

A. INTRODUCTION

This chapter considers the potential for the Proposed Project to cast shadow on nearby publicly accessible parks or plazas, sunlight-dependent features of historic resources, or important natural features. The analysis updates changes in background conditions since the *Final Generic Environmental Impact Statement for the Phased Redevelopment of Governors Island* (2011 FGEIS) and assesses whether any changed background conditions and the differences in program elements between the proposed development program and those assessed in the 2011 FGEIS would result in any significant adverse impacts to sunlight-sensitive resources from project-generated shadow that were not addressed in the 2011 FGEIS. The components of the Proposed Project are described in Chapter 1, “Project Description.”

According to the *City Environmental Quality Review (CEQR) Technical Manual*, a shadows assessment is required if the project would result in structures (or additions to existing structures) of 50 feet or more or if the project site is located adjacent to or across the street from a sunlight-sensitive resource. For the components of the Proposed Project that have changed since the FEIS, only the structure proposed for the open area north of Building 110 and adjacent to Soissons Landing (the Soissons Concession Site) would meet this criteria. The proposed structure, a new restaurant/entertainment building in the area formerly known as Water Taxi Beach, would reach a maximum height of approximately 25 feet. The new structure would be located adjacent to a portion of the Great Promenade, open space area to the south along what is currently known as Ferry Line Road, and the Upper New York Bay. Therefore, a shadows assessment was conducted.

B. PRINCIPAL CONCLUSIONS

The assessment concluded that the proposed building would cast new shadows on portions of the adjacent publicly-accessible open space areas, and the Upper New York Bay. However, the incremental shadow from the proposed structure would not result in a substantial reduction in the usability of the Great Promenade or the other portions of adjacent open space. Similarly, the incremental shadow from the proposed structure would not significantly alter the microclimate of the affected portion of the Upper New York Bay. Therefore the Proposed Project would not result in significant adverse shadow impacts, and the conclusions of the 2011 FGEIS would not change.

C. SUMMARY OF 2011 FGEIS FINDINGS**PHASE 1**

Phase 1 of the Proposed Project would not result in any new structures and, therefore, would not cause any adverse shadow impacts. However, it would improve some existing areas (such as the

paved area at Soissons Landing) and create new open space areas that would become sun-sensitive open spaces.

LATER PHASES

The Later Phases—Park and Public Spaces would also not result in any tall structures but would add to the inventory of sun-sensitive open spaces.

The Later Phases—Island Redevelopment would likely result in new shadows on portions of the open spaces created or improved by the Proposed Project. Open spaces and any sun-sensitive historic resources that are near the development zones and to their east, north, and west would be more likely to experience project-generated shadows than those farther away or directly south of the development zones. If the affected open spaces were not being created by the Proposed Project, it is possible that some incremental shadows from development zone structures would be considered to have significant adverse impacts. On the other hand the North Island open spaces and historic resources that are farther away from the development zones (i.e., north of Liggett Hall) would likely be only minimally affected by project-generated shadows, although this would depend on the height, location, and configuration of the structures that are eventually built in the development zones. The design and programming of the proposed Park and Public Spaces would reflect the expected sunlight and shadow conditions at each location, to address potential shadow effects. Additionally, the two development zones would be planned and developed to minimize shadow impacts on the Island's open spaces. Shadows cast by new buildings could affect utilization of these open spaces, particularly in the cooler weather months. In any case, it is expected that there would be further review of shadows when the development is actually proposed because it is very likely to require land use actions that are subject to environmental review by the City Planning Commission or the Board of Standards and Appeals.

D. DEFINITIONS AND METHODOLOGY

This analysis has been prepared in accordance with CEQR procedures and follows the guidelines of the *CEQR Technical Manual*.

DEFINITIONS

Incremental shadow is the additional, or new, shadow that a structure resulting from a proposed project would cast on a sunlight-sensitive resource.

Sunlight-sensitive resources are those resources that depend on sunlight or for which direct sunlight is necessary to maintain the resource's usability or architectural integrity. Such resources generally include:

- *Public open space* (e.g., parks, beaches, playgrounds, plazas, schoolyards, greenways, landscaped medians with seating). Planted areas within unused portions of roadbeds that are part of the Greenstreets program are also considered sunlight-sensitive resources.
- *Features of architectural resources that depend on sunlight for their enjoyment by the public*. Only the sunlight-sensitive features need be considered, as opposed to the entire resource. Such sunlight-sensitive features might include design elements that depend on the contrast between light and dark (e.g., recessed balconies, arcades, deep window reveals); elaborate, highly carved ornamentation; stained glass windows; historic landscapes and scenic landmarks; and features for which the effect of direct sunlight is described as playing a significant role in the structure's importance as a historic landmark.

- *Natural resources* where the introduction of shadows could alter the resource's condition or microclimate. Such resources could include surface water bodies, wetlands, or designated resources such as coastal fish and wildlife habitats.

Non-sunlight-sensitive resources include, for the purposes of CEQR:

- *City streets and sidewalks* (except Greenstreets);
- *Private open space* (e.g., front and back yards, stoops, vacant lots, and any private, non-publicly accessible open space);
- *Project-generated open space* cannot experience a significant adverse shadow impact from the project, according to CEQR, because without the project the open space would not exist. However, a qualitative discussion of shadows on the project-generated open space should be included in the analysis.

A significant adverse shadow impact occurs when the incremental shadow added by a proposed project falls on a sunlight-sensitive resource and substantially reduces or completely eliminates direct sunlight, thereby significantly altering the public's use of the resource or threatening the viability of vegetation or other resources. Each case must be considered on its own merits based on the extent and duration of new shadow and an analysis of the resource's sensitivity to reduced sunlight.

METHODOLOGY

Following the guidelines of the *CEQR Technical Manual*, a preliminary screening assessment must first be conducted to ascertain whether a project's shadow could reach any sunlight-sensitive resources at any time of year. The preliminary screening assessment consists of three tiers of analysis. The first tier determines a simple radius around the proposed building representing the longest shadow that could be cast. If there are sunlight-sensitive resources within this radius, the analysis proceeds to the second tier, which reduces the area that could be affected by project shadow by accounting for the fact that shadows can never be cast between a certain range of angles south of the project site due to the path of the sun through the sky at the latitude of New York City.

If the second tier of analysis does not eliminate the possibility of new shadows on sunlight-sensitive resources, a third tier of screening analysis further refines the area that could be reached by project shadow by looking at specific representative days in each season and determining the maximum extent of shadow over the course of each representative day.

If the third tier of analysis does not eliminate the possibility of new shadows on sunlight-sensitive resources, a detailed shadow analysis is required to determine the extent and duration of the incremental shadow resulting from the project. The detailed analysis provides the data needed to assess the shadow impacts. The effects of the new shadows on the sunlight-sensitive resources are described, and their degree of significance is considered. The results of the analysis and assessment are documented with graphics, a table of incremental shadow durations, and narrative text.

