4.I  WIND AND SHADOW

This section of the EIR analyzes potential wind and shadow impacts that could occur as a result of the proposed project and assesses the potential for project implementation to adversely affect existing wind and shadow Patterns. The analyses in this section are based in part on the Pedestrian Wind Study/Wind Tunnel Tests\(^1\) (Wind Study) prepared by Rowan Williams Davies & Irwin Inc. (RWDI) and the CEQA Evaluation of the Shadow Effects of the Seawall 337/Mission Rock Project on Public Open Spaces in San Francisco, CA\(^2\) (Shadow Study) prepared by PreVision Design. These reports are included as Appendix 7-1 and 7-2, respectively.

Issues identified in response to the Notice of Preparation (NOP) (Appendix 1) were considered in preparing this analysis. The City and County of San Francisco (City) received three NOP comments related to shadow; no NOP comments related to wind were received. The NOP comments related to shadow expressed concern that the buildings could create shadows along the waterfront and China Basin Park and that the proposed project would cast shadows on the proposed Mission Rock Square.

WIND

ENVIRONMENTAL SETTING

Generally, winds in San Francisco originate on the Pacific Ocean and blow through the city in an easterly direction. Average wind speeds are highest in the summer and lowest in the winter. However, the strongest peak winds occur during the winter. The highest average wind speeds occur during the mid-afternoon, and the lowest wind speeds occur during the morning. The winds that are most prevalent in San Francisco are those from the northwest, west-northwest, west, and west-southwest.

A building’s exposure, massing, and orientation affect nearby ground-level wind accelerations. Exposure is a measure of the degree to which a building extends above surrounding structures into the wind stream. A building surrounded by taller structures is unlikely to cause adverse wind accelerations at ground level, while even a small building can cause wind acceleration if it is freestanding and exposed. Groups of structures tend to slow the winds near ground level because of the friction and drag of the structures themselves on the winds. Buildings that are much taller than the 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, as well as relatively turbulent, and incompatible with the intended uses of nearby ground-level spaces, depending on the level and type of pedestrian use.

Massing affects how much wind a building intercepts and whether wind accelerations occur at ground level. In general, slab-shaped buildings (oriented perpendicular to the prevailing wind direction) have the greatest potential for wind acceleration, and buildings with an unusual shape or setbacks have a lesser effect. Building orientation also affects the amount of wind a structure intercepts and the corresponding extent of wind acceleration. Buildings with a wide axis, perpendicular to prevailing winds, will generally cause greater ground-level wind acceleration. Moreover, structure designs that present tall, flat surfaces that are square to strong winds can create ground-level winds that can prove hazardous to pedestrians in the vicinity. Conversely, a building with a height that is similar to the heights of surrounding buildings typically would cause little or no additional ground-level wind acceleration and turbulence. Thus, wind impacts are generally caused by large building masses that extend substantially above their surroundings and buildings that are oriented so that a large wall can catch a prevailing wind, particularly if such a wall includes little or no articulation. In general, new buildings that are less than 80 feet in height are unlikely to result in substantial adverse effects on ground-level winds such that pedestrians would be uncomfortable. Such winds may occur under existing conditions, but shorter buildings typically do not cause substantial changes in ground-level winds.

The comfort of pedestrians varies under different conditions (e.g., with variations in sun exposure, temperature, wind speed). Winds of up to 4 miles per hour (mph) have no noticeable effect on pedestrian comfort. With velocities between 4 and 8 mph, wind is felt on the face. Winds between 8 and 13 mph will disturb hair, cause clothing to flap, and extend a light flag mounted on a pole, while winds between 13 and 19 mph will raise loose paper, dust, and dry soil and disarrange hair. For wind velocities between 19 and 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 the wind noise is unpleasant. Winds of more than 34 mph can result in loss of balance, and gusts can blow people over.

**Wind Patterns in the Mission Bay Plan Area Vicinity**

The project is not within but is directly adjacent to Mission Bay. Thus, wind patterns in Mission Bay are highly relevant for describing conditions at the project site. In San Francisco, including Mission Bay, more than 90 percent of all measured winds with speeds greater than 13 mph blow from the northwest, west-northwest, west, and west-southwest.

The wind conditions for pedestrians in the Mission Bay Plan area (Plan area) are determined by the interactions between the higher-speed northwest, west-northwest, west, and southwest winds and the combined effects of the Mission Bay Plan street grid and the large buildings
within the Plan area. The west and the west-northwest winds, which, in combination, make up nearly half of all winds, align closely with the street grid and contribute to the strong winds that flow along the east/west-oriented streets within the Plan area. Although the northwest and southwest winds are not aligned with the street grid, both contribute to winds that flow eastward along the east/west-oriented streets.3

Located on the eastern waterfront of San Francisco, the project site is exposed to storm winds that approach from the Bay. The existing pedestrian wind conditions on large vacant parcels of land in the Mission Bay South Plan area can be characterized as windy.

The existing project site is generally windy because of its open surroundings and exposure to the prevailing westerly winds, with wind speeds averaging 15 mph.

**REGULATORY FRAMEWORK**

**PLANNING CODE SECTION 148**

San Francisco Planning Code Section 148, Reduction of Ground-level Wind Currents in Downtown Commercial (C-3) Districts, specifically outlines wind reduction criteria for the C-3 District. The project site is not in a C-3 District and is not subject to Planning Code Section 148; however, these criteria can and have been applied as a guideline to nearby areas such as the project site. The Wind Study prepared for this project was performed using wind testing analysis and evaluation methods to determine conformity with Section 148 criteria.

The Planning Code establishes defined wind hazard and wind comfort criteria. The hazard criterion is based on winds that are measured for 1 hour and averaged. However, the wind speeds reported directly from available meteorological data have much shorter averaging periods, about 1 minute; therefore, the speed must be adjusted to correct for the difference between the 1-hour and the 1-minute averaging time. When adjusted to a 1-minute averaging period, the hazard criterion speed is a 1-minute average of 36 mph. The Planning Code defines these wind speeds in terms of equivalent wind speeds and average wind speed (mean velocity), adjusted to include the level of gustiness and

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turbulence. The hazard criterion requires that the development not cause equivalent wind speeds\(^4\) to exceed the hazard level of 26 mph, as averaged for a single full hour of the year.

The comfort criteria are based on wind speeds that are measured for 1 minute and averaged. The comfort criteria state that wind speeds will not exceed 11 mph in substantial pedestrian use areas and 7 mph in public seating areas more than 10 percent of the time year-around between 7:00 a.m. and 6:00 p.m.\(^5\)

**MISSION BAY DESIGN GUIDELINES**

The Mission Bay Design Guidelines are not used in determining the proposed project’s wind impacts because the project would not be located in the Mission Bay Plan area, which is located upwind of the project site. All discussion about the Mission Bay Design Guidelines is provided for informational purposes, given the proximity of the project site to the Mission Bay Plan area. Development that is part of the Mission Bay area must adhere to the Mission Bay Design Guidelines. The Mission Bay North Redevelopment Plan area wind standards focus on using all feasible means to eliminate wind hazards and reduce adverse wind impacts, including uncomfortable wind conditions for projects that include buildings that would be more than 100 feet in height. Wind tunnel testing is also required for these buildings, unless it is determined that the exposure, massing, and orientation of the building would not result in adverse wind impacts. Under these guidelines, wind analyses are conducted to assess wind conditions for the project in conjunction with the anticipated pattern of development on surrounding blocks.

**ENVIRONMENTAL IMPACTS**

This section describes the impact analysis for the proposed project related to wind. It describes the methods used to determine the impacts of the proposed project and lists the thresholds used to conclude whether an impact would be significant. Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts accompany the discussion of each identified significant impact.

\(^4\) The equivalent wind speeds were calculated according to the specifications in Section 148, whereby the mean hourly wind speed is increased when the turbulence intensity is greater than 15 percent, according to the following formula:

\[
\text{EWS} = \text{V}_{\text{m}} \times \left(1 + 3 \times \text{TI}ight) / 1.45
\]

where 
- EWS = equivalent wind speed 
- \(\text{V}_{\text{m}}\) = mean pedestrian-level wind speed 
- \(\text{TI}\) = turbulence intensity

\(^5\) The wind comfort criteria are defined in terms of equivalent wind speed, which is the average wind speed (mean velocity) adjusted to include the level of gustiness and turbulence. Equivalent wind speed is defined as mean wind velocity multiplied by quantity (one plus three times the turbulence intensity) divided by 1.45. This calculation magnifies the reported wind speed when turbulence intensity is greater than 15 percent.
SIGNIFICANCE CRITERIA

The proposed project would be considered to have a significant impact related to wind if it were to alter wind in a manner that would substantially affect public areas.

To assess whether a project would result in a significant impact under the CEQA significance criterion, the City uses the Planning Code’s hazard criterion. That is, the City determines whether a project would cause equivalent wind speeds to reach or exceed the wind hazard criterion of 26 mph for a single hour of the year. If a project would cause a new wind hazard or exacerbate an existing wind hazard in a public area, it may result in a significant impact under CEQA. Although the City requires mitigation measures to avoid new wind hazards or an increase in existing wind hazards, outside of Section 148 areas, project approval may still be granted if new wind hazard exceedances cannot be avoided. The Section 148 comfort criteria are not CEQA significance criteria. The comfort criteria and the proposed project’s effects on wind comfort are discussed for informational purposes only.

METHODS FOR ANALYSIS

The Wind Study was conducted to assess the existing and proposed wind environment around the project site in terms of pedestrian hazards relative to the wind metrics specified in Section 148, as applied on a site-wide basis. The 1:300 (1- to 25-inch) wind tunnel model included the project site and all relevant surrounding buildings and topography within a 1,200-foot radius of the project site.

The Wind Study also assessed the existing and proposed wind environment in terms of a comfort criterion. The Planning Department considers the wind comfort criterion enumerated in Section 148 when assessing the design of buildings in the C-3 zoning area. The comfort criterion is based on whether the project would cause wind speeds to exceed 11 mph more than 10 percent of the time. The project would not be located in a C-3 area where Section 148 would apply, and the Planning Department does not consider exceedances of the comfort criterion a significant impact for CEQA purposes. However, because the Wind Study assessed wind conditions related to the comfort criterion, the results of this assessment are included in this section of the EIR for informational purposes.

The Wind Study followed the standard methodology for studies in San Francisco, which includes existing, existing plus project, and cumulative configurations. To evaluate the effect of various building and landscaping modifications on wind conditions, an additional six configurations were analyzed. The additional configurations included building massing modulations, windscreens, canopies, and landscaping to analyze which of these wind reduction measures or combinations of wind reduction measures would result in the most favorable wind environment on the project site. In total, nine configurations were studied (Configurations A through I), including existing, existing plus project, existing plus project with measure (for five
different configurations, consisting of combinations of the wind reduction measures that could be implemented), and project plus cumulative configurations (one with measures and one without measures).

The mean speed profile and turbulence of the natural wind approaching the modeled area were simulated in the boundary-layer wind tunnel. The model used 169 wind speed sensors to measure mean and gust wind speeds at a full-scale height of approximately 5 feet. The wind measurement locations were placed at strategic points (i.e., locations that could affect public areas) on and around the project site to capture potential wind accelerations caused by the buildings. This included building corners, narrow (pedestrian-oriented) streets between buildings, broad pedestrian-friendly public sidewalks, and known pedestrian areas, including the proposed Mission Rock Square and China Basin Park. Wind measurements at each of the 169 locations were recorded for the west-southwest, west, west-northwest, and northwest wind directions, which are the most prevalent wind directions in the city.

**LAND USE ASSUMPTIONS**

Because taller buildings tend to intercept stronger winds at higher elevations, the High Residential Assumption, which includes taller buildings on Blocks H, I, and J, is considered to be the more likely of the two land use assumptions to result in the greatest wind effects. Therefore, the Wind Study conservatively analyzed wind conditions under the High Residential Assumption.

**IMPACTS AND MITIGATION MEASURES**

**Impact WS-1. The project would alter wind in a manner that would substantially affect public areas. (Significant and Unavoidable with Mitigation)**

As discussed under Methods for Analysis, a wind tunnel test was conducted as part of the Wind Study to define the pedestrian wind environment with respect to the hazard criterion and assess how wind hazards would change under the project. The wind tunnel test analyzes the wind hazard associated with wind force under existing conditions and with the project. It presents the test results as well as recommendations for conceptual wind control measures where necessary.

Figures 4.I-1 through 4.I-7 on the following pages present the wind hazard analysis results (i.e., the number of hours per year the wind hazard criterion would be exceeded at the 169 onsite and offsite study test points). A summary of the results for the tested configurations is presented in Table 4.I-1, page 4.I-14.

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6 Per the legend in Figures 4.I-1 through 4.I-7, “Pass” denotes a test point location that did not exceed the wind hazard criterion.
Figure 4.1-1
Configuration A: Existing Wind Conditions

Note: No blocks or buildings currently exist on the project site and the proposed block outlines are shown only to demonstrate wind test point locations relative to how the site would be laid out per the project.

Source: Rowan Williams Davies & Irwin 2016
Figure 4.I-2

Configuration B: Existing plus Project Wind Conditions with Buildings Only

Note: Includes the proposed project buildings and off-site surrounding buildings.

