

CHAPTER 7: SHADOWS

7.1 Overview

According to the *CEQR Technical Manual*, an adverse shadow impact occurs when the shadow caused by a proposed action is cast on a publicly-accessible open space, important natural resource or feature, or historic landscape or other historic resource (if the features rendering the significance of the resource are dependent on sunlight), and adversely affects its use and/or important landscaping and vegetation; or, in the case of historic resources, obscures the details that make the resource significant. Shadows falling on streets and sidewalks or other buildings generally are not considered significant, nor are shadows occurring within an hour and a half of sunrise or sunset. In addition, CEQR does not consider the shade created by trees and other natural features to be shadow as defined for the impact analysis. Thus, a structure that casts a shadow on a tree-shaded environment may result in an adverse impact.

As discussed below, development associated with the Proposed Action would cast incremental shadow into the waters of the Upper New York Bay, a sunlight-sensitive natural resource that is located within and adjacent to the Project Area. However, due to the relatively short extent and duration of project-generated shadows that would be cast on the Upper New York Bay waters, no significant adverse shadow impacts are expected to result from the Proposed Action.

7.2 Methodology

A shadow screening analysis was prepared for the Proposed Action based on the guidelines set forth in the *CEQR Technical Manual*. If an action results in structures or enlargements that are 50 feet high or taller, or if an action involves the construction of shorter structures adjacent to important features, the *CEQR Technical Manual* recommends a shadow screening analysis. A more detailed analysis should be conducted if the initial screening analysis indicates that one or more of the resources noted above would be exposed to incremental project-generated shadows. If shadows reach a resource, then further assessment is conducted to determine: (1) the extent and duration of project shadows; and (2) the effect of those shadows on uses and vegetation or on sunlight-sensitive features of architectural resources.

7.2.1 Preliminary Shadow Screening Analysis

An initial screening analysis was conducted to determine the maximum possible area subject to shadows due to structures associated with the Proposed Action, i.e., the study area. In accordance with CEQR, a building has a maximum Shadow Length Factor (except within an hour and a half of sunrise or sunset) equal to 4.3 times its height, including all rooftop structures. Therefore, the radius of the shadow screening analysis study area is equal to 4.3 times the height of the proposed structures.

Under the proposed rezoning, structures would be limited to fifty feet in height with the exception of the Sports Complex on Parcel B2, which would be permitted to be up to 60

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feet tall. Thus for Parcel B2, the maximum shadow length would be 258 feet from the building footprint, while the remaining buildings' shadows would extend 215 feet from the building footprints. Resources identified include publicly-accessible open space and recreation areas; New York City parks; New York City Landmark Preservation Commission (NYCLPC)-designated landmarks; NYCLPC-designated Historic Districts; resources listed on the State and National Registers of Historic Places; New York State Office of Parks, Recreation and Historic Preservation-designated Historic Sites; and the waters of the Upper New York Bay.

The initial shadow screening analysis indicates that no shadow-sensitive resources are located west of the Project Area (as defined in Chapter 1, "Project Description") that would be exposed to shadows from proposed structures. The only resource within the area exposed to shadows due to structures included in the Proposed Action is the Upper New York Bay, situated east of the Homeport Site. The Upper New York Bay is considered an important natural resource; therefore, a more detailed shadow analysis was conducted to determine the extent to which shadows would be cast onto the bay and the duration of the shadows.

7.3 Build Condition

No potentially sunlight-sensitive historic or open space resources are situated within the shadow screening analysis study area. The Upper New York Bay is the one sunlight-sensitive natural feature that would be affected by shadows from the development associated with the Proposed Action. Proposed development sites that would be located near the waters of the Upper New York Bay are identified as Development Parcels A, B1, B2, B3, B4, and B5 on the Homeport Site, as shown on Figure 7-1. Table 7-1 provides information on the maximum height of the buildings and the distance due east from the development parcel to the waterfront.¹

Table 7-1: Building Heights and Setbacks

Development Parcel	A	B1	B2	B3	B4	B5
Maximum Height	50 Feet	50 Feet	60 Feet	50 Feet	50 Feet	50 Feet
Distance from Waterfront	93 Feet	105 Feet	133 Feet	119 Feet	70 Feet	52 Feet

Source: The Louis Berger Group, Inc. 2006.