E. PRELIMINARY SCREENING ASSESSMENT—2022 ANALYSIS YEAR

A base map was developed using Geographic Information Systems (GIS)¹ showing the location of the proposed project and the surrounding roadways and buildings (see **Figure 4-1**). Potential sunlight-sensitive resources were identified and shown on the map.

TIER 1 SCREENING ASSESSMENT

For the Tier 1 assessment, the longest shadow that the proposed Soissons Concession Site structure (a new restaurant/entertainment building) could cast is calculated, and, using this length as the radius, a perimeter is drawn around the project site. Anything outside this perimeter representing the longest possible shadow could never be affected by project-generated shadow, while anything inside the perimeter needs additional assessment.

According to the *CEQR Technical Manual*, the longest shadow that a structure can cast at the latitude of New York City occurs on December 21, the winter solstice, at the start of the analysis day at 8:51 AM, and is equal to 4.3 times the height of the structure.

Therefore, at a maximum height of 25 feet, the proposed structure could cast a shadow up to 108 feet in length (25 x 4.3). Using this length as the radius, a perimeter was drawn around the potential building site (see **Figure 4-1**). Since portions of adjacent publicly-accessible open space areas and the Upper New York Bay (a natural resource) are within the perimeter or longest shadow study area, the next tier of screening assessment was conducted.

TIER 2 SCREENING ASSESSMENT

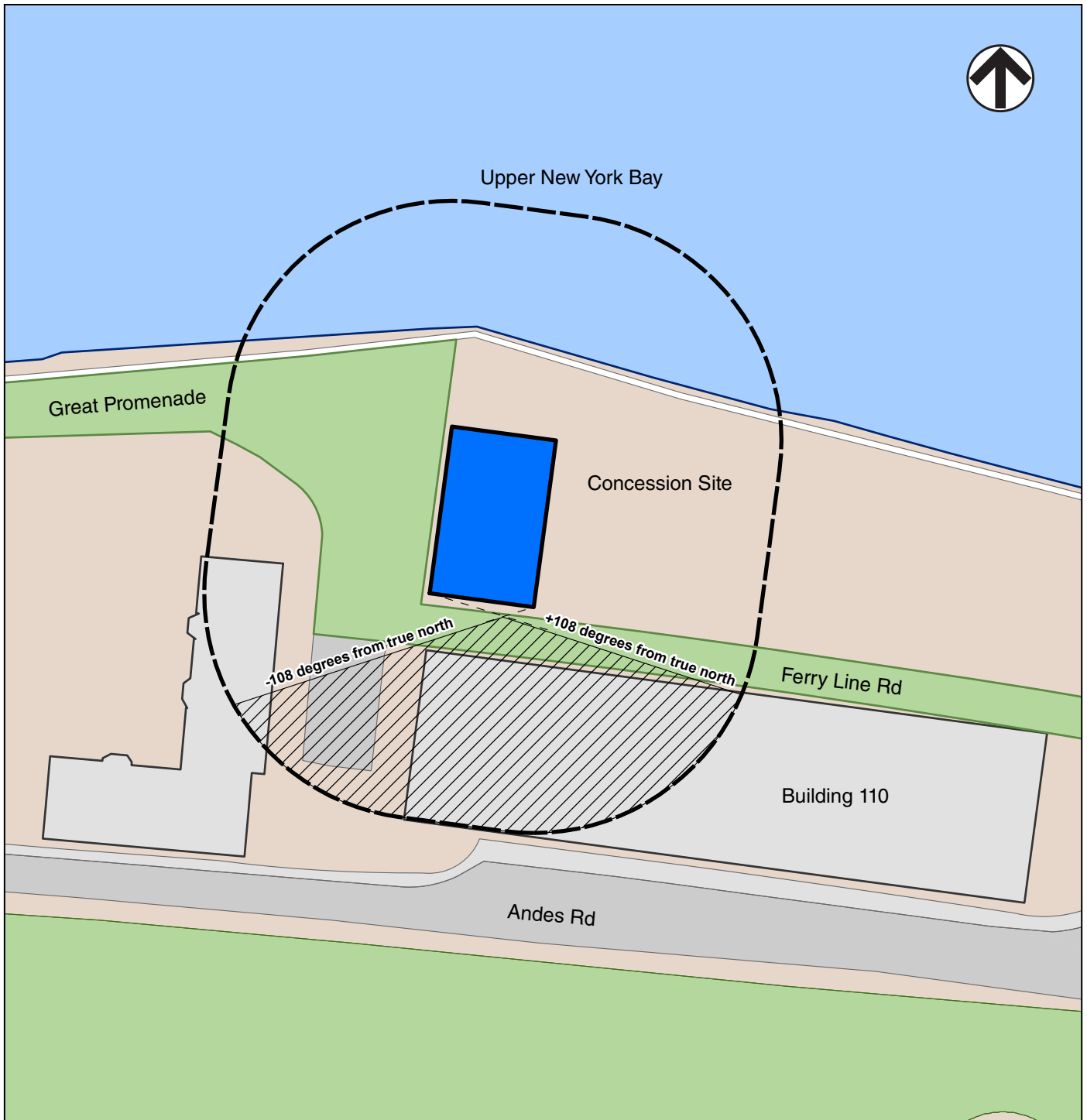
Given the path that the sun travels across the sky in the northern hemisphere, no shadow can be cast in a triangular area south of any given project site. In New York City, this area lies between -108 and +108 degrees from true north. **Figure 4-1** illustrates this triangular area south of the potential building site. The complementing area to the north within the longest shadow study area represents the remaining area that could potentially experience new project-generated shadow.





Portions of adjacent open space areas and the Upper New York Bay are located within the remaining shadow study area. Therefore, the next tier of screening assessment was conducted.

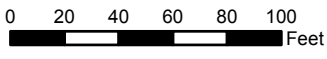
TIER 3 SCREENING ASSESSMENT

The direction and length of shadows vary throughout the course of the day and also differ depending on the season. In order to determine if project-generated shadow could fall on a sunlight-sensitive resource, three-dimensional computer mapping software is used in the Tier 3 assessment to calculate and display the proposed project's shadows on individual representative days of the year. A computer model was developed containing three-dimensional representations of the elements in the base map used in the preceding assessments, the topographic information of the study area, and a reasonable worst-case three-dimensional representation of the proposed project.

¹ Software: Esri ArcGIS 10.1; Data: New York City Department of Information Technology and Telecommunications (DoITT) and other City agencies, and site visits.



