CHAPTER 6: SHADOWS

A. INTRODUCTION

This chapter assesses the potential of the Proposed Actions to result in incremental shadows that may reach nearby sunlight-sensitive resources. Based on CEQR guidance, sunlight-sensitive resources of concern are those that depend on sunlight or for which direct sunlight is necessary to maintain the resource's usability or architectural integrity, such as, public open spaces; historic buildings with architectural features that depend on direct sunlight for their enjoyment by the public, such as carved ornamentation, stained glass windows; and natural resources. This chapter is closely linked to the information presented in other chapters of this Draft Environmental Impact Statement (DEIS), particularly Chapter 5, "Open Space" and Chapter 7, "Historic and Cultural Resources."

According to the *CEQR Technical Manual*, a shadows assessment is required if a proposed action would result in new structures (or additions to existing structures) of 50 feet in height or greater, or those that would be located adjacent to, or across the street from, a sunlight-sensitive resource. As discussed in Chapter 1, "Project Description," the reasonable worst-case development scenario (RWCDS) for the Proposed Actions identifies 30 Projected Development Sites and 23 Potential Development Sites within the Project Area. The redevelopment of the Projected Development Sites, and the less likely development of the Potential Development Sites, is expected to result in new buildings greater than 50 feet in height over the No-Action condition at most development sites. As such, a detailed shadows analysis was prepared to determine the potential of the Proposed Actions to result in significant adverse shadow impacts on sunlight-sensitive resources.

B. PRINCIPAL CONCLUSIONS

A detailed shadow analysis concluded that development resulting from the Proposed Actions would not result in significant adverse impacts at any sunlight-sensitive resources. The 30 Projected and 23 Potential Development Sites identified in the RWCDS would result in incremental shadow coverage on six sunlight-sensitive resources, including five open space resources (Lyons Pool – Entire Property, Lyons Pool – Main Pool, Tompkinsville Park, Tappen Park, the Canal Street Greenstreets) and one natural resource (Upper New York Bay). Incremental project-generated shadows would not substantially reduce or eliminate direct sunlight on any of the six sunlight-sensitive resources, and therefore would not have the potential to affect the utilization or enjoyment of any sunlight-sensitive resources. Although, the active recreation areas of Lyons Pool – Entire Property and Lyons Pool – Main Pool would receive sizable incremental shadow coverage during the summer analysis days, the pool would continue to receive direct sunlight throughout the late morning and early afternoon when utilization would be highest. Therefore, the incremental shadows on Lyons Pool – Entire Property and Lyons Pool – Main Pool would not result in a significant adverse impact on the usability of this resource. In addition, all five open space resources, would continue to receive a minimum of four- to six-hours of direct sunlight throughout the growing season and vegetation would not be adversely affected.

The only natural resource under consideration is Upper New York Bay. While exposure to shadows would cause a decrease in light intensity and could affect primary productivity within the Study Area,

productivity is mainly generated from phytoplankton, which have low light requirements and would only be exposed for a relatively short period of time while moving through the area. Additionally, shadows would only enter the bay during the late afternoon when abundant diffuse light would be available in the water and deep shadows are not anticipated. Therefore, no significant adverse shadow impacts to natural resources are anticipated as a result of the Proposed Actions.

Based on the detailed analyses, the Proposed Actions would not result in any significant adverse shadow impacts on sunlight-sensitive resources within the shadow study area.

C. METHODOLOGY

According to the *CEQR Technical Manual*, the longest shadow a structure will cast in New York City, except for periods close to dawn or dusk, is 4.3 times its height. For projects that would result in structures less than 50 feet tall, a shadow assessment is generally not necessary, unless the project is adjacent to a sunlight-sensitive resource, such as a park, historic building, or natural feature.

First, a preliminary screening assessment must be conducted to determine whether shadows resulting from a project could reach any sunlight-sensitive resources. The *CEQR Technical Manual* defines sunlight-sensitive resources as those resources that depend on sunlight or for which direct sunlight is necessary to maintain the resource's usability or architectural significance. The following are considered sunlight-sensitive resources:

- **Public open space -** (*e.g.,* parks, playgrounds, plazas, schoolyards, greenways, and landscaped medians with seating) Greenstreets, which are planted areas within unused areas or roadbeds, are also considered sunlight-sensitive resources. The use of vegetation in an open space establishes its sensitivity to shadows. This sensitivity is assessed for both (i) warm-weather dependent features, such as wading pools and sandboxes, or vegetation that could be affected by loss of sunlight during the growing season (*i.e.,* March through October); and (ii) features, such as benches, that could be affected by a loss of winter sunlight. Uses that rely on sunlight include passive recreational uses such as sitting or sunning; active recreational uses, such as playfields or paved courts; and such activities as gardening, or using children's wading pools and sprinklers. Where lawns are actively used, the turf requires extensive sunlight. Vegetation requiring direct sunlight includes the tree canopy, flowering plants, and plots in community gardens. Generally, four to six hours a day of sunlight, particularly in the growing season, is a minimum requirement.