Source: Rowan Williams Davies & Irwin 2016

Seawall Lot 337 and Pier 48 Mixed-Use Project EIR
Case No. 2013.0208E
Seawall Lot 337 and Pier 48 Mixed-Use Project EIR
Case No. 2013.0208E

Configuration C: Existing plus Project Wind Conditions with Increased Setback

Figure 4.I-3

Legend:
- Hazard Categories:
  - Grade Level
  - Project Boundary

Source: Rowan Williams Davies & Irwin 2016
Seawall Lot 337 and Pier 48 Mixed-Use Project EIR
Case No. 2013.0208E

Source: Rowan Williams Davies & Irwin 2016

Figure 4.I-4

Configuration D: Existing plus Project Wind Conditions with Increased Setback, Canopies, and Wind Screens
Configuration E: Existing plus Project Wind Conditions with Increased Setback, Canopies, and Proposed Onsite Landscaping

Source: Rowan Williams Davies & Irwin 2016
Figure 4.I-6
Configuration F: Existing plus Project Wind Conditions with Increased Setback and Proposed Onsite Landscaping
Source: Rowan Williams Davies & Irwin 2016

Seawall Lot 337 and Pier 48 Mixed-Use Project EIR
Case No. 2013.0208E

Figure 4.I-7

Configuration G: Existing plus Project Wind Conditions with Increased Setback, Proposed Onsite Landscaping, and Additional Offsite Landscaping
**TABLE 4.I-1. SUMMARY OF WIND TUNNEL STUDY RESULTS FOR THE HAZARD CRITERION**

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Number of Hazard Exceedance Locations</th>
<th>Hours/Year of Hazard Exceedance</th>
<th>Average Hazard Wind Speed (mph), 1 Hour/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Existing (Figure 4.I-1)</td>
<td>10</td>
<td>104</td>
</tr>
<tr>
<td>B</td>
<td>Existing plus Project with Buildings Only (Figure 4.I-2)</td>
<td>23 (5 existing, 18 new)</td>
<td>335</td>
</tr>
<tr>
<td>C</td>
<td>Existing plus Project with Increased Setback (Figure 4.I-3)</td>
<td>25 (5 existing, 20 new)</td>
<td>352</td>
</tr>
<tr>
<td>D</td>
<td>Existing plus Project with Increased Setback, Canopies, and Windscreens (Figure 4.I-4)</td>
<td>16 (4 existing, 12 new)</td>
<td>419</td>
</tr>
<tr>
<td>E</td>
<td>Existing plus Project with Increased Setback, Canopies, and Proposed Onsite Landscaping (Figure 4.I-5)</td>
<td>7 (3 existing, 4 new)</td>
<td>147</td>
</tr>
<tr>
<td>F</td>
<td>Existing plus Project with Increased Setback and Proposed Onsite Landscaping (Figure 4.I-6)</td>
<td>8 (3 existing, 5 new)</td>
<td>127</td>
</tr>
<tr>
<td>G</td>
<td>Existing plus Project with Increased Setback, Proposed Onsite Landscaping, and Additional Offsite Landscaping (Figure 4.I-7)</td>
<td>5 (2 existing, 3 new)</td>
<td>67</td>
</tr>
</tbody>
</table>


**CONFIGURATION A: EXISTING WIND CONDITIONS**

Configuration A represents existing wind conditions at the project site. As shown in Figure 4.I-1, page 4.I-7, and summarized in Table 4.I-1, above, 10 of the 169 locations tested (Locations 1 through 3 and 6 through 12) currently exceed the hazard criterion a total of 104 hours per year. These locations occur in the northwest portion of the project site, on the west side of China Basin Park. For all locations tested, the average hazard wind speed\(^7\) was 28 mph.

**CONFIGURATION B: EXISTING PLUS PROJECT WITH BUILDINGS ONLY**

Configuration B represents wind conditions with the addition of the proposed project buildings at the project site. As shown in Figure 4.I-2 (page 4.I-8) and summarized in Table 4.I-1, 23 of the 169 locations tested would exceed the hazard criterion a total of 335 hours per year under the existing

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\(^7\) The Wind Study measured all average hazard wind speeds in 1 hour/year.
plus project with buildings only configuration, which would include the proposed project buildings and baseline surroundings (i.e., no additional wind attenuation features). Five of the locations would exceed the hazard criterion under existing conditions; 18 of the locations are new exceedances. For all locations tested, the average hazard wind speed was 27 mph.

As shown in Figure 4.I-2, page 4.I-8, an increase in wind speeds would be anticipated on the upwind (west) side of the project site along Third Street and China Basin Park, particularly near building corners. The 18 new hazard locations would be around the buildings primarily on Blocks A, B, D, F, G, and K (Figure 4.I-2, page 4.I-8). Six of the exceedances would be offsite on the west side of Third Street (Location 32), the east side of Terry A. Francois Boulevard (Location 164), and near the Public Safety Building to the south at Third Street and Mission Rock Street (Locations 68, 69, 72, and 74). These additional hazard exceedances would be the result of common wind-flow patterns, such as downwashing, corner accelerations, and channeling flows, which typically occur with the addition of building mass to an exposed site. These locations represent the windiest areas on and around the project site under the existing plus project with buildings only configuration.

The overall “redistribution” of wind speeds on and around the site would result in an average hazard wind speed of 27 mph, which is slightly lower than the average speed of 28 mph under existing conditions (Configuration A). Tables 1.1 and 2.1 of the Wind Study (Appendix 7-1) illustrate that the project would be expected to improve wind speed conditions on the interior of the project site (on sidewalks between buildings) and on the downwind (east) side along Terry A. Francois Boulevard.

**Wind Reduction Measures**

As noted above, the Wind Study also evaluated whether there were measures that could be implemented to reduce project-caused wind hazards. This section describes the various modeling configurations (Configurations C through G) that were studied to determine the relative effectiveness of the different approaches.

**Configuration C: Existing plus Project with Increased Setback**

Under this configuration, the towers above the podium on Blocks A, C, D, F, and G were set farther back on the podium so that the offset distance of the tower from the edges of the podiums was set as close as feasible to 15 feet (the dimensions of these increased setbacks are shown on Image 3: Initial Project Setback Dimensions in the Wind Study). The blocks with increased setbacks were chosen because of their large windward-facing façades, relatively narrower initial setbacks, and the wind consultant’s assessment of wind-flow patterns in the area. Because of the height of the towers along the windward side (west) of the proposed project, ultimately, the increased offset had minimal impact on wind conditions.
As presented in Figure 4.I-3, page 4.I-9; summarized in Table 4.I-1, page 4.I-14; and shown in Tables 1.1 and 1.2 of the Wind Study (Appendix 7-I), the adjustments to the tower locations on the podiums resulted in an average hazard wind speed of 27 mph, similar to the existing plus project with buildings only configuration (Configuration B). Compared to the existing plus project with buildings only configuration (Configuration B), two hazard locations would be eliminated on Third Street (Locations 32 and 46), and four additional hazard locations would be generated in China Basin Park (Locations 4 and 5) and near Blocks C (Location 55) and G (Location 20). Thus, the total number of hazard locations under this configuration would be 25, compared to 23 under the existing plus project with buildings only configuration (Configuration B) and 10 under existing conditions (Configuration A). The total exceedance under this configuration would be 352 hour per year, compared to 335 hours under the existing plus project with buildings only configuration (Configuration B) and 104 hours under the existing-conditions configuration (Configuration A). The new hazard exceedance locations would result from the redirection of winds by the modified building massing. This is a common occurrence around buildings and would occur in an area where existing wind speeds at several locations are already close to the hazard speed threshold. This would result in a slight increase in wind speeds and an exceedance of the hazard criterion.

**Configuration D: Existing plus Project with Increased Setback, Canopies, and Windscreens**

This configuration presents the existing plus project configuration, including the increased setback under Configuration C, with the addition of canopies on Blocks A, D, F, G, and K as well as wind screens in China Basin Park and on the sidewalks between Blocks A, B, C, and D. The locations of these features are shown in Figure 4.I-4, page 4.I-10 and summarized in Table 4.I-1, page 4.I-14. The canopies and wind screens were placed above or upwind of the locations of hazard exceedance found in Configuration C, with the intent of trying to reduce the hazard exceedances, and within the limitations of the site boundaries. Canopies and wind screens typically help reduce the energy in wind gusts and, thus, eliminate the hazard locations around them.

The average hazard wind speed is expected to remain at 27 mph, as under the previous existing plus project with buildings only configuration (Configuration B) and existing plus project increased setback configuration (Configuration C), but the number of exceedances would be reduced to 16, compared to 23 under the existing plus project with buildings only configuration (Configuration B) and 25 with the existing plus project increased setback configuration (Configuration C). There would be 419 hours of exceedance per year, compared to 335 hours under the existing plus project with buildings only configuration (Configuration B) and 104 hours under existing conditions (Configuration A). The number of exceedances would still be higher than under existing conditions (10). Compared to existing conditions (Configuration A), Configuration D, with increased setback, canopies, and windscreens, would eliminate six of the 10 existing hazard locations but add 12 new exceedance locations northeast of the project site; on the northern half of the project site, on the proposed Exposition Street and Bridgeview Street.
as well as China Basin Park and Third Street; and around the Public Safety Building to the south. Compared to the existing plus project with increased setback configuration (Configuration C), nine hazard exceedance locations would be eliminated by Configuration D with increased setback, canopies, and windscreens (refer to Locations 4, 5, 6, 20, 29, 50, 55, 61, and 168 in Figure 4.I-4, page 4.I-10).

**CONFIGURATION E: EXISTING PLUS PROJECT WITH INCREASED SETBACK, CANOPIES, AND PROPOSED ONSITE LANDSCAPING**

Configuration E includes the proposed project with increased tower setbacks and canopies on Blocks A, D, and G, as in Configuration D; as well as proposed onsite landscaping, including trees in China Basin Park and between the proposed buildings (Figure 4.I-5, page 4.I-11). The trees were modeled at the locations to the maximum of the height range (30 to 60 feet) for each species and area specified in Appendices A2 and A3 of the Wind Study. As illustrated in Figure 4.I-5, page 4.I-11, the addition of mature landscaping is expected to result in a substantial reduction in wind activity on and around the proposed project. Depending on the species and location, the proposed onsite landscaping would require between 5 and 20 years to mature.

Implementation of the proposed onsite landscaping would eliminate seven of the 10 wind hazard locations that exist under existing conditions (Configuration A) and add four new hazard exceedance locations. Thus, as illustrated in Figure 4.I-5, page 4.I-11 and summarized in Table 4.I-1, page 4.I-14, wind speeds would exceed the hazard criterion at a total of seven locations out of the 169 tested, with an average hazard wind speed of 21 mph. Configuration E would eliminate 16 wind hazard locations out of the 23 reported under the existing plus project with buildings only configuration (Configuration B). In addition to an improvement over existing conditions (Configuration A), the results depict an improvement in wind conditions compared to Configurations B through D. There would be 147 hours of exceedance per year, compared to 335 hours under the existing plus project with buildings only configuration (Configuration B) and 104 hours under existing conditions (Configuration A). Locations where hazard exceedances would occur with Configuration E are in exposed areas on the northwest portion of the project site (Locations 1, 2, and 9 [areas where hazard exceedances also occur under existing conditions]) and south of the project site on Third and Mission Rock Streets (Locations 68, 70, 72, and 74).

**CONFIGURATION F: EXISTING PLUS PROJECT WITH INCREASED SETBACK AND PROPOSED ONSITE LANDSCAPING**

Configuration F includes the proposed project with increased tower setbacks, similar to Configurations C through E, and landscaping, similar to Configuration E. This configuration did not include the added benefits of canopies and wind screens. Wind activity on and around the project site is expected to be reduced compared to conditions under existing conditions (Configuration A), existing plus project with buildings only configuration (Configuration B), and existing plus project with increased setback, canopies, and windscreens configuration (Configuration D).
As shown on Figure 4.I-6 (page 4.I-12) and summarized in Table 4.I-1, page 4.I-14, implementation of Configuration F is expected to eliminate seven of the 10 wind hazard locations reported under existing conditions (Configuration A) but generate five new hazard locations. Configuration F would eliminate 15 wind hazard locations out of the 23 reported under the existing plus project with buildings only configuration (Configuration B). Ultimately, winds are expected to exceed the hazard criterion at a total of eight locations out of the 169 tested (Figure 4.I-6, page 4.I-12), three of which (Locations 1, 2, and 9) currently exceed the hazard criterion under existing conditions (Configuration A). Other hazard exceedances would be on Exposition Street north of Block B (Location 49) and south of the project site on Third and Mission Rock Streets (Locations 68, 70, 72, and 74). The average hazard wind speed would be 21 mph. There would be 127 hours of exceedance per year, compared to 335 hours under the existing plus project with buildings only configuration (Configuration B) and 104 hours under existing conditions (Configuration A).

**CONFIGURATION G: EXISTING PLUS PROJECT WITH INCREASED SETBACK, PROPOSED ONSITE LANDSCAPING, AND ADDITIONAL OFFSITE LANDSCAPING**

This configuration includes increased tower setbacks, similar to Configurations C through F; landscaping, similar to Configurations E and F; and existing street trees around the development site (see Figure 4.I-7, page 4.I-13; Table 4.I-1, page 4.I-14; and Appendix A4 of the Wind Study). The existing offsite landscaping along the western side of Third Street slows winds from westerly and northwest directions as they approach along Mission Rock, Long Bridge, and Channel Streets and from the park north of Mission Bay Block 1.

As shown in Figure 4.I-7, page 4.I-13, when the additional offsite landscaping is taken into account, the previous eight hazard locations under Configuration F would be reduced to five with the elimination of three hazard exceedances (Locations 9 [northwest corner of Block A], 68, and 70 [south of the project site along Third Street]). Similarly, the total number of hours per year when wind speeds would exceed the hazard criterion would be expected to be reduced from 127 (under Configuration F) to 67 when factoring in the additional existing offsite landscaping.

Compared to existing conditions (Configuration A), eight hazard locations would be eliminated, and three new exceedance locations would be added. Configuration G would eliminate 18 wind hazard locations out of the 23 reported in the existing plus project with buildings only) configuration (Configuration B). The result would be five out of 169 locations with wind speeds above the hazard criterion, compared to 10 under existing conditions (Configuration A). Of these five exceedances, two would be in the northwestern corner of China Basin Park near Lefty O’Doul Bridge (Locations 1 and 2), both of which currently exceed the hazard criterion under existing conditions. The average hazard wind speed would be further reduced to 20 mph, compared to 28 mph under existing conditions (Configuration A). Wind speeds at Location 2 would improve, although this location would continue to exceed the hazard criterion; at Location 1, wind speeds would slightly worsen. Of the other three
exceedance locations, two would be along Mission Rock Street near the corner at Third Street (Locations 72 and 74), and one would be on the proposed Exposition Street between Third Street and the proposed Shared Public Way (Location 49). There would be 67 hours of exceedance per year, a reduction compared to the 335 hours under the existing plus project with buildings only configuration (Configuration B) and 104 hours under existing conditions (Configuration A). On balance, the wind hazard exceedances on the project site would be improved compared to existing conditions as well as the existing plus project with buildings only configuration (Configuration B).