-  Potential Building Site
-  Publicly accessible open spaces
-  Tier 1: Longest shadow study area
-  Tier 2: Area to the south that cannot be shaded by proposed building



REPRESENTATIVE DAYS FOR ANALYSIS

Following the guidance of the *CEQR Technical Manual*, shadows on June 21 (the summer solstice), December 21 (winter solstice) and March 21 and September 21 (spring and fall equinoxes, which are approximately the same in terms of shadow patterns) are modeled to represent the range of shadows over the course of the year. An additional representative day during the growing season is also modeled, generally the day halfway between the summer solstice and the equinoxes, i.e., May 6 or August 6, which have approximately the same shadow patterns.

TIMEFRAME WINDOW OF ANALYSIS

The shadow assessment considers shadows occurring between one and a half hours after sunrise and one and a half hours before sunset. Earlier or later than this, the sun is near the horizon and its rays reach the Earth at very tangential angles, diminishing the amount of solar energy and producing shadows that are very long, move fast, and generally blend with shadows from existing structures until it reaches the horizon and sets. Consequently, shadows occurring outside the timeframe window of analysis are not considered significant under CEQR, and their assessment is not required.

TIER 3 SCREENING ASSESSMENT RESULTS

Figure 4-2 illustrates the range of shadows that would occur, in the absence of intervening buildings, from the proposed building on the four representative days for analysis. As they move east and clockwise over the landscape, the shadows are shown occurring approximately every two hours from the start of the analysis day to the end of the analysis day.

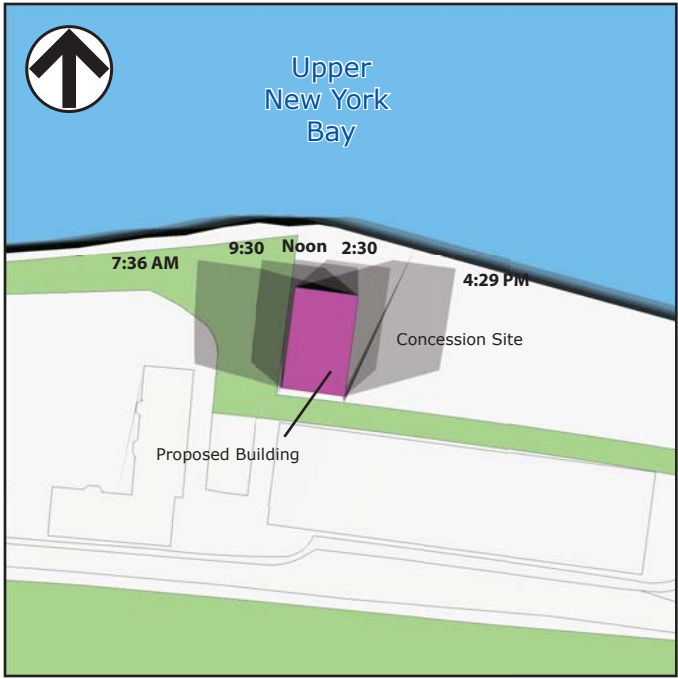
On the mornings of all analysis days, the proposed structure's shadow would pass across the adjacent open space area to the west. Incremental shadow could also reach open space areas to the southeast at the end of the June 21 analysis day. On the December 21 analysis day shadow from the proposed structure would be long enough to also be cast on the Upper New York Bay. Following the methodology of the *CEQR Technical Manual*, further assessment is required for the potentially affected resources.

F. DETAILED SHADOW ANALYSIS—2022 ANALYSIS YEAR

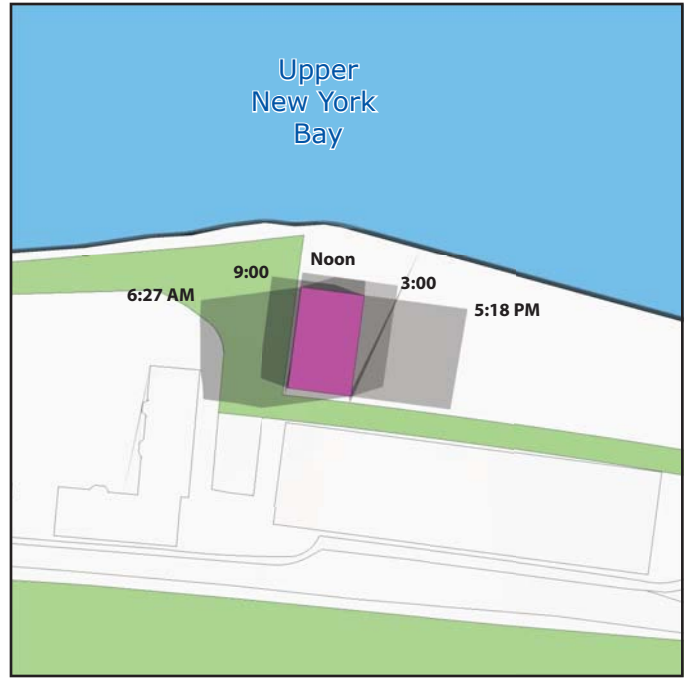
The purpose of the detailed analysis is to determine the extent and duration of new incremental shadows that fall on a sunlight-sensitive resource as a result of the proposed project. To evaluate the extent and duration of new shadow that would be added to a sunlight-sensitive resource as a result of the proposed project, the detailed shadows analysis establishes a baseline condition (No Build) to which the future condition with the proposed project (Build) is compared. Because existing buildings may already cast shadows on a sun-sensitive resource, the proposed project may not result in additional, or incremental, shadows upon that resource.

In order to carry out the detailed shadow analysis, the three-dimensional computer model used for the Tier 3 screening assessment was augmented by adding the existing buildings in the study area.

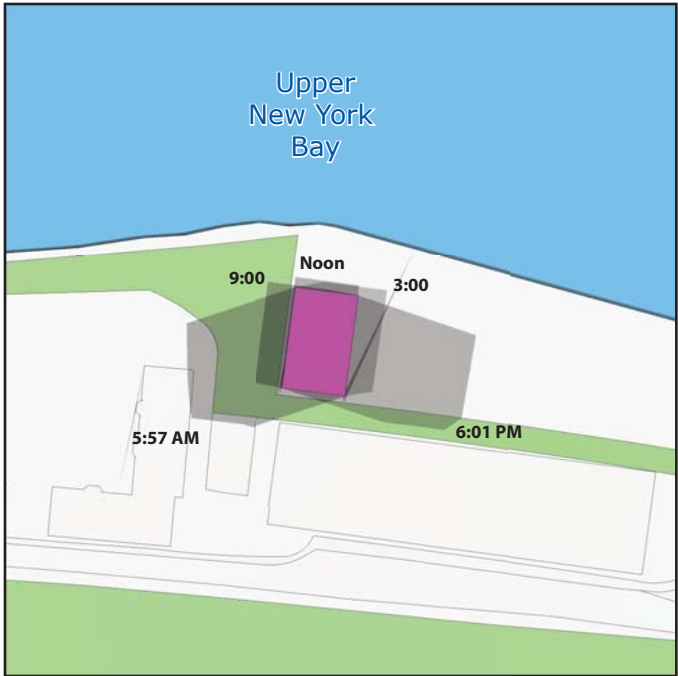
Table 4-1 summarizes the results of the detailed analysis. It shows the entry and exit times and total duration of project-generated incremental shadow on each affected resource.



