impact related to exposure to hazardous building materials at the proposed Transit Tower site because all structures at this site have been eliminated as part of the demolition of the Transbay Terminal that began in 2010.

Mitigation: None required.

Impact HZ-9: The proposed Transit Tower would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. (Less than Significant)

Occupants of the proposed Transit Tower could contribute to congestion if an emergency evacuation of the Downtown neighborhood were required. However, Section 12.202(e)(1) of the *San Francisco Fire Code* requires that all owners of high-rise buildings (over 75 feet) "Shall establish or cause to be established procedures to be followed in case of fire or other emergencies. All such procedures shall be reviewed and approved by the chief of division." Additionally, construction of high-rise buildings (taller than 75 feet) would have to conform to the provisions of the *Building Code* and *Fire Code* which require additional life-safety protections for such taller buildings. As stated in Impact HZ-4, development pursuant to the draft Plan—which includes the proposed Transit Tower—would not interfere with implementation of the City's Emergency Response Plan, or with emergency evacuation. With compliance with the legal requirements noted above and implementation of the Emergency Response Plan, impacts related to emergency response or evacuation plans would be less than significant.

Mitigation: None required.

Impact HZ-10: The proposed Transit Tower would not expose people or structures to a significant risk of loss, injury or death involving fires. (Less than Significant)

As stated under Impact HZ-6, San Francisco ensures fire safety primarily through provisions of the *Building Code* and the *Fire Code*. Existing and new buildings are required to meet standards contained in these codes. In addition, the final building plans would be reviewed by the San Francisco Fire Department (as well as DBI) to ensure conformance with these provisions. The proposed Transit Tower would conform to these standards, which (depending on the building type) may also include development of an emergency procedure manual and an exit drill plan. With compliance with these regulatory requirements, impacts related to potential fire hazards would be less than significant.

Mitigation: None required.

Cumulative Impacts

Impact C-HZ: Implementation of the Transit Center District Plan and construction of the proposed Transit Tower, in combination with past, present, and reasonably foreseeable future projects in the site vicinity, would result in less-than-significant impacts related to hazards and hazardous materials. (Less than Significant)

As discussed previously, the Transit Tower project and development projects that could be proposed and approved pursuant to the draft Plan could all involve some uses of hazardous materials. However, the draft Plan's impacts related to the routine transport, use, or disposal of hazardous materials would be less than significant with compliance with existing regulations, including Articles 21, 21A, and 22 of the San Francisco Health Code and the draft Plan's contribution to this cumulative impact would not be cumulatively considerable with compliance these regulations. Further, any new uses of hazardous materials would be subject to the same regulatory requirements.

The proposed project would result in the disturbance of contaminated soil and groundwater during construction and could also require closure of existing USTs or hazardous materials handling facilities, potentially resulting in exposure of workers and the public to hazardous materials. Based on the common presence of earthquake fill as well as historic and current land uses that involved the use of hazardous materials throughout much of the City, new development projects could also encounter hazardous materials in the soil and groundwater or require UST and facility closures. However, as discussed above, the Transit Tower project and development projects that could be proposed and approved and constructed pursuant to the draft Plan would comply with existing regulations for UST and facility closure specified in Article 21 of the *San Francisco Health Code*; implement Mitigation Measure M-HZ-2, Site Assessment and Corrective Action, which requires appropriate assessment of the potential for contaminated soil or groundwater, and implementation of site investigation and remediation activities should the potential for contamination be identified; and comply with existing regulations for disposal of contaminated soil and discharge of contaminated water. With implementation of these legal regulatory requirements and Mitigation Measure M-HZ-2, the draft Plan and proposed Transit Tower project's contribution to this impact would not be cumulatively considerable, and thus would be less than significant. Further, implementation of the draft Plan and the proposed Transit Tower project would result in increased construction activities which may trigger the need for additional site cleanups, thereby removing existing contamination from the Plan area which is, overall, a beneficial impact.

Similarly, implementation of the draft Plan would result in the demolition or renovation of existing buildings that could include hazardous building materials. Based on the age of many buildings in the Plan area, development projects in the Plan area could also require demolition or renovation of buildings that contain hazardous building materials. However, as discussed above, the development projects that could be proposed and approved pursuant to the draft Plan would comply with existing regulations for abatement of asbestos-containing materials and lead-based paint and would implement Mitigation Measure M-HZ-3, Hazardous Building Materials, which requires a survey for other hazardous building materials as well as removal and disposal of these materials in accordance with applicable laws. With implementation of these regulatory requirements and Mitigation Measure M-HZ-3, the proposed project's contribution to this impact would not be cumulatively considerable (less than significant). Further, implementation of the proposed project would result in increased construction activities which would trigger the need for abatement of hazardous building materials, thereby removing more of these materials from the Plan area which is, overall, a beneficial impact.

Mitigation: None required.

R. Mineral and Energy Resources

Setting

All land in San Francisco, including the Plan area and Transit Tower site, is designated Mineral Resource Zone 4 (MRZ-4) by the CDMG under the Surface Mining and Reclamation Act of 1975 (CDMG, Open File Report 96-03 and Special Report 146 Parts I and II). This designation indicates that there is not adequate information available for assignment to any other Mineral Resource Zone and thus the site is not a designated area of significant mineral deposits. However, since the Plan area and the Transit Tower project site are already developed, future evaluation or designation of these areas would not affect or be affected by the project. There are no operational mineral resource recovery sites in the Plan area vicinity whose operations or accessibility would be affected by the implementation of the draft Plan.