**SUMMARY OF HAZARD CRITERION WIND ANALYSIS**

Hazard wind conditions would worsen overall with the addition of the proposed project, assuming implementation of the existing plus project with buildings only configuration (Configuration B).

Although increased setbacks may not reduce overall wind speeds under the various configurations, localized reductions to hazard exceedances are expected. Therefore, increased setbacks are regarded as effective and modeled throughout Configurations C through G and I. Although not tested, it can be inferred that the benefits of the proposed onsite landscaping, canopies, screens, and additional existing offsite landscaping would still apply, even with the original setbacks (as proposed by the project).

The addition of increased tower setbacks would result in reduced wind speeds in areas adjacent to the modified setbacks but increased wind speeds in areas where winds would be redirected by the tower setbacks. The combination of increased setbacks with canopies and wind screens (Configuration D) would reduce the number of hazard exceedance locations to 16, compared to 23 and 25 hazard exceedance locations from the buildings only configuration (Configuration B) and existing plus project increased setback configuration (Configuration C), respectively. The combination of increased tower setbacks, canopies, and proposed onsite landscaping (Configuration E) would further reduce the number of exceedance locations to seven.

The increased tower setbacks and the proposed onsite landscaping plan (Configuration F) would result in a total of eight exceedance locations. Finally, with the additional offsite landscaping in conjunction with increased tower setbacks and proposed onsite landscaping (Configuration G), the number of hazard locations would be reduced to five.

Overall, the wind reduction measures included in Configurations C through G, especially with landscaping, would have a positive impact on wind conditions on and surrounding the project site because the measures would reduce wind speeds in localized areas. As demonstrated in the Wind Study, the larger the area of coverage with respect to landscaping or wind reduction measures, the greater the wind reduction efficiency of the measures.
Overall, the configurations that include landscaping would result in a net reduction in the number of hazard criterion exceedance locations but introduce new wind hazard locations. The configurations that include physical measures (but not landscaping) would result in net increases in the number of hazard criterion exceedance locations and substantial increases in the number of hours per year of exceedance. The net reduction in the number of wind hazard locations with the inclusion of landscaping indicates that impacts related to the hazard criterion would be less than significant when evaluating impacts on the site-wide level. However, there may be temporary periods of time in which site-wide conditions as reflected in Configuration G are not met for several reasons. Landscaping is not necessarily permanent, requires maintenance, and takes time to reach a level of maturity that can be effective at mitigating wind speeds. As discussed in Chapter 2, Project Description, the project would ensure that landscaping maintenance would be appropriately funded and that the street trees would be inspected and maintained as well as replaced, as necessary, consistent with the landscape maintenance plan and standards to be approved by the City. Nevertheless, landscaping that is not installed at full maturity would not be as effective in baffling wind by the time the project would be built out as assumed in the analysis. This is because, depending on the species and location, landscaping typically requires 5 to 20 years to mature. In addition, despite maintenance commitments, there could be occasions when trees die or need replacement, thereby temporarily worsening wind conditions until new landscaping is planted and reaches full maturity.

In addition, the fully built-out project with mature landscaping was modeled in the Wind Study. However, it is possible that wind conditions during the approximate 6-year buildout period could be worse than the conditions reported in this analysis as certain blocks are constructed while others remain vacant. It is also possible that an economic slowdown or other factors cause a long-term halt to construction; if conditions exist at that time that are worse than conditions assumed in the analysis, those conditions could exist for an even longer period of time than that anticipated in the phasing schedule (refer to Table 2-10 in Chapter 2, Project Description). This impact would be significant.

Mitigation Measure. To reduce wind hazard impacts as much as possible, Mitigation Measure M-WS-1 would be implemented. It would require an assessment of the effectiveness of the wind reduction measures as each building is proposed, thereby providing the most effective combination of wind reduction measures as each building is added to the project site.

Even with implementation of Mitigation Measure M-WS-1, the effectiveness of the mitigation is still uncertain because landscaping is considered an “impermanent” feature, meaning it may be subject to change over time or through the seasons and thus is not effective at all times. In addition, the model assumed full buildout but periods of time may occur before full buildout when wind conditions may worsen temporarily while some blocks are constructed and others remain vacant. Thus, impacts related to wind hazards are considered significant and unavoidable with mitigation.
M-WS-I: *Assessment and Mitigation of Wind Hazards on a Building-by-Building Basis.*

1. Prior to or as part of the submittal package for the schematic design of a new building (Proposed Building), the Proposed Building developer shall submit to the Planning Department, for its review and approval, a report from a Qualified Wind Consultant (QWC) that reviews the Proposed Building schematic design, absent landscaping. "QWC" means a wind consultant retained by the Proposed Building(s) developer and approved by the Planning Department for preparation of the report. The EIR wind consultant for the proposed project and any other wind consultant on the City’s then approved list or otherwise approved by the City will be considered a QWC.

2. The QWC report shall evaluate whether the Proposed Building(s) would create a Significant Wind Impact. “Significant Wind Impact” means a substantial increase on a site-wide basis in the number of hours per year that the 26 mph wind hazard criterion is exceeded or, if baseline wind conditions are greater than 26 mph, a substantial increase in the area subjected to winds greater than 26 mph. This analysis shall focus on the entire project area that was studied in wind tunnel tests conducted for the EIR and not just the area immediately surrounding the Proposed Building(s).

3. The QWC shall consider the Proposed Building(s) in the context of the "Current Project," which, at any given time during construction of the Project, shall be defined as the building masses used in the Original Model (Wind Study Configuration B
d), except as updated to reflect schematic design submittals for any previously approved building that has not yet commenced construction, and construction permit designs for on-site buildings that are under construction or have completed construction. This model shall be referred to as the “Current Project” and shall be updated over time as architectural design for each proposed project block/building is completed.

4. The Proposed Building shall be tested in the wind tunnel as proposed, including any architectural features that can be shown on plans to mitigate wind effects. Testing may not include any existing or proposed onsite

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8 The scope of work for this report shall use the same methodology and wind test point locations as the Wind Study prepared for this EIR.

9 All references to the Wind Study refer to the Mission Rock EIR Pedestrian Wind Study Wind Tunnel Tests Report prepared by RWDI, final report, January 25, 2017, which can be found in Appendix 7-1 to this EIR.

10 These could include features such as setbacks, wind baffles, randomized balconies, overhands, canopies, awnings and the like, provided they are consistent with the project’s Design Controls and shown on schematic architectural plans for the Proposed Building.
A separate test shall be conducted with existing and proposed onsite landscaping included, if required per Section 5, below. The accompanying report shall compare the wind tunnel results analyzing the Proposed Building in the context of the Current Project to the following two baselines: (1) the EIR baseline conditions for the project site (Wind Study Configuration A), and (2) Existing Plus Project (i.e., with Mission Rock proposed project) conditions used in the EIR (Wind Study Configuration B).

5. No further analysis shall be required if the QWC concludes, and the Planning Department concurs, that the Proposed Building’s schematic design, absent proposed onsite landscaping, would not create a Significant Wind Impact. If the QWC concludes that the Proposed Building’s schematic design, absent proposed onsite and existing offsite landscaping, would create a Significant Wind Impact, as defined above, then a second wind tunnel test shall be conducted, taking into account proposed onsite landscaping and existing offsite landscaping. The intent of landscaping is to emulate the function and effect of a manmade wind screen. The following parameters have been determined to be the minimum requirements for landscaping features to be effective in controlling wind:

- It is the combined effect of a cluster or group of landscaping features that is most effective, rather than the maturity of one tree.

- Since a general rule is that vertical wind control features should be taller than the average height of a person, foliage from the ground up is most effective at a height of approximately 6 to 8 feet.

- Since winds can easily flow under tree crowns, underplantings (e.g., shrub plantings at the base of a tree) should be included where trunks are bare for the first 5 to 6 feet of a tree measured from the ground.

- Tree crowns with at least 60 percent cover (density of leafage) and even spread of branches are most effective.

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**INFORMATION REGARDING COMFORT CRITERION**

For informational purposes, the Wind Study also assessed wind comfort speeds.

**CONFIGURATION A: EXISTING WIND CONDITIONS**

For existing conditions, the average measured 90th-percentile equivalent wind speed for the 169 test locations was approximately 15 mph. The majority of the existing site experiences windy conditions because it is vacant. Wind speeds at 163 test locations (out of 169) exceed the Planning Code’s pedestrian comfort criterion of 11 mph. Winds currently exceed the applicable criterion 25 percent of the time under existing conditions (Configuration A).

**CONFIGURATION B: EXISTING PLUS PROJECT WITH BUILDINGS ONLY**

The addition of buildings to the site would result in an increase in wind activity on the windward side of the project site (i.e., the southwest, west, and north sides) and a reduction in wind speeds on the leeward side of buildings (i.e., east side). Under Configuration B, wind speeds calculated at 10 percent exceedance would average 14 mph, with winds at 111 of the 169 locations tested exceeding the 11 mph criterion. Winds would exceed the comfort criterion 20 percent of the time. This would be an improvement compared to the 15 mph average wind speed and 163 exceedances 25 percent of the time under existing conditions (Configuration A).

**CONFIGURATION C: EXISTING PLUS PROJECT WITH INCREASED SETBACK**

Under Configuration C, wind speeds are expected to average 13 mph, with winds at 109 of the 169 locations tested exceeding the 11 mph criterion. Winds would exceed the comfort criterion 20 percent of the time. This would be an improvement compared to the 15 mph average wind speed and 163 exceedances 25 percent of the time under existing conditions (Configuration A) as well as an improvement when compared to Configuration B.

**CONFIGURATION D: EXISTING PLUS PROJECT WITH INCREASED SETBACK, CANOPIES, AND WINDSCREENS**

The proposed canopies would modify winds in the areas closest to them. Although minor reductions in wind speeds were seen at some locations close to the canopies, minor increases in wind speeds were seen at other locations because of winds being redirected by the canopies. Similar to Configuration C, average wind speed under Configuration D is predicted to be 13 mph. However, with winds at 107 of 169 tested locations exceeding the 11 mph criterion, compared to 109 under Configuration C, winds would exceed the applicable criterion 18 percent of the time. These numbers are lower than what would occur under existing conditions (Configuration A) and similar to the existing plus project with increased setback configuration (Configuration C).
**Configuration E: Existing plus Project with Increased Setback, Canopies, and Proposed onsite Landscaping**

Under Configuration E, wind speeds, which exceed the 11 mph criterion for 10 percent (or more) of the time annually, are expected to occur at 65 locations (out of 169 locations tested), with an average wind speed of 11 mph. Winds would exceed the applicable criterion 12 percent of the time. This would be a substantial improvement compared to existing conditions (Configuration A) and Configurations C and D.

**Configuration F: Existing plus Project with Increased Setback and Proposed onsite Landscaping**

Under Configuration F, wind speeds, which exceed the 11 mph criterion for 10 percent (or more) of the time annually, are expected to occur at 67 locations (out of 169 locations tested), with an average wind speed of 11 mph. Winds would exceed the applicable criterion 12 percent of the time. This would be a substantial improvement compared to existing conditions (Configuration A) and Configurations C and D and would be similar to the results from the existing plus project with buildings only configuration (Configuration B) and Configuration E.

**Configuration G: Existing plus Project with Increased Setback, Proposed onsite Landscaping, and Additional Offsite Landscaping**

Under Configuration G, wind speeds, which exceed the 11 mph criterion for 10 percent (or more) of the time annually, are expected to occur at 57 locations (out of 169 tested), with an average wind speed of 10 mph. Winds would exceed the applicable criterion 10 percent of the time. These wind conditions would be the most comfortable/favorable compared to all massing and configurations studied.

**Summary of Wind Comfort Analysis**

Compared to existing conditions (Configuration A), the proposed project, without the inclusion of any wind reduction measures (Configuration B), would result in an improvement in wind comfort conditions.

Configuration C, which would include setbacks, would further improve wind comfort conditions compared to Configurations A and B. Configuration D, which would include canopies and setbacks, would reduce wind speeds at some locations close to the canopies but increase wind speeds at other locations because of winds being redirected by the canopies. These wind speeds under Configuration D would be lower than what would occur under existing conditions (Configuration A) and similar to the existing plus project with increased setback configuration (Configuration C). Under Configurations E and F, which include proposed onsite landscaping, wind comfort conditions would result in a substantial improvement compared to existing conditions (Configuration A) and Configurations C and D. Similarly, Configuration G, which would include the proposed onsite landscaping and additional offsite landscaping, would result in the greatest improvement in wind comfort conditions across all massing and configurations studied.
CUMULATIVE IMPACTS

The geographic context for the analysis of cumulative impacts associated with wind hazards considers the Mission Bay area surrounding the project site. Specifically, the cumulative Wind Study considers future buildout of Mission Bay Block Lots 3E, 4E, 9, and 9A (see Chapter 2, Project Description, Figure 2-3). The projects considered in this analysis are listed in Table 4-1 of Chapter 4, Environmental Setting and Impacts.