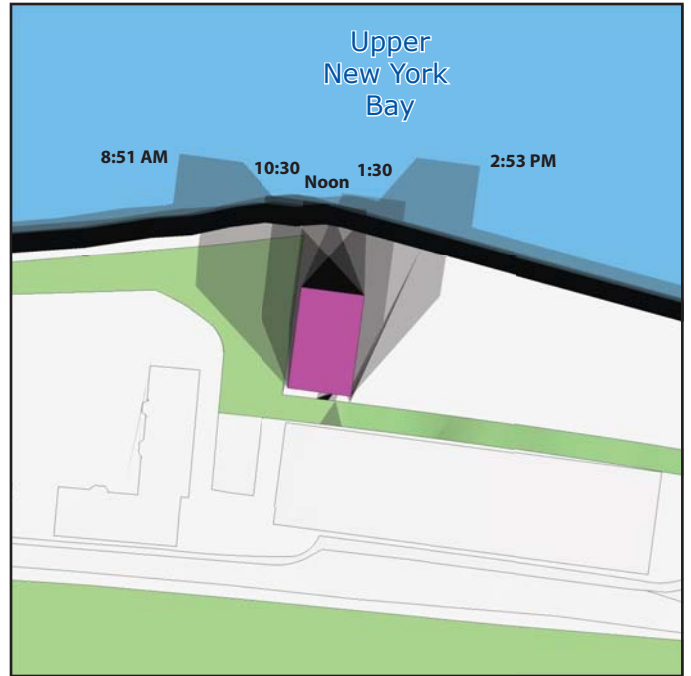
March 21/Sept. 21



May 6/August 6



June 21



December 21

Note: Daylight Saving Time not used.

- Publicly accessible Open Space
- Shadow

**Table 4-1
Incremental Shadow Durations**

	March 21 / Sept. 21 7:36 AM-4:29 PM	May 6 / August 6 6:27 AM-5:18 PM	June 21 5:57 AM-6:01 PM	December 21 8:51 AM-2:53 PM
Open Space Resources				
Open Spaces Adjacent to Soissons Concession Site	7:36 AM–11:50 AM Total: 4 hr 14 min	6:27 AM – 11:20 AM Total: 4 hr 53 min	5:57 AM – 11:20 AM 5:20 PM– 6:01 PM Total: 6 hr 4 min	8:51 AM – 12:00 PM Total: 3 hr 9 min
Natural Resources				
Upper New York Bay	—	—	—	8:51 AM – 2:53 PM Total: 6 hr 2 min
Notes: Table indicates entry and exit times and total duration of incremental shadow for each sunlight-sensitive resource. Daylight saving time is not used—times are Eastern Standard Time, per <i>CEQR Technical Manual</i> guidelines. However, in reality, Eastern Daylight Time is in effect for the March/September, May/August and June analysis periods. Therefore, add one hour to the given times to determine the actual clock time.				

Figures 4-3 through **4-6** document the results of the analysis by providing graphic representations or “snapshots” of times when incremental shadow would fall on a sun-sensitive resource. The figures illustrate the extent of additional, or incremental, shadow at that moment in time, highlighted in red, and also show existing shadow and remaining areas of sunlight.

RESOURCES OF CONCERN

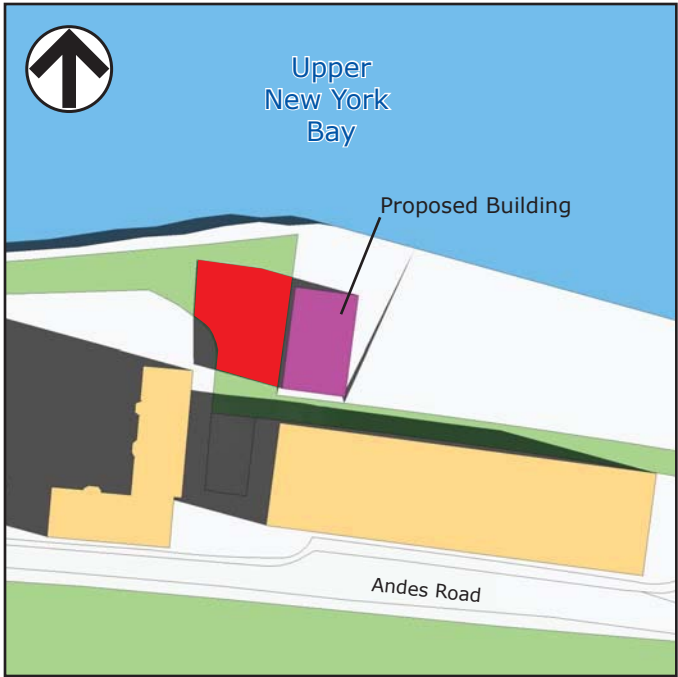
The Great Promenade is a 2.2-mile path around most of the perimeter of the Island which provides sweeping views of New York Harbor and the area around Governors Island. The Promenade terminates at the Soissons Concession Site. The small section of the Great Promenade near the potential building site that would be affected by incremental shadow from the proposed structure provides opportunities for walking, running, and bicycling, among other activities. Currently, the Promenade consists mostly of a shared roadway for vehicles, bicycles and pedestrians. Vehicle traffic is limited to maintenance, service and related functions.

At the termination of the Great Promenade, where it meets the Soissons Concession Site, the paved walkway and roadway turns south and then east, past the Concession Site along what is currently known as Ferry Line Road. Directly west-adjacent to the proposed building, there is currently a grassy area or traffic island as well.

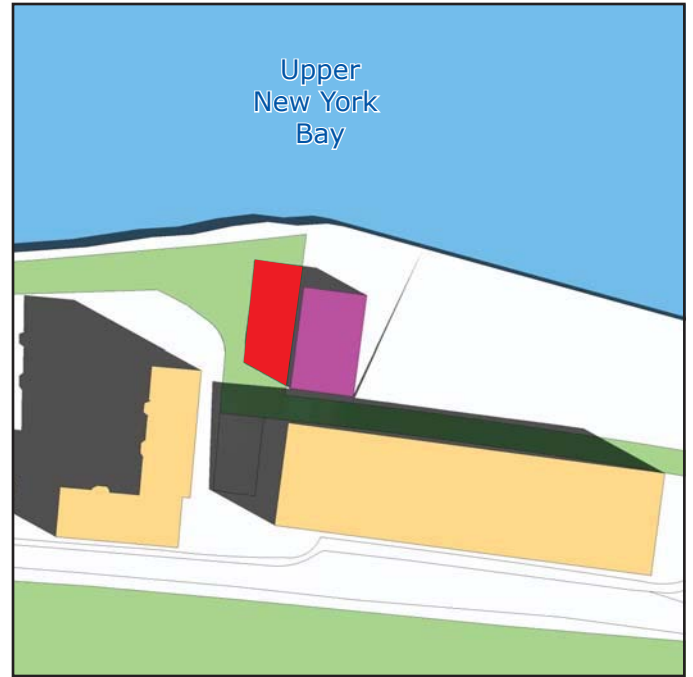
The detailed analysis concluded that incremental shadow would fall on the adjacent open space areas to the west and northwest on all four analysis mornings, for several hours (see **Figures 4-3 to 4-6**). The extent of incremental shadow would be larger early in the mornings, and would become smaller later in the mornings, affecting only the area directly west adjacent to the Concession Site. Also, incremental shadow would fall far enough to the southeast at the end of the June 21 analysis day to reach a small section of what is currently Ferry Line Road, for about 40 minutes.