Table 3E-1, "Maximum Shadow Length Factor for Each Angle from True North" and Table 3E-2 "Shadow Factors and Time of Day for Each Shadow Angle, June 21, May 5, March 21, December 21" in the *CEQR Technical Manual* were consulted to determine the Shadow Length Factor appropriate for each of the six development parcels situated on the Homeport Site and adjacent to the bay. The analysis below was conducted for each of the four dates suggested in the *Manual*: December 21, March 21, May 6 and June 21.

¹ As the precise locations of buildings associated with each Development Parcel have yet to be determined, the entire Development Parcel has been used in lieu of building footprints for the purposes of the shadow analysis.

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For each development parcel and for each date suggested in the *CEQR Technical Manual*, the approximate time that project-related shadows would enter the bay was determined. Also, for each of the four dates, the duration of shadow exposure and the maximum distance shadows would extend into the bay for each of the six development parcels were established. In Tables 7-2 through 7-5 below, Entry Time (Eastern Standard Time with no adjustment for Daylight Savings) indicates the time project-related shadows would first enter the water. Maximum Exposure Distance indicates the horizontal distance perpendicular to the bulkhead that shadows would extend into the water. The Duration of Exposure represents the amount of time any portion of the bay would be in shadow. That portion of the water adjacent to the bulkhead would experience shadow for the full duration, but as the distance from the bulkhead increases the duration of exposure would be progressively less than that indicated in the tables.

Tables 7-2 through 7-5 indicate that shadows from the development parcels would enter the bay in the late afternoon when the sun is fairly low in the sky. Figures 7-1 through 7-4 illustrate the maximum shadow coverage for each of the four dates and relate to Tables 7-2 through 7-5, respectively. It should be noted that the Project Area properties located west of Front Street would be too far from the shoreline to cast shadows into the bay.

Table 7-2: Shadows on December 21

Development Parcel	A	B1	B2	B3	B4	B5
Entry Time	2:20 pm	2:30 pm	2:33 pm	2:38 pm	1:56 pm	1:30 pm
Maximum Exposure Distance	47 Feet	35 Feet	35 Feet	20 Feet	70 Feet	88 Feet
Duration of Exposure	33 Minutes	23 Minutes	20 Minutes	15 Minutes	57 Minutes	73 Minutes

Source: The Louis Berger Group, Inc. 2006.

Table 7-3: Shadows on March 21

Development Parcel	A	B1	B2	B3	B4	B5
Entry Time	3:37 pm	3:52 pm	3:57 pm	4:02 pm	3:09 pm	2:35 pm
Maximum Exposure Distance	62 Feet	50 Feet	52 Feet	36 Feet	85 Feet	103 Feet
Duration of Exposure	52 Minutes	37 Minutes	32 Minutes	27 Minutes	80 Minutes	114 Minutes

Source: The Louis Berger Group, Inc. 2006.

Table 7-4: Shadows on May 6

Development Parcel	A	B1	B2	B3	B4	B5
Entry Time	4:16 pm	4:28 pm	4:40 pm	4:46 pm	3:42 pm	3:01 pm
Maximum Exposure Distance	70 Feet	58 Feet	62 Feet	44 Feet	93 Feet	111 Feet
Duration of Exposure	64 Minutes	50 Minutes	38 Minutes	32 Minutes	96 Minutes	137 Minutes

Source: The Louis Berger Group, Inc. 2006.

Table 7-5: Shadows on June 21

Development Parcel	A	B1	B2	B3	B4	B5
Entry Time	4:45 pm	5:00 pm	5:06 pm	5:13 pm	4:07 pm	3:23 pm
Maximum Exposure Distance	96 Feet	84 Feet	94 Feet	70 Feet	119 Feet	137 Feet
Duration of Exposure	76 Minutes	61 Minutes	55 Minutes	48 Minutes	114 Minutes	158 Minutes

Source: The Louis Berger Group, Inc. 2006.