- **Historic and cultural resources –** Historic resources that contain historic architectural features dependent on sunlight for their enjoyment by the public are analyzed for shadow impacts. Only sunlight-sensitive features are considered, as opposed to the entire architectural resource. As described in the *CEQR Technical Manual*, sunlight-sensitive features include design elements that are part of a recognized architectural style that depends on the contrast between light and dark (*e.g.,* deep recesses or voids, such as open galleries, arcades, recessed balconies, deep window reveals, and prominent rustication); elaborate, highly carved ornamentation; stained glass windows; exterior building materials and color that depend on direct sunlight for visual character; historic landscapes, such as scenic landmarks, including vegetation recognized as an historic feature of the landscape; and

structural features for which the effect of direct sunlight is described as playing a significant role in the structure's importance as an historic landmark.

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

The preliminary screening assessment consists of three tiers. The first tier (Tier 1) determines the longest shadow study area, which includes the area around the proposed buildings with a radius equal to 4.3 times the height of the proposed buildings. If there are sunlight-sensitive resources within the longest shadow study area, the assessment proceeds to the second tier (Tier 2). Because of 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. Based on this, the Tier 2 screening assessment eliminates the area that could not be affected by project-generated shadows. Based on the Tier 2 screening assessment, if there are any sunlight-sensitive resources that could be affected by incremental shadows, a third tier (Tier 3) should be performed. The Tier 3 screening assessment further refines the area that could be reached by incremental shadows on specific representative days of the year, and determines the maximum extent of incremental shadow over the course of each representative day.

If the Tier 3 screening assessment 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. In accordance with *CEQR Technical Manual* guidance, shadows on sunlight-sensitive resources of concern were modeled for four representative days of the year (the "analysis days"). For New York City, the months of concern for an open space resource encompass the growing season (*i.e.,* March through October) and one month between November and February, which represents a cold-weather month (usually December). Representative days for the growing season are generally the March 21st vernal equinox (or the September 21st autumnal equinox, which is approximately the same), the June 21st summer solstice, and a spring or summer day halfway between the summer solstice and equinoxes, such as May 6th or August 6th (which are approximately the same). For the cold-weather months, the December 21st winter solstice is included to demonstrate conditions when open space users rely heavily on available sunlight warmth. Because these months and days are representative of the full range of possible shadows, they are also used for assessing shadows on sunlight-sensitive open space, historic, and natural resources. The *CEQR Technical Manual* considers only those shadows occurring between 1.5 hours after sunrise and 1.5 hours before sunset and does not consider daylight savings time.

The detailed analysis provides the data needed to assess shadow impacts. The potential effects of the incremental shadows on sunlight-sensitive resources are described, and their degree of significance is considered. The result of the analysis and assessment are documented through the use of graphics, a table of incremental shadow durations, and narrative text. As described in the *CEQR Technical Manual*, an incremental shadow is generally not considered significant when its duration is less than 10 minutes at any time of year and the resource continues to receive substantial direct sunlight. Although the *CEQR Technical Manual* defines a significant shadow impact as an incremental shadow of 10 minutes or longer that falls on a sunlight-sensitive resource and results in a reduction in

sunlight on vegetation or sunlight-sensitive features, and/or a reduction in utilization, these criteria do not always constitute a significant adverse impact. Incremental shadows may result in impacts to the following:

- **Vegetation:** a substantial reduction in sunlight available to sunlight-sensitive features of the resource to less than the minimum time necessary for its survival (when there would be sufficient sunlight in the future without the project) or a reduction in direct sunlight exposure where the sensitive feature of the resource is already subject to substandard sunlight (*i.e.,* less than the minimum time necessary for its survival);

- **Historic and cultural resources:** 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:** a substantial reduction in the usability of open space as a result of increased shadow, including information regarding anticipated new users and the open space's utilization rates throughout the affected time periods; and

- **For any sunlight-sensitive feature of a resource:** 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.[1]

In general, a significant adverse shadow impact occurs when the incremental shadow added by a proposed action falls on a sunlight-sensitive resource and substantially reduces or completely eliminates direct sunlight exposure, thereby significantly altering the public's use of the resource or threatening the viability of vegetation or other resources.

D. PRELIMINARY SCREENING ASSESSMENT

An assessment of the 30 Projected Development Sites and 23 Potential Development Sites was first conducted to determine which sites required a preliminary screening assessment. As discussed above, pursuant to *CEQR Technical Manual* guidance, the preliminary assessment includes Projected and Potential Development Sites that, under the With-Action Condition, would result in development: (i) of new structures (or addition to an existing structures) of 50 feet or more; or (ii) located adjacent to, or across the street from, a sunlight-sensitive resource, regardless of its height.