Incremental shadow would fall on a section of Upper New York Bay north-adjacent to the Great Promenade on December 21 (see **Figure 4-6**). The new shadow would be small and would move across areas of the surface over the course of the analysis period. None of the species that could potentially live in the Upper New York Bay would be affected by the small incremental change this shadow would cause. Phytoplankton would pass through the affected area of the Bay quickly and would not be affected. Macroalgae would not be affected because the incremental

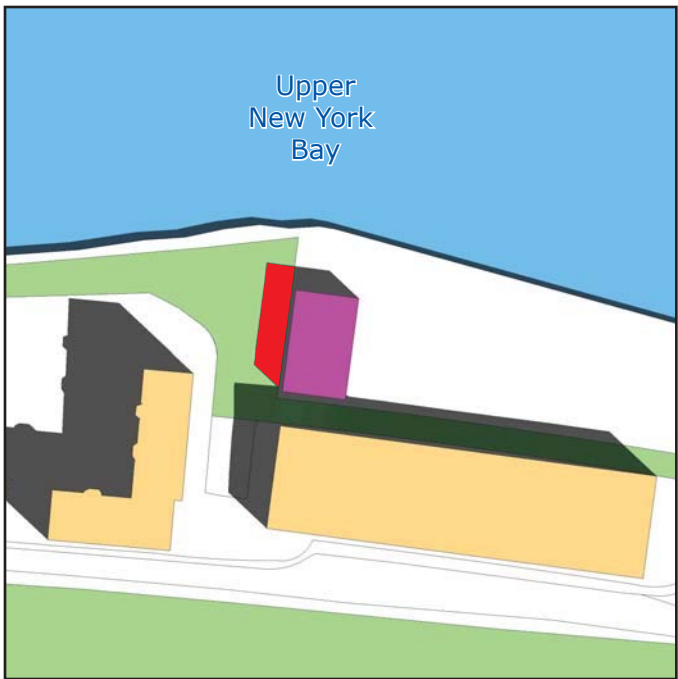
2.4.13



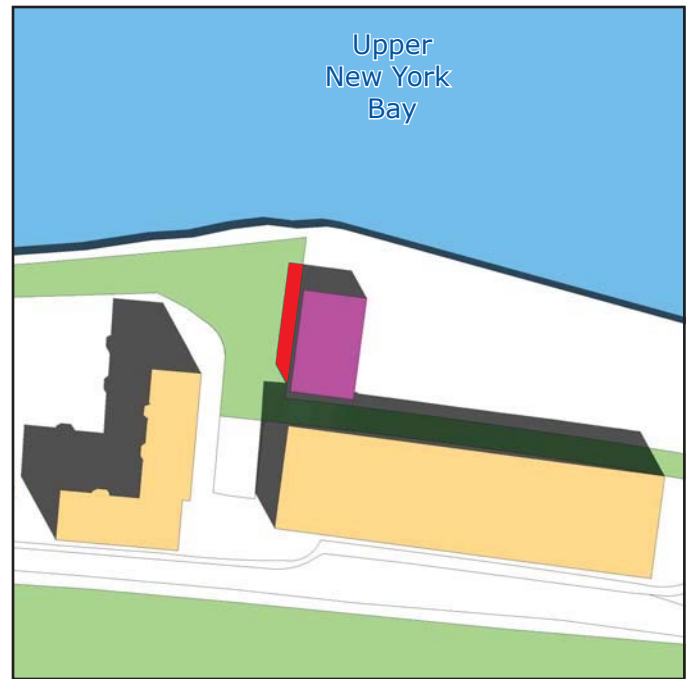
7:36 AM



8:45 AM



9:45 AM

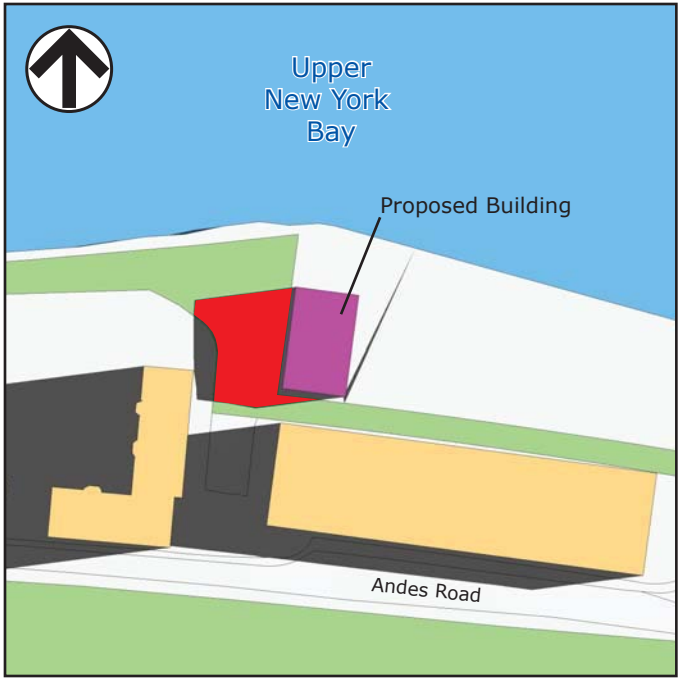


10:45 AM

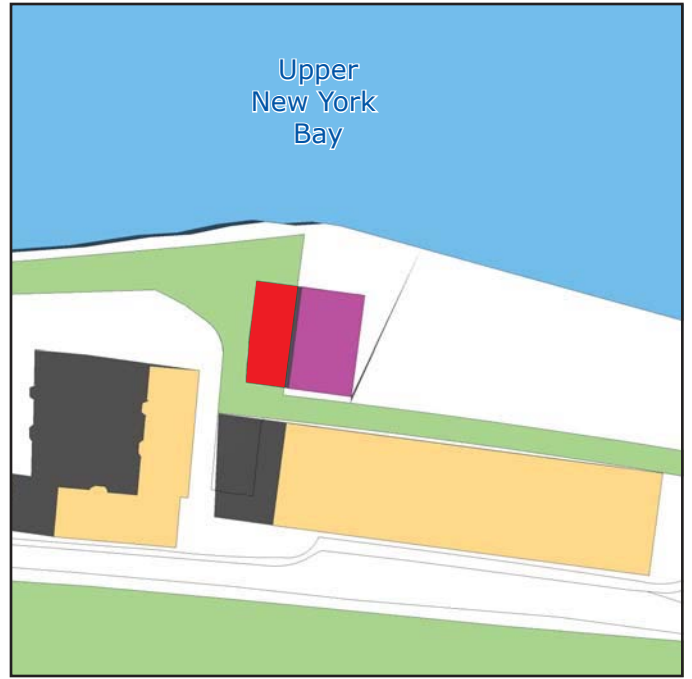
Note: Daylight Saving Time not used.