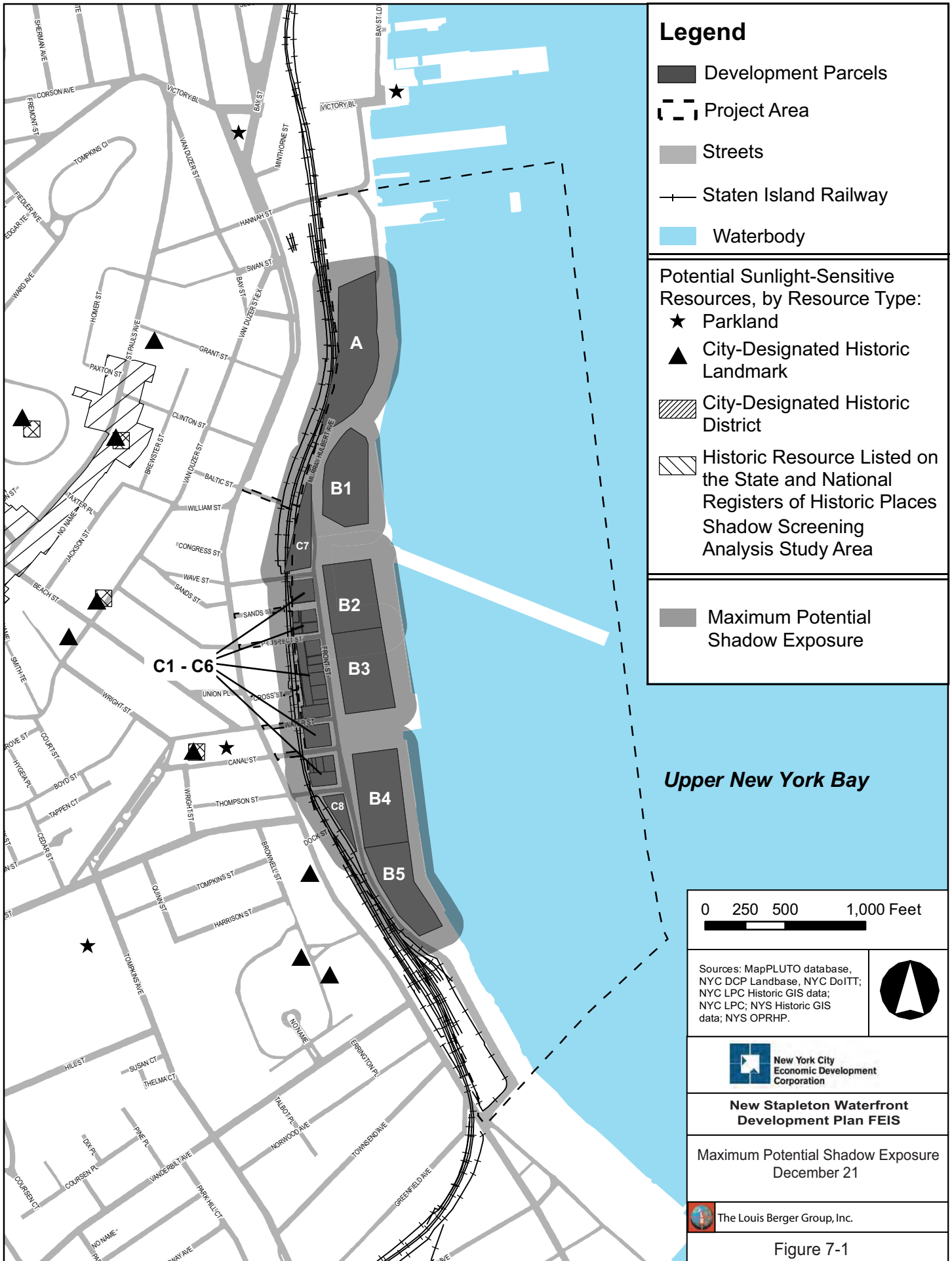
7.4 Conclusion

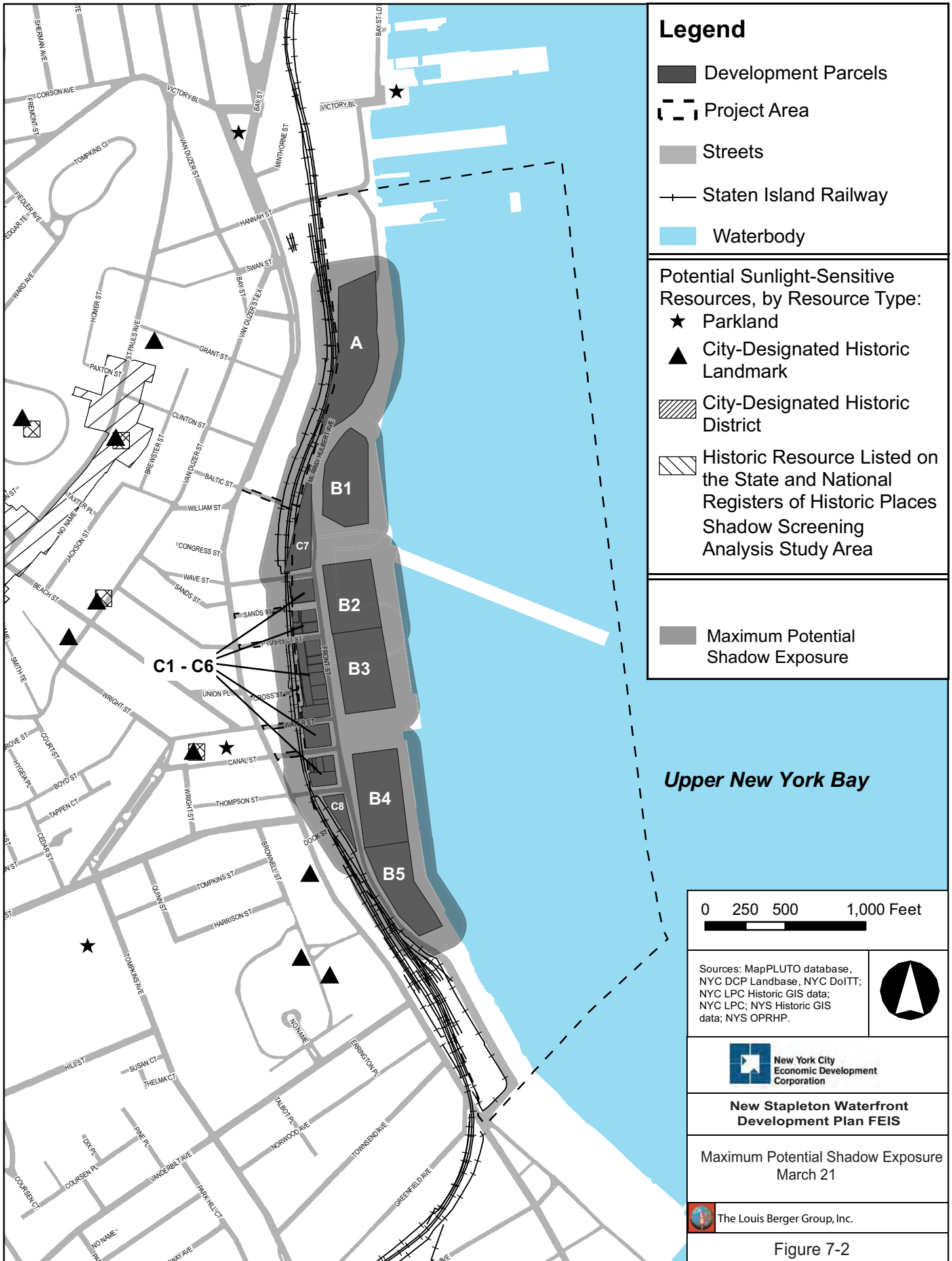
Exposure to shadows could cause a decrease in light intensity and could affect primary productivity within affected waters. Primary productivity within the study area is generated mainly from phytoplankton. However, light requirements for phytoplankton are low, and the reduction in light within the shadow footprint would have a negligible impact on phytoplankton populations. Additionally, the phytoplankton communities would be carried by tidal currents and would be exposed to the shadows for a relatively short period, moving through the area in shadow to areas outside the shadow exposure.

As indicated in Tables 7-2 through 7-5, water near the bulkhead would be in shadow for a length of time ranging from 15 to 158 minutes per day. However, as the distance from the bulkhead increases, the duration of shadow exposure decreases. The maximum extent to which shadows would reach into the bay ranges from 20 to 137 feet.

Also as indicated in Tables 7-2 through 7-5, shadows would enter the bay in the late afternoon when the sun is low on the horizon. At these times the incident angle of sunlight on the surface is acute (approximately 20 degrees at maximum exposure) and a large percentage of available energy is reflected. Additionally, due to the distance from the buildings to the water, diffuse light is abundant and deep shadows are not anticipated.

Therefore, no significant adverse shadows impacts are anticipated to result from the Proposed Action, and no mitigation is required.





Legend

- Development Parcels
- Project Area
- Streets
- Staten Island Railway
- Waterbody

Potential Sunlight-Sensitive Resources, by Resource Type:

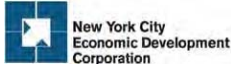
- Parkland
 - City-Designated Historic Landmark
 - City-Designated Historic District
 - Historic Resource Listed on the State and National Registers of Historic Places
- Shadow Screening Analysis Study Area

Maximum Potential Shadow Exposure

Upper New York Bay

0 250 500 1,000 Feet

Sources: MapPLUTO database, NYC DCP Landbase, NYC DoITT; NYC LPC Historic GIS data; NYC LPC; NYS Historic GIS data; NYS OPRHP.