Impact C-WS-1: The project, in combination with past, present, and reasonably foreseeable future projects, would alter wind in a manner that would substantially affect public areas. (Significant and Unavoidable)

The Wind Study included two additional configurations, Configurations H and I, to account for cumulative development. Configuration H, project plus cumulative buildings only, represents the wind hazard impact of the proposed project in the presence of all existing and baseline buildings and proposed future buildings in the surrounding offsite area (Blocks 3E, 4E, 9, and 9A), without wind reduction measures. This configuration setup is similar to the existing plus project with buildings only configuration (Configuration B), but it also includes cumulative buildings. Configuration I, project plus cumulative with increased setbacks, proposed onsite landscaping, and additional existing offsite landscaping, represents the wind impact of the proposed project in the presence of all existing and baseline buildings and proposed future buildings in the surrounding area with the incorporation of increased setbacks, proposed onsite landscaping, and existing offsite landscaping. This configuration setup is similar to the existing plus project with increased setback, proposed onsite landscaping, and additional offsite landscaping configuration (Configuration G), but it also includes cumulative buildings.


CONFIGURATION H: PROJECT PLUS CUMULATIVE WITH BUILDINGS ONLY

Configuration H was modeled to represent the highest exposure to prevailing winds on a site-wide basis. This configuration represents the wind hazard impact of the proposed project in the presence of all existing and baseline buildings and proposed future buildings in the surroundings (Blocks 3E, 4E, 9 and 9A), without any of the wind reduction measures included in Configurations C through G. This configuration is similar to the existing plus project with buildings only configuration (i.e., the building only assumptions described in Configuration B), but it also includes cumulative buildings.
### Table 4.I-2. Summary of Wind Tunnel Study Cumulative Results for the Hazard Criterion

<table>
<thead>
<tr>
<th>Configuration</th>
<th>Number of Exceedance Locations</th>
<th>Hours/Year of Exceedance</th>
<th>Average Hazard Wind Speed (mph), 1 Hour/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Existing</td>
<td>10</td>
<td>104</td>
<td>28</td>
</tr>
<tr>
<td>B Existing plus Project with Buildings Only</td>
<td>23 (5 existing, 18 new)</td>
<td>335</td>
<td>27</td>
</tr>
<tr>
<td>G Existing Plus Project with Increased Setback, Proposed Onsite Landscaping, and Additional Offsite Landscaping</td>
<td>5 (2 existing, 3 new)</td>
<td>67</td>
<td>20</td>
</tr>
<tr>
<td>H Project plus Cumulative with Buildings Only</td>
<td>29 (5 existing, 24 new)</td>
<td>517</td>
<td>27</td>
</tr>
<tr>
<td>I Project plus Cumulative with Increased Setback, Proposed Onsite Landscaping, and Additional Offsite Landscaping</td>
<td>5 (2 existing, 3 new)</td>
<td>40</td>
<td>19</td>
</tr>
</tbody>
</table>


The addition of cumulative buildings, and thereby densification of areas southwest of the project site, would cause the northwesterly and westerly winds to be redirected to the more open areas north of the site from time to time. Similar to the project-specific existing plus project with buildings only configuration (Configuration B), five of the 10 existing hazard exceedances would be eliminated. However, 24 new hazard locations would be generated, primarily around the exposed buildings on Blocks A, B, C, D, F, G, and K and the China Basin Park (Figure 4.I-8, on the following page). A total of 29 hazard exceedances are expected for this configuration. Average wind speed would be 27 mph, which is the same as in the project-specific existing plus project with buildings only configuration (Configuration B) and 1 mph lower than that under existing conditions (Configuration A). This configuration, under cumulative conditions, would result in 517 hours of exceedance per year, compared to 335 hours under the existing plus project with buildings only configuration (Configuration B) and 104 hours under existing conditions (Configuration A).
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Source: Rowan Williams Davies & Irwin 2016

Figure 4.1-8

Configuration H: Project plus Cumulative Wind Conditions with Buildings Only

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Figure 4.1-9
Configuration I: Project plus Cumulative Wind Conditions with Increased Setback, Proposed Onsite Landscaping, and Additional Offsite Landscaping
**Configuration I: Project plus Cumulative with Increased Setback, Proposed onsite Landscaping, and Additional Offsite Landscaping**

Configuration I was modeled to represent the least exposure to prevailing winds on a site-wide basis. This configuration represents cumulative buildings added to the existing plus project with the increased setback, proposed onsite landscaping, and additional offsite landscaping configuration (similar to Configuration G).

Because of the presence of proposed onsite and existing offsite landscaping (Configuration I), a large area of China Basin Park is protected from prevailing winds. The impact of the cumulative buildings would be substantially negated by the more localized sheltering afforded by landscaping, and therefore, the number of hazard exceedances in Configuration I is anticipated to be the same as in Configuration G (five exceedances [see Figure 4.I-7, p. 4.I-13]). All other existing plus project configurations with the addition of cumulative buildings would generate wind results that would be similar to one of the two tested cumulative configurations and their corresponding project-level wind test scenarios.

The addition of cumulative buildings is predicted to result in conditions similar to those presented in the project-level configuration with increased setback, proposed onsite landscaping, and existing offsite landscaping (Configuration G). Wind speeds are expected to exceed the hazard criterion at five of 169 locations, compared to 10 under existing conditions (Configuration A), 23 in the existing plus project with buildings only configuration (Configuration B), and 29 in the project plus cumulative with buildings only configuration (Configuration H) (see Figure 4.I-8, page 4.I-27). The five locations were reported as wind hazard locations under the existing plus project with buildings only (Configuration B) and project plus cumulative with buildings only configuration (Configuration H). Of these five exceedances, two would be in the northwestern corner of China Basin Park, near Lefty O'Doul Bridge (Locations 1 and 2); both would exceed the hazard criterion under existing conditions (Configuration A). Of the other three locations, two would be along Mission Rock Street near the corner at Third Street (Locations 72 and 74), and one would be on the proposed Exposition Street between Third Street and the proposed Shared Public Way (Location 49). Average wind speed is predicted to be 19 mph, which is 9 mph lower than under existing conditions. There would be 40 hours of exceedance per year, compared to 517 hours under the project plus cumulative with buildings only configuration (Configuration H) and 104 hours under existing conditions (Configuration A). On balance, the wind hazard exceedances on the project site would be improved overall compared to the existing, existing plus project with buildings only (Configuration B), and project plus cumulative with buildings only (Configuration H) configurations.

Similar to existing plus project with increased setback, proposed onsite landscaping and additional offsite landscaping (Configuration G), on a site-wide basis, because Configuration I shows a decrease in wind hazard exceedance locations and wind speeds, impacts would be
considered \textit{less than significant}, despite the creation of three new wind hazard locations. However, because of the uncertainty regarding the permanence of the proposed onsite and existing offsite landscaping, cumulative impacts are conservatively considered significant and unavoidable with mitigation. Even with Mitigation Measure M-WS-1, which would assess the effectiveness of wind measures on a building-by-building basis, impacts are considered 	extit{significant and unavoidable}.

\textbf{INFORMATION REGARDING COMFORT CRITERION}

For informational purposes, the Wind Study also considered the effect of cumulative conditions plus the project on the comfort criterion.

\textbf{CONFIGURATION H: PROJECT plus CUMULATIVE with BUILDINGS ONLY}

Under this configuration, the results would be similar to those for the existing plus project with buildings only configuration (Configuration B). Wind speeds would exceed the 11 mph criterion at 113 of 169 locations, with wind speeds averaging at 14 mph, compared to 163 locations and a 15 mph average speed under existing conditions (Configuration A). Winds would exceed the applicable criterion 20 percent of the time, compared to 25 percent of the time under existing conditions (Configuration A).

\textbf{CONFIGURATION I: PROJECT plus CUMULATIVE with INCREASED SETBACK, PROPOSED ONSITE LANDSCAPING and ADDITIONAL OFFSITE LANDSCAPING}

Under Configuration I, project plus cumulative with increased setback, proposed onsite landscaping, and additional offsite landscaping, the average wind speed is predicted to be 10 mph, and speeds at 50 locations (out of 169) are expected to exceed the 11 mph criterion. Winds would exceed the applicable criterion 9 percent of the time. This would be an improvement compared to existing conditions (15 mph and 163 exceedances) and all other project and cumulative configurations.

\section*{SHADOW}

\textbf{ENVIRONMENTAL SETTING}

In an urban environment, shadow is a function of the height, size, and massing of buildings, as well as other elements of the built environment, and the angle of the sun. The angle of the sun varies with the time of day (from rotation of the earth) and the change in seasons (from the earth’s elliptical orbit around the sun and its tilted axis). The longer midday shadows are cast during the winter (when the midday sun is lowest in the sky), and the shorter midday shadows are cast during the summer (when the midday sun is higher in the sky). At the time of the summer solstice (approximately June 21 of every year), the midday sun is highest in the sky. The longest day and shortest night occur on this date. Conversely, the shortest day and longest
night occur on the winter solstice (approximately December 21 of every year). The vernal/autumnal equinoxes (when day and night are equal in length) represent the halfway point between solstices. Therefore, measuring shadow lengths during the summer and winter solstices captures the extremes for the shadow patterns that occur throughout the year.

The difference between the current levels of shading and the levels that would be present with the addition of the proposed project yields the total annual increase, measured in square foot hours (sfh) of shadow. This increase is taken as a percentage of the existing total annual available sunlight in the park or open space (i.e., the amount of sun that would fall on the park or open space throughout the year if there were no shading present at any time) and used to determine the existing versus relative increase in new shadows created by the proposed project.

**PARKS, RECREATIONAL FACILITIES, AND OPEN SPACES IN THE VICINITY OF THE PROJECT SITE**

There are several parks, recreational facilities, and open spaces in the vicinity of the project site (refer to Section 4.J, Public Services and Recreation, for a more detailed discussion). The parks, recreational facilities, and open spaces analyzed in the EIR for this project are organized as follows (refer to Figure 4.I-10 on the following page for the locations of these facilities):

- Open spaces under the jurisdiction of the Recreation and Park Commission
- Other public open spaces
- Other outdoor recreation facilities
- Future public open spaces in the project vicinity
- Future public open spaces on the project site

**OPEN SPACES UNDER THE JURISDICTION OF THE RECREATION AND PARK COMMISSION**

The Shadow Study determined that no parks or open spaces that are under the jurisdiction of the Recreation and Park Commission (i.e., subject to the provisions of Planning Code Section 295) are close enough to the project site to receive any new shading from either the High Commercial Assumption or the High Residential Assumption. The closest park or open space that is under the jurisdiction of the Recreation and Park Commission is South Park, located approximately 0.4 mile northwest of the project site. Therefore, no properties under the jurisdiction of the Recreation and Park Commission are included in the analysis.\(^{12}\)

Figure 4.I-10
Affected Open Spaces in the Project Vicinity

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**Other Public Open Spaces**

There are several public open spaces that are not under the jurisdiction of the Recreation and Park Commission in the vicinity of the project site that could be affected by project-generated shadow. These existing open spaces include Mission Creek Park South, Mission Creek Park Esplanade, China Basin Building Promenade, AT&T Park Plaza (southern portion), Kids’ Park, and China Basin Park (pre-expansion).

In addition, three proposed, reasonably foreseeable, or under-construction publicly accessible open spaces near the project site would be affected by new project shadows at some point during the year. These approved or under-construction publicly accessible open spaces in the vicinity of the project site include Mission Creek Park, Dog Run Park, and Mission Bay Park, as described below. For the purposes of analyzing the proposed project’s shadow impacts, these future publicly accessible open spaces are being treated as if they are existing open spaces.

Although the project site is not located within the area subject to Mission Bay shading controls, some of the existing open spaces in the vicinity, as identified above, are within the Mission Bay Parks system. Therefore, for those open spaces, a discussion of shading per Mission Bay standards is included for informational purposes.

**Mission Creek Park South.** Mission Creek Park South (Mission Bay Block P1)\(^{13}\) is an existing, developed 3.2-acre, publicly accessible open space located in the South of Market neighborhood, along the south side of Mission Creek on Block 8710/Lot 002, Block 8731/Lot 001, and Block 3810/Lot 006. Mission Creek Park South is part of Mission Bay Parks and operated under the jurisdiction of the San Francisco Public Works (Public Works) and the Port of San Francisco (Port). The main entry to the park is from Fourth Street, with four smaller entrances along Channel Street. The daily hours of operation are from sunrise to 10:00 p.m. every day. The park includes an open lawn with benches, a small outdoor amphitheater, a walkway, and a plaza with public restrooms and facilities. Approximately 20 trees divide the walkway from the sidewalk on Channel Street, and mature trees line the periphery of the park.

The Shadow Study determined that, under existing conditions, Mission Creek Park South receives approximately 98.8 million sfh of shadow per year, which is equal to being shaded approximately 14.1 percent of the year. The majority of existing shadow falls during the early morning, affecting all portions of the park. In the summer, additional shadows fall along the edge of the park, adjacent to Mission Creek, during the late afternoon and evening.

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\(^{13}\) “P1,” and subsequent “P#” references (i.e., P2, P3, etc.), stands for “Park 1” or “Park #” (i.e., Park 2, Park 3, etc.) on the Mission Bay Development Overview Map (http://sfocii.org/sites/default/files/Documents/Project%20Areas/MB/Mission%20Bay%20Development%20Overview%20Map%20July%202016.pdf).
The Mission Bay Design Guidelines establish a maximum area for allowable shading that falls continuously for 1 hour on Mission Creek Park (combination of park parcels NP1, NP2, NP3, P1, P2, P3, and P8) between 10 a.m. and 4 p.m. from March 20 to September 22. Currently, the largest area of the park affected by shading for 1 hour or more during that time period is equal to approximately 7.9 percent of the total park area, which is below the maximum allowable area of 13 percent.

**MISSION CREEK PARK ESPLANADE.** Mission Creek Park Esplanade (Mission Bay Block NP1) is a 1.1-acre publicly accessible open space in the South of Market neighborhood at 301 Berry Street on Block 8708/ Lot 002. The esplanade is part of Mission Bay Parks and operated by the MJM Management Group through a contract with the Office of Community Investment and Infrastructure (OCII) and under the jurisdiction of Public Works. Entrances to the esplanade are provided from Fourth Street, Berry Street, and Mission Creek Senior Center. The daily hours of operation are from sunrise to 10:00 p.m. every day; however, the esplanade is not enclosed and therefore accessible at all times. The esplanade includes benches, landscaping, and approximately 17 trees.