 Publicly accessible Open Space

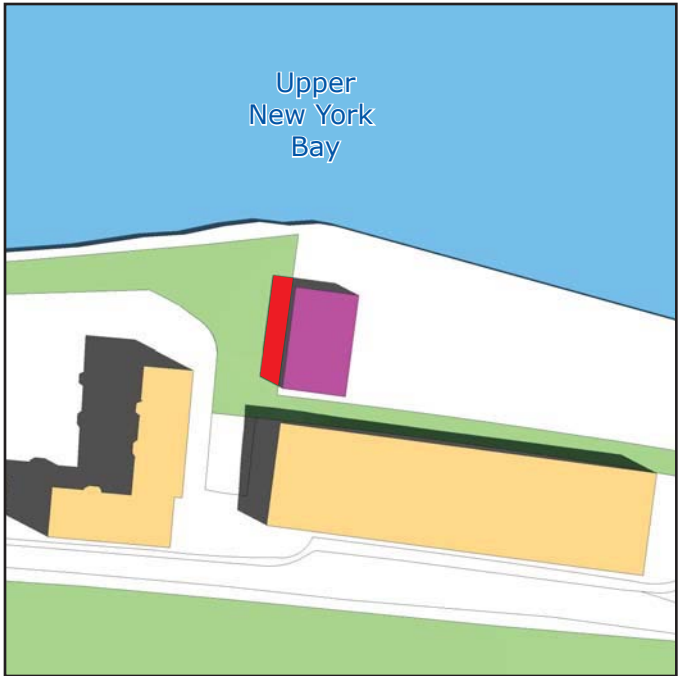
 Incremental Shadow on Sunlight-Sensitive Resource



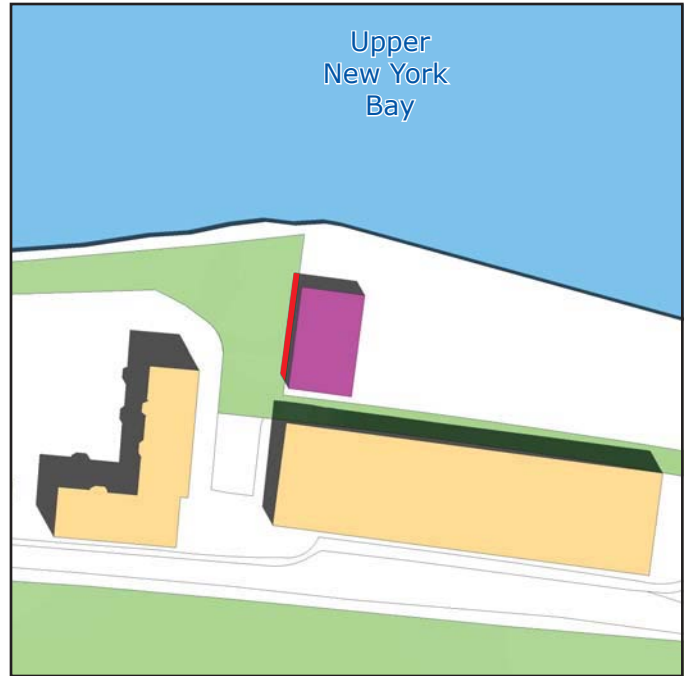
6:27 AM



8:00 AM



9:30 AM

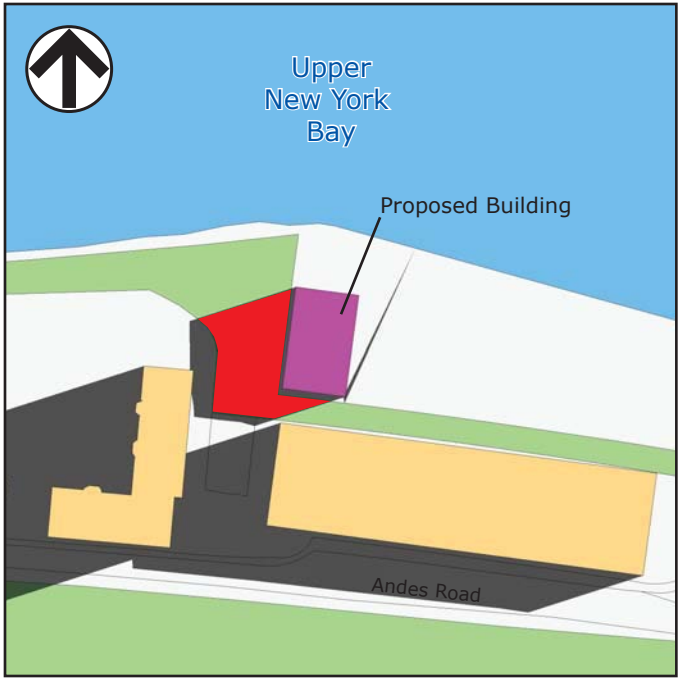


11:00 AM

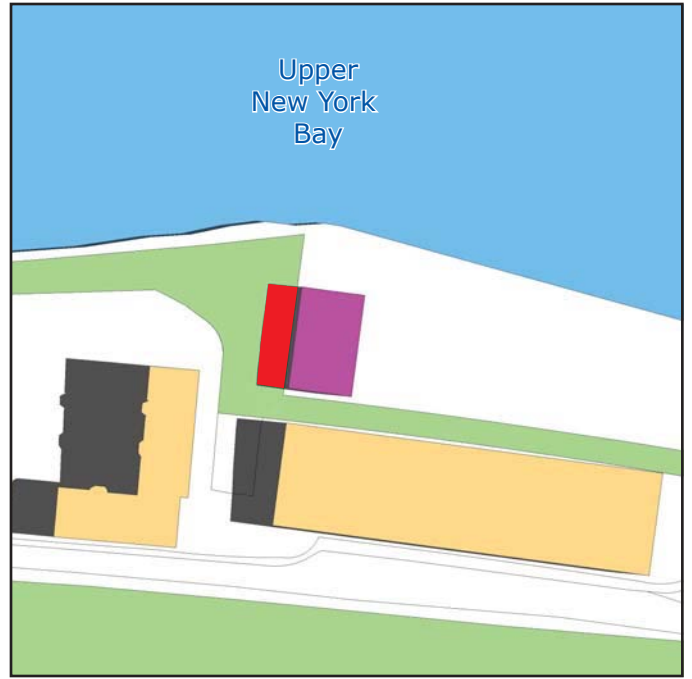
Note: Daylight Saving Time not used.