Impacts

Significance Criteria

The proposed project would result in a significant impact with respect to mineral and energy resources if it would:

- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state;
- Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan; or
- Encourage activities which result in the use of large amounts of fuel, water, or energy, or use these in a wasteful manner.

Impact Analysis

The Plan would be implemented in an urban infill area. The draft Plan would not require quarrying, mining, dredging, or extraction of locally important mineral resources on site, nor would it deplete any nonrenewable natural resources. Therefore, the Plan, including the Transit Tower would have no effect on mineral resources.

All land in San Francisco, including the Plan area and Transit Tower site, is designated Mineral Resource Zone 4 (MRZ-4) by the California Division of Mines and Geology (CDMG) under the Surface Mining and Reclamation Act of 1975 (CDMG, Open File Report 96-03 and Special Report 146 Parts I and II). This designation indicates that there is inadequate information available for assignment to any other MRZ and thus the site is not a designated area of significant mineral deposits. Since the project site is already developed, future evaluation or designation of the site would not affect or be affected by the draft Plan. There are no operational mineral resource recovery sites in the Plan area whose operations or accessibility would be affected by the construction or operation pursuant to the draft Plan.

Impact ME-1: Neither the Transit Center District Plan nor the development of the Transit Tower would encourage activities which result in the use of large amounts of fuel, water, or energy, or use these in a wasteful manner. (Less than Significant)

Development pursuant to the Plan would entail construction of new office, residential, hotel, retail, and entertainment uses. Development of these uses would not result in unusually large amounts of fuel, water, or energy in the context of energy use throughout the City and region. Demand from development projects in the Plan area would be typical for a buildings of the size and nature proposed and would meet, or exceed, the current state and local codes and standards concerning energy consumption, including Title 24 of the *California Code of Regulations* and the San Francisco Green Building Ordinance. Documentation showing compliance with these standards is submitted with the application for the building permit. Title 24 and the Green Building Ordinance are enforced by DBI. Moreover, new development in the Plan are would be anticipated to incorporate energy-saving features that would reduce energy consumption to levels lower than those of conventionally built structures.

The draft Plan includes a chapter on District Sustainability, which includes a number of objectives and policies aimed at reducing energy consumption. For example, Objective 6.1 states, "Increase energy efficiency, reduce carbon intensiveness of energy production, and enhance energy reliability in the district." Policy 6.8 would require new large projects to develop an "energy strategy" that would document how the project would minimize its use of fossil fuel use for heating, cooling and power through energy efficiency, efficient supply, and no or low carbon generation. Policy 6.9 calls for integrating passive solar features (such as building orientation, shading, and window treatments) into the design of new buildings. And Policy 6.12 calls for new development to achieve basic LEED (Leadership in Energy and Environmental Design) standards established in the Green Building Ordinance, without considering the benefits of location. Finally, the draft Plan proposes consideration of the establishment of a so-called District Energy System that could efficiently supply both heating and electricity to new development from a co-generation facility. These objectives and policies would be consistent with CEQA Guidelines Appendix F, Energy Conservation, which identifies conservation measures such as reducing wasteful, inefficient and unnecessary energy consumption; building siting, orientation, and design to minimize energy consumption; reducing peak energy demand; the use of alternative fuels or energy systems; and energy conservation through recycling.

It is noted that, because no physical improvements have been defined to implement a district-wide heat and power system in the Plan area, this EIR analyzes this aspect of the draft Plan at a very general, programmatic level. Any district-wide energy system proposed in the future would be subject to subsequent environmental review. Individual building cogeneration plants are subject to review by the Bay Area Air Quality Management District, in much the same manner as are individual boilers and generators.

Because subsequent projects, including the Transit Tower, would meet or exceed current state and local codes concerning energy consumption and would not cause a wasteful use of energy, and because of the project's stated goal of LEED certification, effects related to energy consumption would not be considered significant, and neither the draft Plan nor the Transit Tower would make a considerable contribution to cumulative energy consumption impacts.

Mitigation: None required.

S. Agricultural and Forest Resources

Setting

The Plan area, including the Transit Tower site, is located within an urban area in the City and County of San Francisco. The California Department of Conservation's Farmland Mapping and Monitoring Program identifies the site as *Urban and Built-Up Land*, which is defined as "…land [that] is used for residential, industrial, commercial, institutional, public administrative purposes, railroad and other transportation yards, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, water control structures, and other developed purposes."

Impacts

Significance Criteria

The proposed project would result in a significant impact with respect to agricultural and forest resources if it would:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use;
- Conflict with existing zoning for agricultural use, or a Williamson Act contract; or
- Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)) or timberland (as defined by Public Resources Code Section 4526);
- Result in the loss of forest land or conversion of forest land to non-forest use; or
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or forest land to non-forest use.

Impact Analysis

Impact AG-1: Neither the Transit Center District Plan nor the development of the Transit Tower would convert farmland to non-agricultural use or conflict with existing agricultural zoning or a Williamson Act contract, conflict with zoning for forest land, result in the loss of forest land to non-forest use, or involve any other changes that would convert farmland to non-agricultural use or convert forest land into non-forest use. (No Impact)

Because the Plan area and the surrounding areas do not contain agricultural or forest uses and are not zoned for such uses, implementation of the draft Plan would not convert any prime farmland, unique farmland or Farmland of Statewide Importance to non-agricultural use, and it would not conflict with existing zoning for agricultural land use or a Williamson contract, nor would it involve any changes to the environment that could result in the conversion of farmland. Nor would it result in the loss of forest land or conversion of forest land to non-forest uses. Accordingly, these criteria are not applicable to the proposed project.

Mitigation: None required.