Under existing conditions, Mission Creek Park Esplanade receives approximately 31.0 million sfh of shadow per year, which is equal to being shaded approximately 17.9 percent of the year. Some existing shadow is present during morning hours, but the park receives the majority of its shade during afternoon hours when the park is often largely cast in shadow.

The Mission Bay Design Guidelines determine maximum shading for Mission Creek Park, which includes Mission Bay Park South, Mission Creek Park Esplanade, and Mission Creek Park (P3), as well as other open space areas, in the aggregate. Currently, as explained in the above discussion of Mission Bay Park South, the largest area of the park affected by shading for 1 hour or more during the applicable time period is equal to approximately 7.9 percent of the total park area, which is below the maximum allowable area of 13 percent.

**CHINA BASIN BUILDING PROMENADE.** The existing 815-foot-long China Basin Building Promenade is located southeast of Berry Street and northwest of Mission Creek. The promenade, which is in the South of Market neighborhood, is a privately owned public open space. There are two public entrances at Fourth Street and Lefty O’Doul Bridge/Third Street and three private entries along the elevated walkway to and/or from Berry Street. The Waterfront Promenade is lined with planters with approximately 12 trees total and benches, providing covered and uncovered seating areas. The promenade is accessible 24 hours per day.

Under existing conditions, China Basin Building Promenade receives approximately 32.7 million sfh of shadow per year, which is equal to being shaded approximately 22.5 percent of the year. Existing shadows partially shade the park in the morning, but the park is shaded primarily during the afternoon hours.

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14 “NP #” corresponds to parks located in the north subarea on the Mission Bay Plan Map.
**AT&T Park Plaza.** AT&T Park Plaza is an existing 12-acre, publicly accessible open space located adjacent to AT&T Park at 24 Willie Mays Plaza, north of China Basin Park and northeast of Third Street. The plaza is located in the South of Market neighborhood on Block 3794/Lot 003-028 and under the jurisdiction of the Port. For purposes of this analysis, the portions of the plaza that were analyzed\(^\text{15}\) represent three principal areas: Willie Mays Plaza (the main ballpark entry plaza, located at the corner of Third/King Streets), Lefty O’Doul Plaza (a secondary entry along Third Street, to the southeast), and a portion of Waterfront Promenade to the south and the footpath between the ballpark and China Basin. Willie Mays Plaza functions as a gathering space and features the main entry into AT&T Park via the Willie Mays Gate. Approximately 24 palm trees are planted throughout Willie Mays Plaza.

Under existing conditions, AT&T Park Plaza receives approximately 59.7 million sfh of shadow per year, which is equal to being shaded approximately 27.7 percent of the year. Existing shadows fall year-round, primarily during the morning and evening hours.

**Kids’ Park.** Kids’ Park is an existing 1.20-acre triangular park in the middle of Mission Bay South’s residential core (i.e., north of China Basin Street, southeast of Long Bridge Street, west of Fourth Street). The park is in the Mission Bay neighborhood and under the jurisdiction of Public Works, with the Mission Bay Development Group as the Master Developer. There are six public entrances into the park between China Basin Street and Long Bridge Street. The park includes interactive play areas, a fenced playground, benches, picnic areas, bicycle racks, and water fountains. The park is open 7 days a week from 8:00 a.m. to 9:00 p.m.

Under existing conditions, Kids’ Park currently receives approximately 54.2 million sfh of shadow per year, which is equal to being shaded approximately 27.8 percent of the year. Existing shadows fall on the park throughout the day, with the exception of midday during summer and fall.

The Mission Bay Design Guidelines establish a maximum area for allowable shading that falls continuously for 1 hour on Kids’ Park (P6) between 10 a.m. and 4 p.m. from March 20 to September 22. Currently, the largest area of the park affected by shading for 1 hour or more during that time period is equal to 11.0 percent of the total park area, which is below the maximum allowable area of 17 percent.

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\(^{15}\) For purposes of this analysis, only the southern portion of this open space area was analyzed because there is no potential for shadow from the proposed project to affect the northern portion because of distance and intervening structures.
CHINA BASIN PARK. China Basin Park is an existing 2.2-acre park located in the Mission Bay neighborhood of San Francisco on Block 8719/Lots 002 and 006 and Block 9900/Lot 062 at the corner of Third Street and Terry A. Francois Boulevard, within the northern portion of the project site. The park is under the jurisdiction of the Port. The park has two entry points, one at the southern end of Lefty O’Doul Bridge, at the intersection of Third Street and Terry A. Francois Boulevard, and one at Terry A. Francois Boulevard by Pier 48. The park includes an elevated rectangular lawn that has been enclosed within a concrete ledge, with approximately 25 trees lining the southern edge. A smaller secondary lawn is located on the northeastern corner. The Junior Giants Field, a small baseball field, is located to the south.

Under existing conditions, China Basin Park receives approximately 6.0 million sfh of shadow per year, which is equal to being shaded approximately 1.4 percent of the year. The limited amount of existing shadow falls during late afternoon/early evening hours from mid-spring through summer to mid-fall. These shadows occur on the western third of the park. Early-morning shadows are present during spring and fall on the southeastern side of the park near Pier 48. The duration of both morning and afternoon shading is longest during the winter when morning shading covers a portion of the southeastern corner. After an hour of midday full sun, shadows move from west to east across the western two-thirds of the park.

MISSION CREEK PARK (P3). Mission Creek Park (P3) (Mission Bay Block P3) is a proposed 2.32-acre park that would be located northeast of Fourth Street, northwest of Block 1, southeast of Mission Creek, and southwest of Third Street. The proposed park would be under the jurisdiction of the Port and Public Works, with the Mission Bay Development Group as the Master Developer. Mission Creek Park (P3) would include pedestrian pathways, children’s play areas, gardens, and water-oriented viewing/seating areas. The park is planned to open in fall 2017 and would be part of Mission Bay Parks upon completion.

The area for the proposed Mission Creek Park (P3) currently receives approximately 117.0 million sfh of shadow per year, which is equal to being shaded approximately 30.5 percent of the year. Existing shadows fall from morning through mid-afternoon throughout the year; the area is additionally shaded for up to 1 hour in the afternoon and evening from late spring through early fall.

The Mission Bay Design Guidelines determine maximum shading for Mission Creek Park, which includes Mission Bay Park South, Mission Creek Park Esplanade, and Mission Creek Park (P3), as well as other open space areas, in the aggregate. Currently, as explained above,

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16 The Shadow Study assumes a size for China Basin Park of 2.57 acres. Since the initial drafting of the Shadow Study, it was determined that the actual park size is 2.2 acres, as described here and in Chapter 2, Project Description. This minor discrepancy does not affect the conclusions reached in the Shadow Study or the results presented in this section.
the largest area of the park affected by shading for 1 hour or more during the applicable time period is equal to approximately 7.9 percent of the total park area, which is below the maximum allowable area of 13 percent.

**Dog Run Park.** Dog Run Park (Mission Bay Block P5) is a proposed approximately 0.3-acre dog park that would be located northwest of Long Bridge Street and southeast of Channel Street. The park would be under the jurisdiction of Public Works, with the Mission Bay Development Group as the Master Developer. Dog Run Park would be designed for use as a small dog park and contain planting, hardscape, and furniture elements to enhance the visual connection between the parks. The park would serve as a link between Mission Creek Park to the north and Kids' Park to the south (each discussed above). At this time, it is unknown when the park will be open (although it is fully entitled).

The area of the proposed Dog Run Park currently receives approximately 24.5 million sfh of shadow per year, which is equal to being shaded approximately 45.6 percent of the year. Existing shadows fall throughout the day, with the exception of midday during summer and fall.

The proposed Dog Run Park is part of the Mission Bay Parks system. However, this park has no stated restrictions or limitations with respect to shadow under the Mission Bay Design Guidelines.

**Mission Bay Park (P19).** Mission Bay Park (Mission Bay Block P19) is a proposed approximately 0.2-acre, triangularly shaped public open space. The proposed park would be located north of China Basin Street, south of Mission Rock Street, east of Lot 9A, and west of Terry A. Francois Boulevard. The park would be under the jurisdiction of the Port, with the Mission Bay Development Group as the Master Developer. The park would provide plazas next to the neighboring residential building, an OCII affordable housing site, and a small planting strip along the residential units. It is anticipated that the park will open in spring 2017. The area of the proposed Mission Bay Park (P19) currently receives approximately 2.1 million sfh of shadow per year, which is equal to being shaded approximately 6.5 percent of the year.

The proposed Mission Bay Park (P19) is part of the Mission Bay Parks system. However, this park has no stated restrictions or limitations with respect to shadow under the Mission Bay Design Guidelines.

**Other Outdoor Recreation Facilities**

**Mission Creek.** Mission Creek is located north of Channel Street and south of Mission Creek Park and Berry Street. There are three public entrances, at Fourth Street, Channel Street, and Berry Street. The Mission Creek boat launch provides access to and from Mission Creek and
San Francisco Bay for small non-motorized boats via Mission Creek Park. Mission Creek provides commercial and sport fishing, contact water recreation, noncontact water recreation, and suitable estuarine and wildlife habitat.\textsuperscript{17}

**SAN FRANCISCO BAY.** San Francisco Bay is located east of the project site. The estuarine habitat provides areas for fish migration, spawning, and the preservation of rare and endangered species. Activities within San Francisco Bay include commercial and sport fishing, shell fish harvesting, contact water recreation, and noncontact water recreation.

**REGULATORY FRAMEWORK**

**SAN FRANCISCO GENERAL PLAN**

The San Francisco General Plan (General Plan) contains objectives and policies that are related to preserving sunlight on open spaces and other public areas. These objectives and policies are found in the Recreation and Open Space Element and the Urban Design Element.

**RECREATION AND OPEN SPACE ELEMENT**

The Recreation and Open Space Element establishes Policy 1.9, "Preserve sunlight in public open spaces," and states that solar access to public open space should be protected.\textsuperscript{18} In San Francisco, the presence of the sun's warming rays is essential to enjoying open space. This is because climatic factors, including ambient temperature, humidity, and wind, usually combine to create a comfortable climate only when direct sunlight is present. Therefore, the shadows created by new development nearby can critically diminish the utility of the open space.

**URBAN DESIGN ELEMENT**

The Urban Design Element establishes Policy 3.4, "Promote Building forms that will respect and improve the integrity of open spaces and other public areas." The Urban Design Element further states that buildings to the south, east, and west of parks and plazas should be limited in height or effectively oriented so as not to prevent the penetration of sunlight to such parks and plazas. Large buildings and developments should, where feasible, provide ground-level open space on their sites that is well situated for public access and for sunlight penetration.\textsuperscript{19}


PLANNING CODE SECTION 295

New development projects in San Francisco that would be more than 40 feet in height and could contribute new shading to parks that are under the jurisdiction of the Recreation and Park Commission are subject to review under Section 295 of the San Francisco Planning Code. Compliance with Section 295 of the Planning Code requires that proposed projects not adversely affect the use of existing or proposed open spaces that are under the jurisdiction of the Recreation and Park Commission. Such adverse effect is defined as any development in excess of 40 feet in height that would add additional levels of new shading that would be in excess of any potentially allowable new shadow increment on that open space throughout the year between 1 hour after sunrise and 1 hour before sunset, unless the Planning Commission, with input from the general manager of the Recreation and Parks Department and its commission, determines that such an impact would be insignificant.

The shadow analysis determined that no parks or open spaces that are under the jurisdiction of the Recreation and Park Commission would receive any new shading from either of the project land use assumptions; therefore, Section 295 does not apply to any of the open spaces reviewed in this analysis. However, the San Francisco Planning Department has determined that Section 295 analysis times, sfh shadow calculations, and the usage observation methodology, which is often used to support CEQA analysis for development projects in San Francisco, would be adequate and appropriate for evaluating shading under CEQA and determining if the proposed project would create a net new shadow that would affect, in an adverse manner, the use of any park, open space, outdoor recreation facility, or other public areas.

PLANNING CODE SECTION 101.1/PROPOSITION M

In November 1986, the voters of San Francisco approved Proposition M (the Accountable Planning Initiative), which added Section 101.1 to the Planning Code and established eight Priority Policies. These Priority Policies are the basis upon which inconsistencies with the General Plan are resolved. Priority Policy No. 8 calls for the protection of parks and open space and their access to sunlight and vistas. Prior to issuing a permit for any project that requires an initial study under CEQA; prior to issuing a permit for any demolition, conversion, or change of use; and prior to taking any action that requires a finding of consistency with the General Plan, the City is required to find that the proposed project or legislation would be consistent with the Priority Policies.

MISSION BAY DESIGN GUIDELINES

Development that is part of the Mission Bay Plan area must adhere to the Mission Bay Design Guidelines. The Mission Bay shading standards focus on shadows between the hours of 10:00 a.m. and 4:00 p.m. from March 20 to September 22. The shading standards set a maximum
allowable percentage of park or open space area that may be shaded for more than 1 hour by a proposed building project within identified parks or open spaces. The established percentages for existing and proposed parks\(^{20}\) that are applicable to the project site are:

- Mission Creek Park (including Mission Creek Park South [P1], Mission Creek Park Esplanade [NP1], Mission Creek Park [P3]), 13 percent
- Kids’ Park (P6), 17 percent

**ENVIRONMENTAL IMPACTS**

This section describes the impact analysis for the proposed project related to shadow. It describes the methods used to determine the impacts of the proposed project and lists the thresholds used to conclude whether an impact would be significant. Measures to mitigate (i.e., avoid, minimize, rectify, reduce, eliminate, or compensate for) significant impacts accompany the discussion of each identified significant impact.

**SIGNIFICANCE CRITERIA**

The proposed project would be considered to have a significant impact on shadow if it would create new shadows in a manner that would substantially affect existing outdoor recreational facilities or other public areas.

**METHODS FOR ANALYSIS**

In order to determine whether new shading would be considered significant, both quantitative findings (how large the shadows would be and when they would occur) as well as qualitative elements (what activities occur in the open spaces and how the spaces are used) were evaluated.