 Publicly accessible Open Space

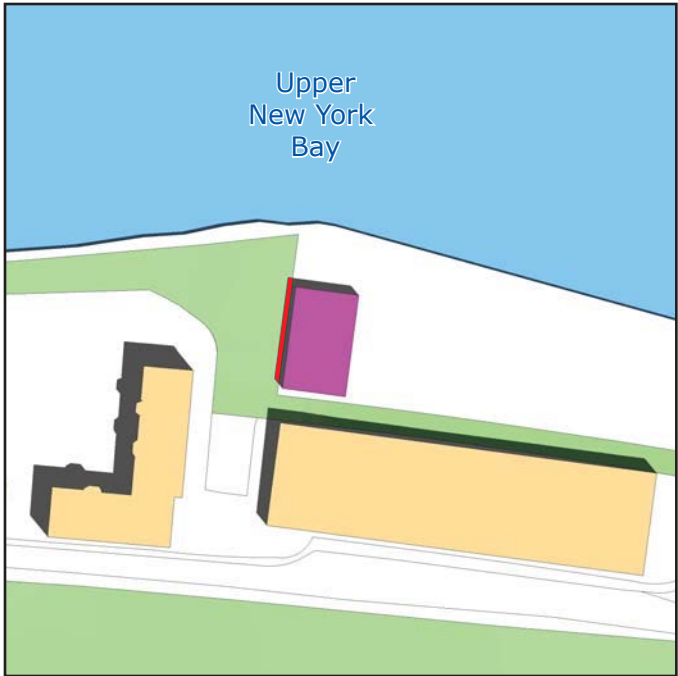
 Incremental Shadow on Sunlight-Sensitive Resource



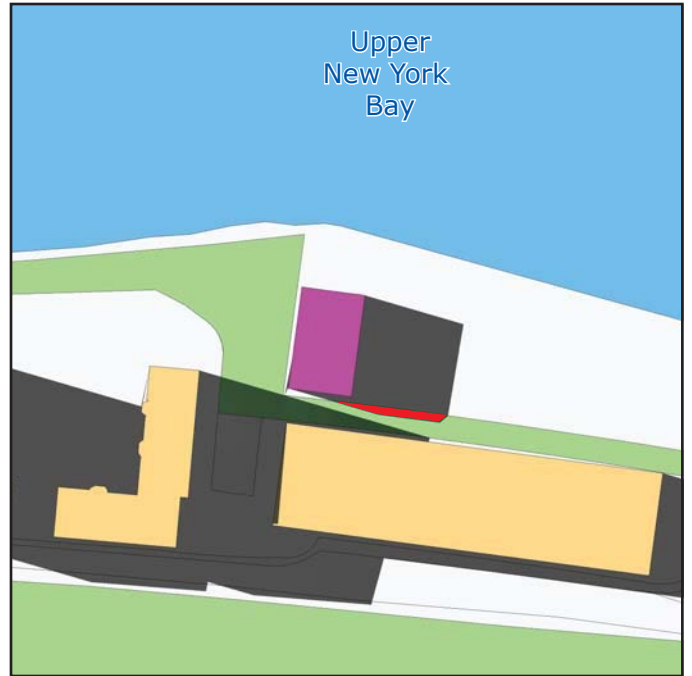
6:00 AM



8:30 AM



11:00 AM

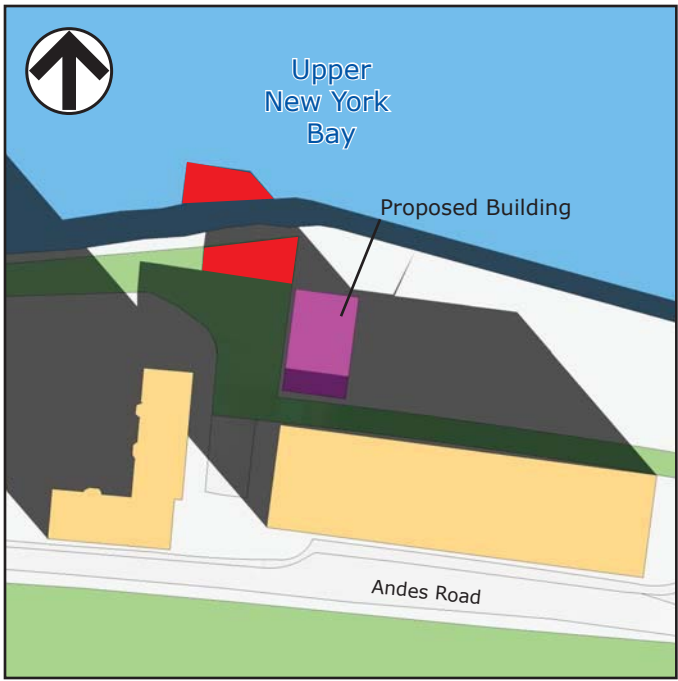


5:45 PM

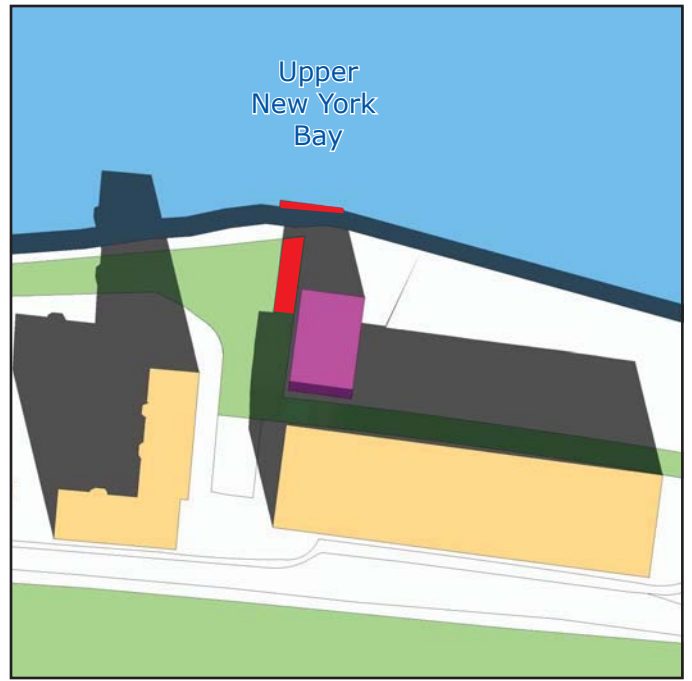
Note: Daylight Saving Time not used.