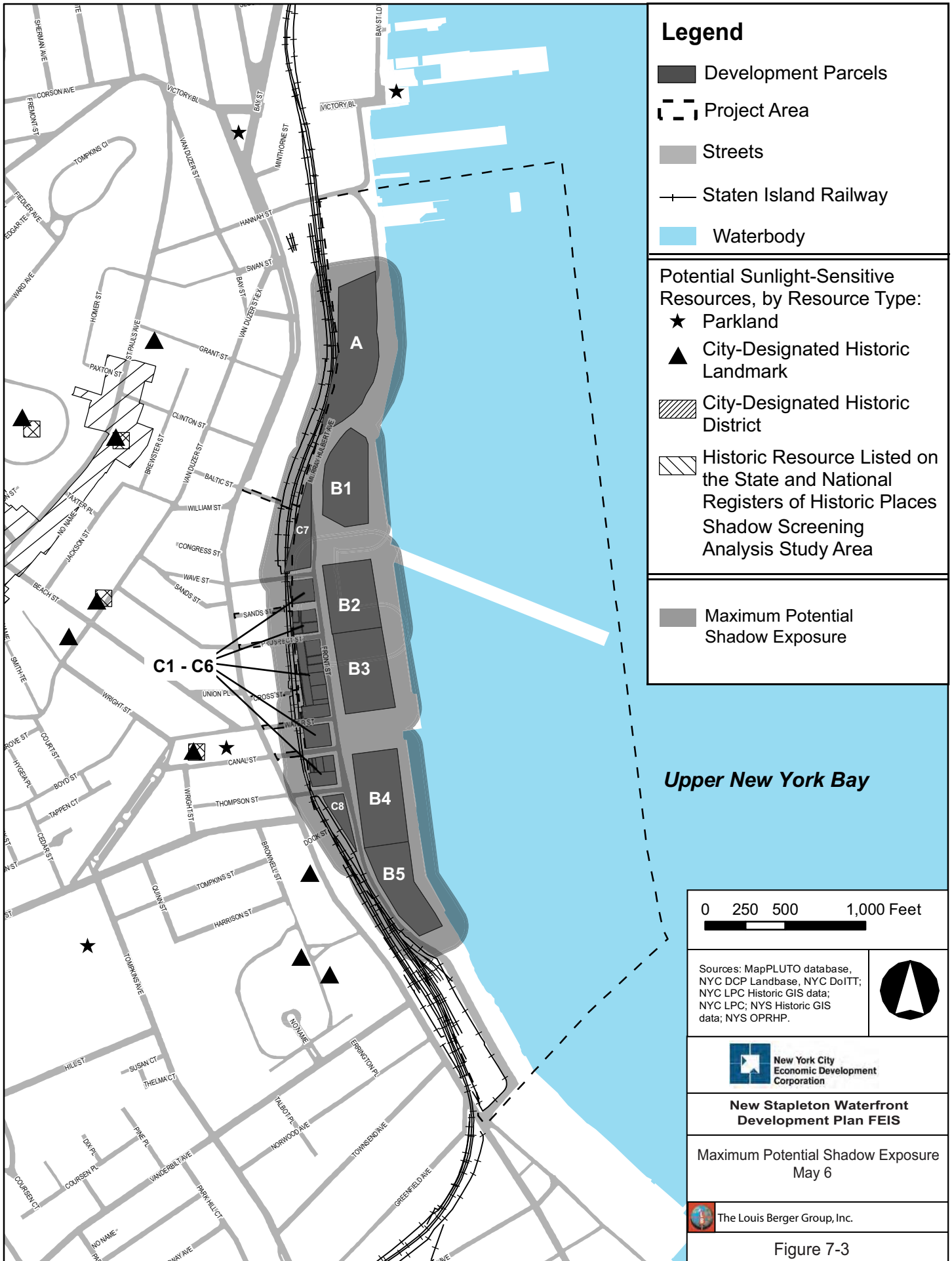


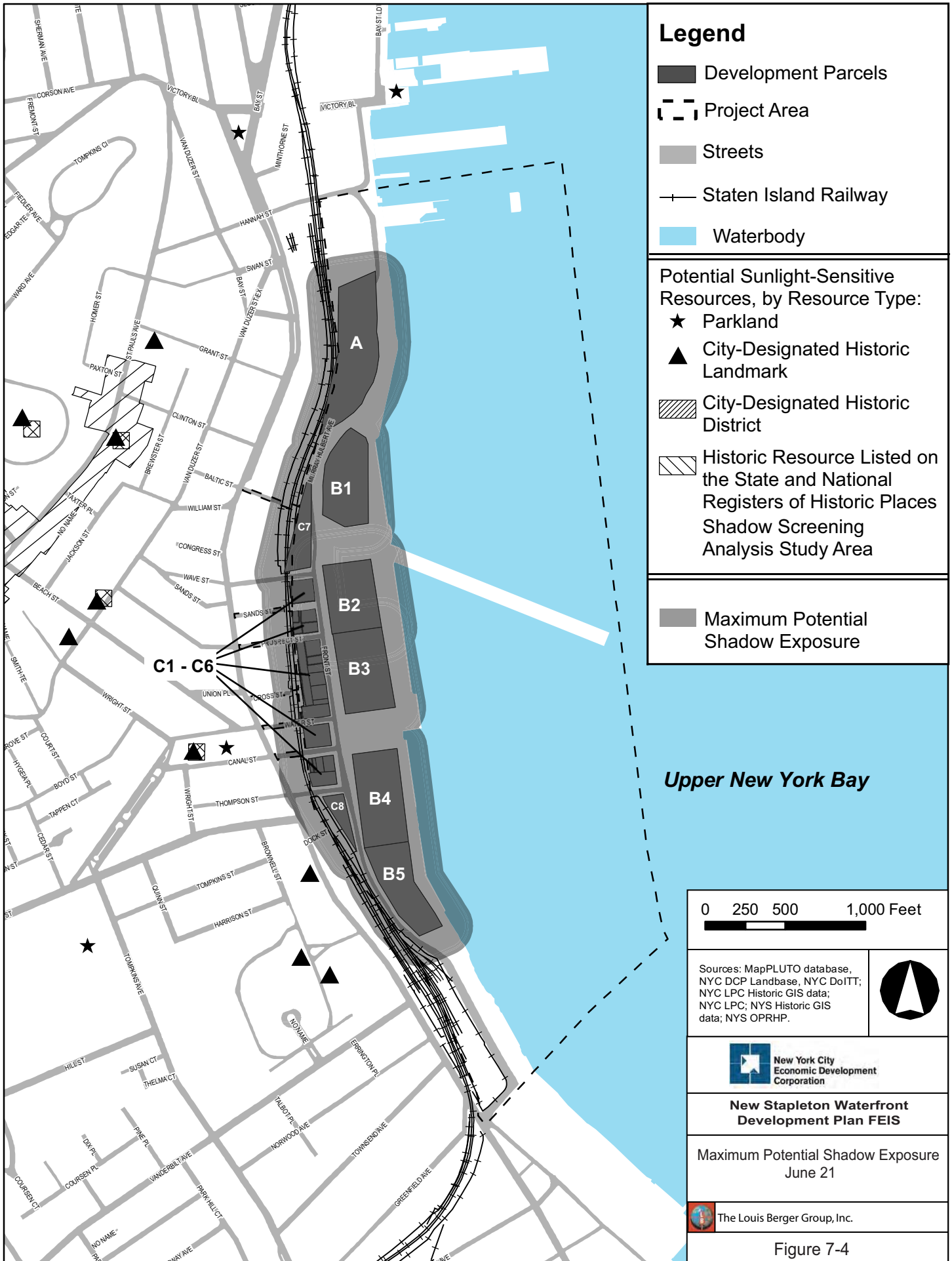
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Maximum Potential Shadow Exposure
March 21

The Louis Berger Group, Inc.

Figure 7-2





Legend

- Development Parcels
- Project Area
- Streets
- Staten Island Railway
- Waterbody

Potential Sunlight-Sensitive Resources, by Resource Type:

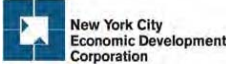
- Parkland
 - City-Designated Historic Landmark
 - City-Designated Historic District
 - Historic Resource Listed on the State and National Registers of Historic Places
- Shadow Screening Analysis Study Area

Maximum Potential Shadow Exposure

Upper New York Bay

0 250 500 1,000 Feet

Sources: MapPLUTO database, NYC DCP Landbase, NYC DoITT; NYC LPC Historic GIS data; NYC LPC; NYS Historic GIS data; NYS OPRHP.



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Maximum Potential Shadow Exposure
June 21

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Figure 7-4