**QUANTITATIVE METHODOLOGY**

To evaluate the shadow impact of the proposed project, a 3D virtual model of the project area was prepared.

The massing models considered the project site, the affected open spaces (based on their lot boundaries per City records),\(^{21}\) the surrounding urban and natural environment, and cumulative development in the project vicinity. The Planning Department has determined that Section 295 analysis times, sfh shadow calculations, and the usage observation methodology would be adequate and appropriate for evaluating the shading impacts of the proposed project,

\(^{20}\) The proposed Dog Run Park and Mission Bay Park (P19) are part of the Mission Bay Parks System. However, these parks have no stated restrictions or limitations with respect to shadow under the Mission Bay Design Guidelines.

\(^{21}\) Note that for the purposes of this analysis, shadow on proposed open spaces is analyzed as if the open space were existing.
even though the affected open spaces are not subject to Section 295. The purpose of this analysis is to inform decision-makers of the potential significance of the proposed project’s shadow on existing nearby public parks and publicly accessible open spaces, specifically, whether or not the project would create new shadow in a manner that would substantially affect existing outdoor recreation facilities or other public areas and, therefore, cause a significant shadow impact for purposes of the Planning Department’s review of the project under CEQA.

The models were used to simulate and calculate both existing amounts of shading and the levels of shading that would be present with the addition of the proposed project, starting 1 hour after sunrise through 1 hour before sunset. Between these times, the model performed snapshot analyses at 15-minute intervals and repeated this process for every 7 days between the summer solstice and winter solstice. This half-year is referred to as a “solar year;” the data taken from the 27 sample dates throughout the course of the solar year are mirrored with extrapolated interim times and dates to arrive at the full-year shading calculation.

The proposed project would include expansion of the existing China Basin Park. The analysis compares the total square footage of available sunlight on the existing park to the total square footage of available sunlight under the proposed expanded China Basin Park.

In order to provide a visual understanding of the location, size, and extent of the new shading, graphics were prepared to accompany the quantitative analysis. The diagrams depict the entire project site and larger surrounding area. The diagrams were prepared for the following dates: June 21 (the summer solstice, when the sun is at its highest point in the sky); December 21 (the winter solstice, when the sun is at its lowest point in the sky); and March 20/September 22 (the vernal/autumnal equinoxes, when day and night are of approximately equal length). For each of these dates, three times of day are shown: one hour after sunrise, noon, and one hour before sunset.

For existing, approved, or under-construction affected parks and open spaces within the Mission Bay Parks system, shading effects relative to the Mission Bay shadow design criteria were also reviewed for informational purposes. Mission Bay park areas are, or will be when developed, under the jurisdiction of either the Port or the City and County of San Francisco and under Public Works as dedicated public right-of-way. With the exception of the existing China


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22 The Shadow Study also includes focused shadow diagrams that depict each of the affected open spaces and their immediate surroundings. Focused shadow diagrams were prepared 1 hour after sunrise, 9:00 a.m., 10:00 a.m., noon, 3:00 p.m., 5:00 p.m., and 1 hour before sunset. All diagrams showing the proposed project’s contribution included cumulative shadow conditions.

Basin Park, which is proposed for modification, shading on open spaces created by the project (e.g., Mission Rock Square, Channel Lane and Channel Wharf) is discussed for informational purposes. The Planning Department does not consider project shading on open spaces and parks that are created by a project to be impacts under CEQA because such shading is not part of the existing physical environment.

**Qualitative Methodology**

The shadow consultant conducted six 30-minute site visits to each of the affected open spaces to observe the existing pattern and intensity of use at the affected park or open space. Two site visits were performed in the morning, two at midday, and two late in the day, with one visit on a weekday and one on a weekend day. The discussion of qualitative impacts on the affected spaces is based on the nature of existing versus new shadow profiles and how new shadows might adversely affect observed existing patterns of use in the open space. These observations help evaluate the potential for impacts on existing uses resulting from new shading, including shadow characteristics (size, duration, and location of new shadows) and the value of sunlight (time of day and year new shadows would be present at parks/open spaces relative to patterns of use).

**Other Factors Affecting Sunlight**

Although present in many parks and open spaces, shade contributed by trees and other landscape features is not taken into consideration as part of the quantitative analysis because such features are considered “impermanent” (i.e., they may be subject to change over time, through the seasons, or added or removed). However, at times, such features are a defining feature of the open space (or features within it) and may constitute a significant shadow presence that may capture some or all new shading created by the proposed development. In such cases, a discussion of the presence and nature of such features is included for informational purposes.

**Land Use Assumptions**

The Shadow Study considered both the High Commercial Assumption and the High Residential Assumption. Of the 12 parks and open spaces evaluated, including parks proposed under the project, shading impacts at nine existing parks and open spaces (all off-site open spaces) would be the same under both land use assumptions. Shading impacts at the three remaining parks and open spaces proposed by the project were evaluated separately because the two land use assumptions would result in different shading impacts.

**Topics Not Evaluated in Detail**

As discussed above, the Shadow Study determined that no parks or open spaces that are under the jurisdiction of the Recreation and Park Commission would receive any new shading from either or both of the project land use assumptions. Therefore, under the proposed project,
Section 295 does not apply to any of the parks or open spaces, and no further analysis under Section 295 was conducted. The Mission Bay Design Guidelines apply to parks in Mission Bay. Because the project is outside the Mission Bay area, the Mission Bay Design Guidelines do not apply to the project. Where shadow impacts on Mission Bay parks are reviewed, the Mission Bay Design Guidelines are discussed for informational purposes, but the shadow impact conclusions for the project are based on the quantitative and qualitative methodology described previously.

**IMPACTS AND MITIGATION MEASURES**

**Impact WS-2.** The proposed project would not create new shadow in a manner that would substantially affect outdoor recreation facilities or public areas. (Less than Significant)

Existing shadow patterns and shadow patterns associated with the proposed project are shown in Figures 4.I-11 through 4.I-19 on the following pages. These figures provide representative snapshots of shadow patterns at the times of the day and seasons selected for the analysis. The figures illustrate the worst-case hours of day for the summer solstice, vernal/autumnal equinox, and winter solstice. The Shadow Study contains additional diagrams for various times of day for these particular times of year.

As described under Land Use Assumptions, the Shadow Study evaluated each park and open space under the High Commercial Assumption and the High Residential Assumption. The analysis concluded that project-generated shadow impacts on existing parks and open spaces would be the same under both land use assumptions, and project-generated shadow impacts on parks and open spaces proposed by the project would differ slightly between land use assumptions. Potential shadow impacts as a result of the proposed project on existing and proposed offsite public open spaces in the vicinity of the project site are described below.

**EXISTING PUBLIC OPEN SPACES IN THE PROJECT VICINITY**

**MISSION CREEK PARK SOUTH.** Under existing conditions, Mission Creek Park South currently receives approximately 98.8 million sfh of shadow per year, equal to being shaded approximately 14.1 percent of the year. The majority of existing shadow falls during the early morning and affects all portions of the park, with additional late-afternoon/evening shadows in the summer falling primarily along the edge of the park adjacent to Mission Creek. The proposed project would increase the amount of shadow that Mission Creek Park South receives by approximately 1.1 million sfh of shadow per year, equal to an increase of 0.2 percent over current shading conditions, from mid-February through the end of October (approximately 250 days a year).

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Figure 4.I-11
Summer Solstice (June 21) Shadows
Cumulative Projects
1 Lot 3E
2 Lot 4E
3 Lot 9
4 Lot 9A
5 Lot 12W
Open Spaces (listed in orange if part of Seawall 337 project)
1 Mission Creek Park (P1)
2 Mission Creek Park Esplanade (NP1)
3 China Basin Park Promenade
4 AT&T Park Plaza (southern portion)
5 Kid's Park (P6)
6 China Basin Park (existing)
7 New China Basin Park *
8 Mission Rock Square*
9 Channel Lane*
10 Channel Wharf*
11 Mission Creek Park (P3)*
12 Dog Run (P5)*
13 New China Basin Park (P19)*

* under construction / proposed

LEGEND
- Project
- Existing Shadows
- Cumulative Project Shadows
- New Project Shadow
- Residential AND Commercial LUA
- Commercial LUA Shadow Only
- Residential LUA Shadow Only

(LEC = Land Use Assumption)

SUMMER SOLSTICE
JUNE 21
12:00 PM

Seawall Lot 337 and Pier 48 Mixed-Use Project EIR
Case No. 2013.0208E

Figure 4.I-12
Summer Solstice (June 21) Shadows
Figure 4.I-14
Vernal/Autumnal Equinox
(March 20/September 20) Shadows
Figure 4.I-15
Vernal/Autumnal Equinox (March 20/September 20) Shadows

Figure 4.I-16
Vernal/Autumnal Equinox (March 20/September 20) Shadows


Seawall Lot 337 and Pier 48 Mixed-Use Project EIR
Case No. 2013.0208E

4.1-49
Figure 4.I-17
Winter Solstice (December 20) Shadows
Cumulative Projects
1 Lot 3E
2 Lot 4E
3 Lot 9
4 Lot 9A
5 Lot 12W

Open Spaces (listed in orange if part of Seawall 337 project)

1 Mission Creek Park (P1)
2 Mission Creek Park Esplanade (NP1)
3 China Basin Park Promenade
4 AT&T Park Plaza (southern portion)
5 Kid's Park (P6)
6 China Basin Park (existing)
7 New China Basin Park *
8 Mission Rock Square*
9 Channel Lane*
10 Channel Wharf*
11 Mission Creek Park (P3)*
12 Dog Run (P5)*
13 Mission Bay Park (P19)*
14 Children's Park (P6)
15 Mission Bay Park (P19)*

* under construction / proposed

LEGEND
- Project
- Existing Shadows
- Cumulative Project Shadows
- New Project Shadow
- Residential AND Commercial LUA
- Commercial LUA Shadow Only
- Residential LUA Shadow Only
  (LUA = Land Use Assumption)

Seawall Lot 337 and Pier 48 Mixed-Use Project EIR
Case No. 2013.0208E

Winter Solstice (December 20) Shadows

Figure 4.I-18
Figure 4.I-19
Winter Solstice (December 20) Shadows


Winter Solstice December 20
3:54 PM
Shading impacts would occur over a central area of the park close to Mission Creek and a northern portion near the Fourth Street entry in the early-morning hours for up to 45 minutes in the summer, from 6:45 to 7:30 a.m., and up to 25 minutes in the spring and fall, between 7:45 and 8:45 a.m. There would be no project-generated shadow in the winter.

Mission Creek Park South is part of the Mission Bay Parks system, which establishes the maximum amount of additional allowable shading (e.g., 13 percent for Mission Creek Park, which is the aggregate of parcels NP1, NP2, NP3, P1 (i.e., Mission Creek Park South), P2, P3, and P8) for parks in the Mission Bay Parks system between 10:00 a.m. and 4:00 p.m. from March 20 to September 22 under the Mission Bay Design Guidelines. Therefore, shading effects relative to the Mission Bay shadow design criteria are reviewed for informational purposes. Because the proposed project would result in new morning shadow on Mission Creek Park South only before 10:00 a.m., the proposed project would not increase the amount of shadow subject to the maximum under the Mission Bay Design Guidelines.

Use observations of Mission Creek Park South indicate that although a number of users were transitory, a large number remained in the park. The area of the park that would receive new shadow does not contain any of the park’s fixed benches and is not particularly unique (similar features exist in other parts of the park). Moreover, new shadow from spring through the fall would occur at a time when the majority of the park area is already in shadow because of existing buildings. As such, the new shadow resulting from the proposed project would occupy the majority of the remaining unshaded area, which might be desirable for some users. Project shading would be short in duration and would be gone from the park no later than 7:30 a.m., a time when lower levels of use would be more likely.

**MISSION CREEK PARK ESPLANADE.** The proposed project would increase the amount of shadow that Mission Creek Park Esplanade would receive by 508,658 sfh of shadow per year, equal to an increase of 0.3 percent over current shading conditions, from mid-January through early December (approximately 340 days a year). Shading impacts would occur during the early-morning hours over the central and northern portions of the park in the summer and over the northern portions of the park in the spring and fall. Depending on the time of year, shadows from the proposed project would be cast 20 to 30 minutes between the hours of 6:45 and 8:30 a.m.

Mission Creek Park Esplanade is part of the Mission Bay Parks system, which establishes the maximum amount of additional allowable shading (e.g., 13 percent for Mission Creek Park, which is the aggregate of parcels NP1 [Mission Creek Park Esplanade], NP2, NP3, P1, P2, P3, and P8) for parks in the Mission Bay Parks system occurring between 10:00 a.m. and 4:00 p.m. from March 20 to September 22 under the Mission Bay Design Guidelines. Therefore, shading effects relative to the Mission Bay shadow design criteria are reviewed for informational purposes. Because the proposed project would not result in any new shading on Mission Creek Park Esplanade between 10:00 a.m. and 4:00 p.m. from March to September, the time period subject to shadow limits under the Mission Bay Design Guidelines, the proposed project would not increase the amount of shadow on Mission Creek Park Esplanade.
Use observations indicate somewhat lower levels of use in the morning, with about 90 percent of users passing through the esplanade rather than stopping and resting. Shade-sensitive features, such as two of the promenade’s six fixed benches, would be in project-generated shadow for approximately 10 minutes, starting at 6:58 a.m. on the date of maximum shading (July 12), leaving two remaining sunny benches, which could affect the desirability of passive uses for some users for a short period of time during the summer months. At other times of year, one or no benches would be affected.

**China Basin Building Promenade.** Under existing conditions, China Basin Building Promenade currently receives approximately 32.7 million sfh of shadow per year, equal to being shaded approximately 22.5 percent of the year. Some existing shadow falls in the morning, but the park is shaded primarily during afternoon hours. The proposed project would increase the amount of shadow that China Basin Building Promenade would receive by approximately 3.4 million sfh of new shadow per year, equal to an increase of approximately 2.4 percent over current shading conditions, with new shadow being present in the morning hours over the central portions of the promenade throughout the year. Depending on the time of year, shadows from the proposed project would be cast for 1.75 to 2.75 hours between the hours of 7:15 and 10:45 a.m. Because this park is not part of the Mission Bay Parks system, it is not subject to the Mission Bay Design Guidelines.