 Publicly accessible Open Space

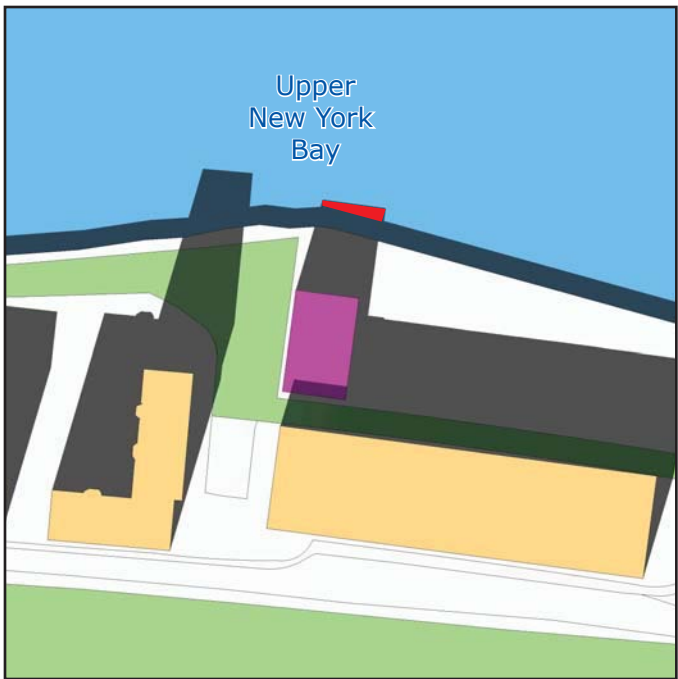
 Incremental Shadow on Sunlight-Sensitive Resource



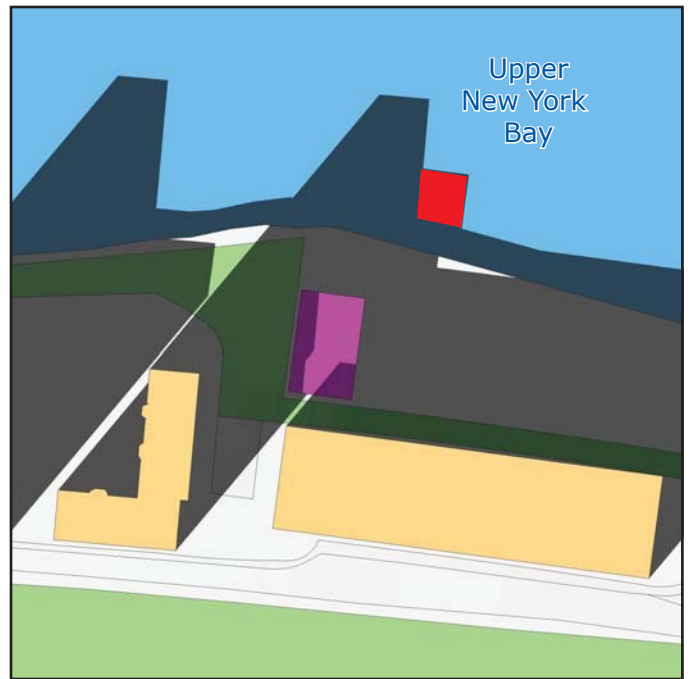
9:00 AM



11:00 AM



1:00 PM



2:45 PM

Note: Daylight Saving Time not used.

 Publicly accessible Open Space

 Incremental Shadow on Sunlight-Sensitive Resource

shadow does not significantly change the amount of time exposed to light. Fish would be expected to move out of shadowed areas that become undesirable and benthic macroinvertebrates are unlikely to be adversely affected by shadow.

G. CONCLUSIONS

2022 ANALYSIS YEAR

According to the *CEQR Technical Manual*, a significant shadow impact generally occurs when an incremental shadow of 10 minutes or longer falls on a sunlight sensitive resource and results in one of the following:

VEGETATION

1. A substantial reduction in sunlight available to a sunlight-sensitive feature of the resource to less than the minimum time necessary for its survival (when there was sufficient sunlight in the future without the proposed project).
2. A reduction in direct sunlight exposure where the sensitive feature of the resource is already subject to substandard sunlight (i.e., less than minimum time necessary for its survival).

HISTORIC AND CULTURAL RESOURCES

3. A substantial reduction in sunlight available for the enjoyment or appreciation of the sunlight-sensitive features of a historic or cultural resource.

OPEN SPACE UTILIZATION

4. A substantial reduction in the usability of open space as a result of increased shadow.

FOR ANY SUNLIGHT-SENSITIVE FEATURE OF A RESOURCE

5. Complete elimination of all direct sunlight on the sunlight-sensitive feature of the resource, when the complete elimination results in substantial effects on the survival, enjoyment, or, in the case of open space or natural resources, the use of the resource.

This analysis concluded that the proposed building would cast new shadows on adjacent open space areas in all seasons. The incremental shadow would remain small for most of the analysis periods, owing to the small scale of the proposed building. Other nearby open spaces, including the Great Promenade to the west and areas south of Andes Road, would remain in sun during the times when incremental shadow would fall on the areas adjacent to the potential building site. In addition, the areas affected by incremental shadow would continue to receive more than four hours of direct sunlight in the afternoons during the spring, summer, and fall, due to the lack of other nearby tall structures to the south and east. Further, the new shadows would not substantially affect the active users of the space, who are moving through the areas of sun and existing and incremental shadow. Therefore, the no significant shadow impacts would occur.

The analysis concludes that the proposed project would not result in significant adverse shadow impacts.

2030 ANALYSIS YEAR

Development in the South Island Development Zones would likely result in new shadows on portions of the open spaces created or improved by the Proposed Project. Open spaces and sun-

Governors Island—North Island Re-Tenancing and Park and Public Space Master Plan

sensitive historic resources near the development zones and to their east, north, and west would be more likely to experience project-generated shadows than those farther away or directly south of the development zones. If the affected open spaces were not being created by the Proposed Project, it is possible that some incremental shadows from development zone structures would be considered to have significant adverse impacts. On the other hand the North Island open spaces and historic resources that are farther away from the development zones (i.e., north of Liggett Hall) would likely be only minimally affected by project-generated shadows, although this would depend on the height, location, and configuration of the structures that are eventually built in the development zones. The design and programming of the proposed Park and Public Spaces would reflect the expected sunlight and shadow conditions at each location, to address potential shadow effects. In addition, the two development zones would be planned and developed to minimize shadow impacts on the Island's open spaces. Shadows cast by new buildings could affect utilization of these open spaces, particularly in the cooler weather months. In any case, it is expected that there would be further review of shadows when the development is actually proposed because it is very likely to require land use actions that are subject to environmental review by the City Planning Commission or the Board of Standards and Appeals.*