Observations indicate that the majority of promenade usage is transitory; therefore, the promenade would be less likely to be affected by shading compared with other uses. Although some stationary users were observed in the morning hours, more were seen around the lunch hour. At that time, there would be no shading impacts from the proposed project.

**AT&T Park Plaza.** Under existing conditions, AT&T Park Plaza currently receives approximately 59.7 million sfh of shadow per year, equal to being shaded approximately 27.7 percent of the year. Existing shadow falls primarily during morning and evening hours year-round. The proposed project would increase the amount of shadow that AT&T Park Plaza would receive by approximately 873,823 sfh of shadow per year, equal to an increase of 0.4 percent over current shading conditions, from early November through early February (approximately 100 days a year). In the winter, shading would occur along the western edge of Willie Mays Plaza and throughout Lefty O’Doul Plaza and a portion of the Waterfront Promenade for 1 to 3 hours, from approximately 7:45 to 11:15 a.m. There would be no project-generated shadow from spring through fall. Because this park is not part of the Mission Bay Parks system, it is not subject to the Mission Bay Design Guidelines.

Usage of AT&T Park Plaza varies greatly. Large-scale events such as baseball games in the spring, summer, and fall, as well as additional year-round events, increase usage of AT&T Park. Because the proposed project would not generate new shadows during the baseball season, impacts on a great number of users would be diminished. However, the plaza is part of the San Francisco Bay Trail, which is a well-used pedestrian thoroughfare that operates at all times of
year, including during the winter months when the proposed project would shade a portion of the plaza in the morning. The plaza itself is a transitional space; therefore, users would be unlikely to be substantially affected. However, the fixed bench in the southern corner of the plaza would receive new shadow for up to approximately 90 minutes, which could affect its desirability for some users.

**Kids’ Park.** Under existing conditions, Kids’ Park currently receives approximately 54.2 million sfh of shadow per year, equal to being shaded approximately 27.8 percent of the year. Existing shadow falls throughout the day, with the exception of midday during summer and fall. Under either land use assumption, Kids’ Park would receive an additional 38,383 sfh of shadow per year, equal to an increase of 0.02 percent over current shading conditions, from mid-May through late July (approximately 70 days a year). In the summer, new shadows would be cast over the southwestern portion of the park during the first 30 minutes of the morning hours, starting around 6:45 a.m., from late May through mid-July, thereby affecting the picnic area as well as a grassy area. There would be no new shading impacts in fall, spring, or winter.

Kids’ Park is part of the Mission Bay Parks system. Therefore, shading effects relative to the Mission Bay shadow design criteria are reviewed for informational purposes. However, the proposed project would not result in any new shading between 10:00 a.m. and 4:00 p.m. from March 20 to September 22, the time period subject to shadow limits under the Mission Bay Design Guidelines. Shading would occur in the early morning and be gone prior to 10:00 a.m. Therefore, the proposed project would not increase the amount of shadow on Kids’ Park subject to the maximum under the Mission Bay Design Guidelines.

Project shadows would occur for a short period of time during summer months in an area that contains seating and eating areas; portions of a grassy area could also be affected. Although these features could be considered sensitive to additional shadow, project-generated shadow would occur for only a short period of time during the early morning, when active use of these features may be low.

**Other Existing Outdoor Recreation Facilities**

**Mission Creek**

Mission Creek is host to a number of user activities, including boating, canoeing, and paddle boarding. Although shadows cast on these areas could affect the aforementioned activities, the majority of these activities are transitory in nature. Therefore, most users would not remain in one specific area for an extended period of time and would be able to leave the areas shaded by the project. Between March and October, for up to approximately 4 hours after sunrise, the proposed project would cast shadows toward the west. These shadows would fall on Mission Creek. On or around the summer solstice, these shadows would fall on a section of Mission Creek south of the Fourth Street Bridge, between Mission Creek Park Esplanade and Mission Creek Park, but shadows would not extend as far southward as the mooring locations for a
row of permanent houseboat residences. On dates leading up to, or away from, the summer solstice, the shadows would progressively move northward, affecting the section of Mission Creek between the Third and Fourth Street Bridges until approximately October 15 and March 1.

**San Francisco Bay**

Similar to Mission Creek, the San Francisco Bay is host to user activities including boating, canoeing, and paddle boarding. In addition, a boat launch serves as an origin point for certain Bay tours. Water areas affected in the afternoon include eastern portions of the San Francisco Bay to the east. On or around the summer solstice, new shadows would be southward past Pier 50, and on the winter solstice the northward extent of new shadows on the bay would reach the mouth of the South Beach Harbor Marina, but not shade the AT&T Park ferry terminal. Although shadows cast on these areas could affect the aforementioned activities, the majority of these activities are transitory in nature. Therefore, most users would not remain in one specific area for an extended period of time and would be able to leave the areas shaded by the project. A possible exception would be those users who gather in kayaks and other small watercraft during San Francisco Giants baseball games at AT&T Park (April through October); however, throughout the baseball season (when AT&T Park has the greatest number of regular visitors), the proposed project would not shade any portion of China Basin waterfront.

**Sidewalks**

Sidewalks in the project vicinity are already shadowed in the morning and afternoon by densely developed, multi-story buildings. Although implementation of the proposed project would add net new shadow to the streets and sidewalks in the project vicinity, these shadows would be transitory in nature, would not substantially affect the use of the streets and sidewalks, and would not increase shadows above levels that are common and generally expected in a densely developed urban environment. The proposed project would not create a significant shadow impact on streets and sidewalks in the project vicinity. This impact would be *less than significant*.

**Future Public Open Spaces in the Project Vicinity (Treated as Existing for Purposes of This Analysis)**

As discussed above, three future open spaces (Mission Creek Park [P3], Dog Run Park, and Mission Bay Park [P19]) have been approved or are under construction. For the purposes of analyzing the proposed project’s shadow impacts, these three future open spaces are being treated as existing open spaces.

**Mission Creek Park (P3).** The area where Mission Creek Park (P3) would be located currently receives approximately 117.0 million sfh of shadow per year, equal to being shaded 30.5 percent of the year. Existing shadow in the area falls during morning through mid-afternoon hours year-around. In addition, existing shadow occurs for up to 1 hour in the afternoon/evening from
late spring though early fall. The proposed project would result in new shadows at Mission Creek Park (P3) 365 days per year. Under either land use assumption, Mission Creek Park (P3) would receive an additional 17.5 million sfh of new shadow per year, equal to an increase of approximately 4.6 percent over current shading conditions. In the summer, new shadows would occur over a portion of the central/northern area of the park during morning hours, lasting for up to 5 hours, from approximately 6:45 to 11:45 a.m. Similar shadows would occur during the fall and spring months, except that they would last for up to 4 hours, from approximately 7:45 to 11:45 a.m. In the winter, new shadows would be cast over the northern quarter of the park during morning hours, lasting for up to 3 hours, from approximately 7:30 to 10:30 a.m.

Mission Creek Park (P3) would be part of the Mission Bay Parks system, which, under the Mission Bay Design Guidelines, establishes the maximum amount of additional park area (e.g., 13 percent for Mission Creek Park, which is the aggregate of parcels NP1, NP2, NP3, P1, P2, P3 [Mission Creek Park (P3)], and P8) that can be shaded continuously for 1 hour or longer between 10 a.m. and 4 p.m. from March 20 to September 22. Therefore, shading effects relative to the Mission Bay shadow design criteria are reviewed for informational purposes. The project would result in new shading that would be present at 10:00 a.m. throughout the year and leave the park between 10:30 and 11:45 a.m. However, the areas of the park that would be shaded continuously for 1 hour or longer between March 20 and September 22 would represent less than 13 percent of total park area. As such, proposed project shading would not increase the amount of shadow on Mission Creek Park (P3) subject to the maximum under the Mission Bay Design Guidelines.

Given that Mission Creek Park (P3) would feature wide pedestrian pathways and serve as a connector between Third and Fourth Streets, it is likely that a large portion of users of this open space would be transitory and therefore less likely to be adversely affected by project shading, when present. With respect to nontransitory uses, the northern portion of the park that would be affected by project shading would contain approximately four fixed benches/seating areas (i.e., tables in a “picnic grove” as well as a designated seating area for “cafe seating”). It is likely that use of these spaces would be lower during the early-morning hours, the time when the project’s shadow area is largest; however, some shading on the cafe seating area as well as one of the fixed benches on the northern end of the park would be present until later in the morning (until around 11:30 a.m.), at which time these areas may be more active. The tables in the picnic grove would be located under proposed trees, which would reduce the expectation of users for sunlight.

**Dog Run Park.** The area where Dog Run Park would be located receives approximately 24.5 million sfh of shadow per year, equal to being shaded 45.6 percent of the year. Existing shadow falls throughout the day, with the exception of midday during summer and fall. Under either land use assumption, Dog Run Park would receive an additional 49,947 sfh of new shadow per year, equal to an increase of 0.1 percent over current shading conditions, from mid-May through early August (approximately 80 days a year). During these summer months, new shadows would be cast over the southern portion of the park during the first 25 minutes of the morning hours, starting around 6:45 a.m., from mid-May through early August. There would be no new shadow during fall, spring, or winter. Dog Run Park is part of the Mission Bay Parks system. However, Dog Run Park has no stated restrictions or limitations with respect to shadow under the Mission Bay Design Guidelines. Therefore, the proposed project would not result in an exceedance of maximum shadow limits at Dog Run Park under the Mission Bay Design Guidelines.

Located southwest of the proposed project, Dog Run Park would receive no project-generated shadow at any time from the mid-morning on; project buildings would cast shadow on this open space only in the early morning hours. For a large portion of users, Dog Run Park would be a specific destination where they would remain with or near their pets. If the final design of Dog Run Park were to feature seating areas in the southwestern corner of the park, along the Long Bridge Street frontage, users would most likely be affected by early-morning shadows from the project during summer months; however, that shading would recede and leave the park over the span of 20 minutes or less and therefore would not displace any users who had chosen a sunny location.

**Mission Bay Park (P19).** The area where Mission Bay Park (P19) would be located currently receives approximately 2.1 million sfh of shading per year, equal to being shaded 6.5 percent of the year. Under either land use assumption, Mission Bay Park (P19) would receive an additional 139,994 sfh of shadow per year, equal to an increase of 0.4 percent over current shading conditions, from mid-April through late August (approximately 140 days a year). In the summer, new shadows would be cast over the northern two-thirds of the park in the later afternoon/evening, starting between 6:15 and 6:45 p.m. Other than a few afternoons in late spring, no project-generated shadow impacts would occur during the fall, spring, or winter months. Mission Bay Park (P19) is part of the Mission Bay Parks system. However, no shadow limit applies to this park under the Mission Bay Design Guidelines. Therefore, the proposed project would not result in any exceedance of maximum shadow limits at Mission Bay Park (P19) under the Mission Bay Design Guidelines.

Mission Bay Park (P19) would receive project-generated shadow only during late afternoons and evenings in the summer. Little specific information is available regarding the basic programming at this time. Only a conceptual discussion of possible qualitative shading effects is appropriate. However, it is likely that many of users of this open space would be transitory in nature. If features such as fixed seating were implemented on the northern side of the space, it is possible that users could be affected by project-generated shadows.
CONCLUSION OF SHADOW IMPACTS ON EXISTING AND PROPOSED OFFSITE PARKS

As described above, the proposed project would generate a new net shadow on each of the open spaces analyzed. The annual increase in new shadow on existing and proposed offsite parks and open spaces would range from 0.02 percent (Kids’ Park) to 4.6 percent (Mission Creek Park South) throughout the year, with the number of days of increased shadow ranging from approximately 70 to 365 days a year.

With regard to qualitative shadow impacts, park and open space users in Mission Creek Park South (P1), China Basin Building Promenade, AT&T Park Plaza, Mission Creek Park (P3), and Mission Bay Park (P19) were found to be primarily transitory in nature and therefore less likely to be adversely affected by project shading. In parks and open spaces, including Mission Creek Park Esplanade, AT&T Plaza, Kids’ Park, and Dog Run Park, shade-sensitive or fixed features such as benches would be shaded. However, shading would be short in duration.

Because project shading would be present from the time that the new offsite open spaces are created, users of these new open spaces would not experience such shading as additive to a baseline condition. Although it is possible that users of existing open spaces could be affected by the presence of new shadow, the likelihood that the project would create new shadow in a manner that would substantially affect existing outdoor recreation facilities or other public areas would appear to be low. In general, the new net shadow cast would represent a very small increase in shadows cast. Therefore, the new net shadow would not adversely affect the use of Mission Creek Park South, Mission Creek Park Esplanade, China Basin Building Promenade, AT&T Park Plaza, Kids’ Park, Mission Creek Park (P3), Dog Run Park, or Mission Bay Park (P19). This impact is considered less than significant.

FUTURE PUBLIC OPEN SPACES ON THE PROJECT SITE

As discussed above, one existing open space (China Basin Park) would be expanded as part of the proposed project, and three new open spaces (Mission Rock Square, Channel Lane, and Channel Wharf) would be created as part of the proposed project. Out of these four open spaces, China Basin Park, is the only open space included in the impact assessment because it is an existing open space.

CHINA BASIN PARK (EXPANDED). Under existing conditions, the existing China Basin Park receives approximately 6 million sfh of shadow per year, equal to being shaded approximately 1.44 percent of the year. The limited amount of existing shadow falls during late afternoon/early evening hours from mid-spring through summer and into mid-fall, occurring on the western third of the park. Early morning shadows are present during spring and fall on the southeastern side of the park near Pier 48, and the duration of both morning and afternoon shading is longest during the winter when morning shading covers a portion of the southeastern corner; after an hour of midday full sun, shadows move from west to east across the western 2/3 of the park.
Under existing conditions, the area where the proposed expanded China Basin Park would be located currently receives approximately 20.9 million sfh of shadow per year, equal to being shaded approximately 2.7 percent of the year. Existing shadow falls primarily during morning and evening hours year-round, with some midday shadow during the winter months. The proposed publicly accessible apron of Pier 48 currently receives 85.4 million sfh, or 13.4 percent, of shadow per year. As discussed above, China Basin Park is an existing park at the project site. The proposed expansion to 4.4 acres (an addition of 2.2 acres) would include the existing east–west portion of Terry A. Francois Boulevard. Upon completion, the expanded China Basin Park would be bounded by China Basin to the north, the San Francisco Bay to the east, Pier 48 to the southeast, proposed Blocks A, G, and K to the south, and Third Street/Lefty O’Doul Bridge to the northwest. The expanded China Basin Park would include open space (a lawn), a special-event/assembly area for about 5,000 people, waterfront café and kiosks, play areas, Little League baseball field, picnic area, and promenade.

The proposed project buildings would contribute to new shadow 365 days per year. Under the High Commercial Assumption, the expanded China Basin Park would receive an additional 224 million sfh of shadow per year, which is equal to an increase of 28.4 percent compared with existing conditions. In addition, the Pier 48 apron would receive an additional 6.3 million sfh of shadow per year, equal to being shaded approximately 1.0 percent of the year, under the High Commercial Assumption. Under the High Residential Assumption, the expanded China Basin Park would receive an additional 223.7 million sfh of shadow per year, or an increase of approximately 28.4 percent compared with existing conditions. The Pier 48 apron would receive an additional 6.8 million sfh of shadow per year, equal to being shaded approximately 1.1 percent of the year, under the High Residential Assumption.

Although the proposed expanded China Basin Park would receive an approximately 28 percent increase in shadow from the project than the area where the proposed expanded China Basin Park would be located, or than the existing China Basin Park receives, the expanded China Basin Park would also receive more sfh of theoretically available sunlight than the existing China Basin Park, because of the increased size of the expanded park relative to the existing park. The existing China Basin Park currently has 411.8 million sfh of theoretically available sun annually; the proposed expanded China Basin Park would have 767.6 million sfh of theoretically available sun annually. This represents an annual increase in total theoretically available sunny open space of 180 percent over existing conditions.

In the summer, new project-generated shadows would be present throughout the day but smaller relative to other times of year, and would be cast over the southern edge of the park throughout the day, affecting primarily the park promenade, and southern portions of the play areas and the Great Lawn (all of which are proposed features of the expanded China Basin Park). In the fall and spring months, new shadows would be cast throughout the day but farther northward than in summer months, shading the southern half of the park in September and
April and as much as the full park in October and March. Affected areas would be similar to those affected during summer months, with late-fall/early-spring impacts extending to the Waterfront Promenade and Rain Gardens. Most park features would receive some shadow at some point during the day. During the winter months, new shadows would be cast over the majority of the park and beyond to China Basin, sweeping from west to east from morning through evening. All park features would receive winter shadow from the proposed project at some point during the day.

Throughout the year, the park areas that would be most affected by daily project shading would be along the southern edge of the park. These areas immediately adjacent to the northernmost proposed buildings would be in shadow for most of the day, from fall through spring; however, planned uses in these areas are expected to be primarily transitory in nature (i.e., the park promenade) and, as such, would most likely be less affected by the presence of shadow. Use observations of the existing China Basin Park indicate that current park usage is predominately transitory; however, features such as Junior Giants Field were observed to have a slightly higher level of use than other existing park features (such as the promenade), and given the additional size and amenities that are planned for the enlarged park overall, it is reasonable to assume that a higher number of users may treat the renovated/expanded park as a destination. In addition to Junior Giants Field, other areas potentially more sensitive to new shadow, such as the central play areas and the Great Lawn, would receive more shadow during the fall, winter, and spring, particularly from afternoon through early evening, which could affect their nontransitory users.

**Conclusion of Shadow Impacts on China Basin Park**

As discussed above, China Basin Park would be expanded as part of the proposed project. Although the expanded China Basin Park would receive around 28 percent more shadow from the proposed project compared with the amount the existing China Basin Park receives under existing conditions, it would also receive a higher total sfh of theoretically available sunlight because of the increased size of the expanded park relative to the existing park. This represents an annual increase in total theoretically available sunny open space of 180 percent. Shading impacts would occur year-round, with the most affected area along the southern edge of the park. However, planned uses in this area of the expanded park are expected to be primarily transitory in nature. Because project shading would be present from the time that the expanded portion of China Basin Park is created, users of this new portion of open space would not experience such shading as additive to a baseline condition. Although it is possible that users of existing open spaces could be affected by the presence of new shadow, the likelihood that the project would create new shadow in a manner that would substantially affect existing outdoor recreation facilities or other public areas would appear to be low. In general, the new net shadow cast would be more than offset by the increase in the total amount of sunlight available at the park due to the increase in the size of the park. Therefore, the new net shadow would not adversely affect the use of China Basin Park (expanded). This impact is considered less than significant.
Because the following open spaces would be developed as part of the proposed project, this discussion is presented for informational purposes only.

**Mission Rock Square.** The proposed 1.1-acre Mission Rock Square would be located in the center of Seawall Lot 337. Mission Rock Square would be framed by a mix of residential and commercial uses above active/retail and production uses on the lower floors. Mission Rock Square would include a multi-use lawn, plaza, café pavilion, and special-event/assembly area for approximately 2,000 people.

Under project conditions, portions of Mission Rock Square would be shaded 365 days per year (refer to Figures 4.I-11 through 4.I-19). Under the High Commercial Assumption, Mission Rock Square would receive 95 million sfh of shadow per year. Under the High Residential Assumption, Mission Rock Square would receive 96.3 million sfh of shadow per year.

The project design optimizes sunlight on proposed open spaces during the active hours of the day – particularly on the northern portion of Mission Rock Square. From spring through fall, the proposed project would result in early-morning shadows that would cover the majority of Mission Rock Square; however, they would recede by mid-morning. In the early afternoon, shadows would be present in the southern portion of Mission Rock Square; shading would encroach from the west in the afternoon until the entire square would be in shadow by the later afternoon/early evening. During fall and spring, the midday shadow area south of the square would be larger than in the summer, and a band of sunlight running west–east would be present in the late afternoon. In the winter, early-morning shadows would cover all of the square but would recede by noon to cover only the southern one-half to two-thirds of the square. Shading would encroach from the west in the afternoon until the entire square would be in shadow by mid-afternoon. The central event space (particularly the northern half) and the northern boardwalk/seating area would be the areas of the park that would enjoy the greatest amount of sunshine during midday hours throughout the year, while the southern boardwalk/seating area would be more frequently cast in shadow. Early-morning park users would encounter more shadow on the eastern half of the park, whereas afternoon users would find shadows growing in size from the west. Given the park’s location among proposed tall structures, significant shading is inevitable, and coupled with the fact that Mission Rock Square would be created at the same time as the surrounding structures that would cast shadow on it, it is unlikely that users would expect greater access to sunlight at this location.

**Channel Lane.** Channel Lane would be part of the proposed Seawall 337 project and an approximately 0.2-acre pedestrian walkway, linking Mission Rock Square to Channel Wharf and the Bay. It would be located north of Block I and south of Block J, running east–west between the proposed Bridgeview Street and Terry A. Francois Boulevard on the Seawall Lot 337 site. Gathering spaces would be provided on either side of a ramp that would serve as an egress/ingress point for the Mission Rock Square parking garage. Site features could include overhead lighting, special paving, and shade-tolerant plants and trees. The proposed project
would result in shadow on portions of Channel Lane 365 days per year. Under the High Commercial Assumption, Channel Lane would receive 19.8 million sfh of shadow per year. Under the High Residential Assumption, Channel Lane would receive 20.3 million sfh of shadow per year.

In the summer months, morning shadows would fall on the northern side of Channel Lane, with the least amount of shading occurring around noon. Shadows would increase in the afternoon, affecting all areas of Channel Lane by late afternoon or evening. During the fall and spring, morning shadows would fall on the southern side of Channel Lane and move east. By noon, shadows would encompass the majority of the area. By afternoon or evening, sunlight would be present along the northwestern corner and the northern edge of Channel Lane. In the winter, morning shadows would fall on the southern side of Channel Lane, covering all but the northeast corner of Channel Lane. By the afternoon, shadows would cover most to all of Channel Lane.

Despite its proposed location immediately adjacent to two tall structures to the north and west, Channel Lane would have an open vista on the Bay to the east, which would provide morning sunlight, particularly on the eastern side of Channel Lane, as well as some afternoon sunlight, particularly during the fall and spring, through a gap in project buildings to the west. During summer months, midday sun would also be present over the majority of the space. Aside from its likely use as a transitional space between Mission Rock Square and the waterfront, Channel Lane would have a variety of seating areas, both fixed and open. This variety would allow park visitors to locate to a sunnier area if desired. As with Mission Rock Square, Channel Lane would be created at the same time as the surrounding structures that would cast shadow on it; therefore, it is unlikely that Channel Lane users would expect greater access to sunlight at this location.

**CHANNEL WHARF.** A new open space at Channel Wharf would be constructed in the location of the current marginal wharf between Piers 48 and 50, east of Terry A. Francois Boulevard. Channel Wharf would be a 0.5-acre paved plaza with public art, seating, and a drop-off area leading to the recreational uses at the project site. It is intended to provide public access to the Bay front and function as a maritime access point for industrial activities on Piers 48 and 50. The proposed project would result in shadow on portions of Channel Wharf 365 days per year. Under the High Commercial Assumption, Channel Wharf would receive 20.8 million sfh of shadow per year. Under the High Residential Assumption, Channel Wharf would receive 21.1 million sfh of shadow per year.

In the summer, new shadows would be cast over the entirety of Channel Wharf in the late afternoon, starting between 3:45 and 4:30 p.m., with shadows from the High Residential Assumption arriving up to 30 minutes earlier than shadows cast by the High Commercial Assumption. From fall through the spring, new shadows would be cast over the entirety of Channel Wharf from the afternoon, starting around 1:30 p.m., through the end of the day, with
shadows from the High Residential Assumption arriving up to 15 minutes earlier than shadows cast by the High Commercial Assumption. In the winter, new shadows would be cast over the entirety of the park in the late afternoon, starting between 1:30 and 3:30 p.m. and growing through the end of the day, with shadows from the High Residential Assumption arriving up to 15 minutes earlier than shadows cast by the High Commercial Assumption.

Located to the east of the proposed Seawall 337 development (between Piers 48 and 50), Channel Wharf would receive no project-generated shadow at any time from the morning through early afternoon throughout the year; project buildings would cast shadow on this open space in late afternoon. Similar to Channel Lane, a large portion of users of this open space would be transitory in nature. However, the fixed seating areas would also draw visitors who would remain for some time. Users may not find the space as attractive as a destination in the afternoon when the wharf is in shade; however, as is the case with the other open spaces proposed by the project, Channel Wharf would be created at the same time as the surrounding structures that would cast shadow on it; therefore, it is unlikely that Channel Wharf users would expect greater access to sunlight at this location.

**CONCLUSION OF SHADOW IMPACTS ON PROPOSED ONSITE OPEN SPACES**

The Planning Department does not consider project-related shading on the proposed open spaces in the impact analysis of shadow. As such, the discussion provided is for informational purposes only. No impact conclusion is required for Mission Rock Square, Channel Lane, or Channel Wharf. Given the proposed locations of Mission Rock Square, Channel Lane, and Channel Wharf among and near tall structures, substantial shading on these open spaces would be inevitable. Coupled with the fact that these areas would be created at the same time as the surrounding structures that would cast shadow on them, it is unlikely that users would expect greater access to sunlight.

**CUMULATIVE IMPACTS**

The geographic context for the analysis of cumulative impacts associated with shadow considers the Mission Bay area surrounding the project site. Specifically, the cumulative shadow study considers future buildout of Mission Bay Block Lots 3E, 4E, 9, and 9A. In addition to these blocks, the Shadow Study also considers buildout of Mission Bay Block 12W. The projects considered in this analysis are listed in Table 4-1 of Chapter 4, *Environmental Setting and Impacts.*
Impact C-WS-2: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not create new shadow in a manner that would substantially affect outdoor recreational facilities or public areas. (Less than Significant)

Mission Bay Park (P19) is the only open space in the project vicinity that would be affected by shadow cast by cumulative projects, specifically from development on Lot 9A, which is immediately adjacent to the park and to the west. Throughout the year, cumulative shading would occur on Mission Bay Park (P19), starting at midday, continuing throughout the afternoon, and expanding eastward as the day progresses. During summer months, all of Mission Bay Park (P19) would be in cumulative shadow by around 5:00 p.m. From fall through the spring, the northern three-quarters of Mission Bay Park (P19) would be shaded by the early afternoon, with the whole park being cast in shadow by around 6:00 p.m. At times when project shadows would be present, cumulative shadow would also be present, covering all locations where project shadows would fall. Therefore, when the cumulative projects are built as planned, there would be no net new shadow from the project on Mission Bay Park (P19) due to overlapping shadow cast by cumulative projects. The proposed project would not combine with past, present, and reasonably foreseeable future projects in the project vicinity to create a significant cumulative shadow impact on Mission Bay Park. This impact (P19), would be less than significant.

Sidewalks in the project vicinity are already shadowed in the morning and afternoon by densely developed, multi-story buildings. Although implementation of the proposed project and nearby cumulative development projects would add net new shadow to the streets and sidewalks in the project vicinity, these shadows would be transitory in nature, would not substantially affect the use of the streets and sidewalks, and would not increase shadows above levels that are common and generally expected in a densely developed urban environment. The proposed project would not combine with past, present, and reasonably foreseeable future projects in the project vicinity to create a significant cumulative shadow impact on streets and sidewalks in the project vicinity. This impact would be less than significant.