As shown in Table 6-1, the Proposed Actions would result in new structures of greater than 50 feet in height on 28 of the 30 Projected Development Sites and 19 of the 23 Potential Development Sites. The two Projected Development Sites that do not warrant a preliminary assessment include city disposition sites 1 and 2 that would be developed with structures less than 50 feet in height, and neither site is adjacent to a sunlight-sensitive resource as defined in the *CEQR Technical Manual*. Although City Disposition Site 1 is adjacent to St. George Park, a publicly owned open space, the park is currently in disrepair and is not an accessible open space with maintained vegetation. In addition, the historic and cultural resources that are adjacent to City Disposition Site 1, including the Staten Island Museum (eligible for State/National Register of Historic Places (S/NR) listing), NYPD 120th

[1] *2014 CEQR Technical Manual*, Chapter 8, "Shadows."

Precinct (Landmarks Preservation Committee (LPC)-designated, S/NR-eligible), and Staten Island Family Courthouse (LPC-designated, S/NR-eligible), do not contain any sunlight-dependent architectural features.[2] While four Potential Development Sites would result in new structures less than 50 feet in height compared to No-Action conditions, these resources are located adjacent to the Canal Street Greenstreets and are therefore included in the analysis.

A base map was prepared showing the 28 Projected Development Sites and 23 Potential Development Sites identified for analysis (Table 6-1), as well as the Project Area boundaries, the surrounding street layout, and all sunlight-sensitive resources (*i.e.,* publicly-accessible open spaces, architectural resources, and natural resources). Although located near the Project Area, the Staten Island Savings Bank (LPC-designated, S/NR eligible) is located outside the shadow analysis area, defined as an area within a radius of 4.3 times the height of the proposed buildings on the 28 Projected Development Sites and 23 Potential Development Sites.

Table 6-1: Development Sites Warranting Preliminary Shadow Analyses

Sites Warranting Preliminary Shadow Analysis		**Sites Not Warranting Preliminary Shadow Analysis – With Buildings Less than 50-foot in Height and Not Adjacent to Sunlight-Sensitive Resources**
With Buildings 50-foot or Greater in Height [1]	**With Buildings Less than 50-foot in Height and Adjacent to Sunlight-Sensitive Resources**	
Projected Development Sites 1 through 25; City Disposition Site 3; and Stapleton Waterfront Phase III Sites A and B1; Potential Development Sites A through S	Potential Development Sites T through W	City Disposition Sites 1 and 2
Note(s): *[1] Based on maximum zoning envelopes.*		

TIER 1 SCREENING ASSESSMENT

According to the *CEQR Technical Manual*, the longest shadow that a structure will cast in New York City, except for periods close to dawn or dusk, is 4.3 times its height. The maximum shadow radius for each of the 28 Projected Development Sites and 23 Potential Development Sites warranting a preliminary shadow analysis was determined using each site's maximum building height and zoning envelope. The maximum shadow radius for each Projected and Potential Development Site was merged to form the longest shadow study area (Tier 1 Assessment) (Figure 6-1).

As shown in Figure 6-1, there are 12 potentially sunlight-sensitive resources within the longest shadow study area, which include the following:

1a. Tompkinsville (Joseph H. Lyons) Pool ("Lyons Pool"), which consists of the entire property, including a main pool (No. 1b), bath house building (No. 1c), diving pool, and spray showers;

[2] New York City Landmarks Preservation Commission (LPC), *Staten Island Family Courthouse*, LP-2057 (2001), http://s-media.nyc.gov/agencies/lpc/lp/2057.pdf. LPC, *120th Police Precinct Station House (Former 66th Police Precinct Station House and Headquarters)*, LP-2058 (2000), http://s-media.nyc.gov/agencies/lpc/lp/2058.pdf. Confirmation with LPC October 17, 2016.

1b. Tompkinsville (Joseph H. Lyons) Main Pool;

1c. Tompkinsville (Joseph H. Lyons) Bath House Building;

2. Tompkinsville Park;
3. Tappen Park;
4. Canal Street Greenstreets
5. NYPL – Stapleton Branch;
6. Stapleton Playground;
7. Stapleton Phase I Open Space;
8. St. Paul's Avenue Greenstreet;
9. Edgewater Village Hall;
10. Upper New York Bay

Resources labeled No. 1 through 4, and No. 6 through 8 are open space resources, of which resource No. 1 (1a, 1b, and 1c) is also a historic resource. Resources No. 5 and 9 are historic resources. The Upper New York Bay (No. 10) is the only natural resource identified within the shadow study area. Under future With-Action conditions, one additional resource, the proposed Stapleton Phase III Open Space is expected to be constructed within the shadow study area as part of the development anticipated on two Projected Development Sites – Stapleton Site A and Stapleton Site B1. Based on CEQR guidance, shadows on project-generated open space are not considered a potentially significant impact; therefore, the detailed shadow analysis assesses project-generated shadows on Stapleton Phase III Open Space; however, the incremental shadows are discussed qualitatively.

Given the presence of sunlight-sensitive resources within the shadow study area that have potential to be affected by the incremental shadows, further screening (Tier 2 Screening Assessment) is warranted.

TIER 2 SCREENING ASSESSMENT

Due to the path of the sun 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. The purpose of the Tier 2 screening assessment is to determine whether the sunlight-sensitive resources identified in the Tier 1 screening assessment are located within portions of the longest shadow study area that can receive shade from the 28 Projected Development Sites or 23 Potential Development Sites.

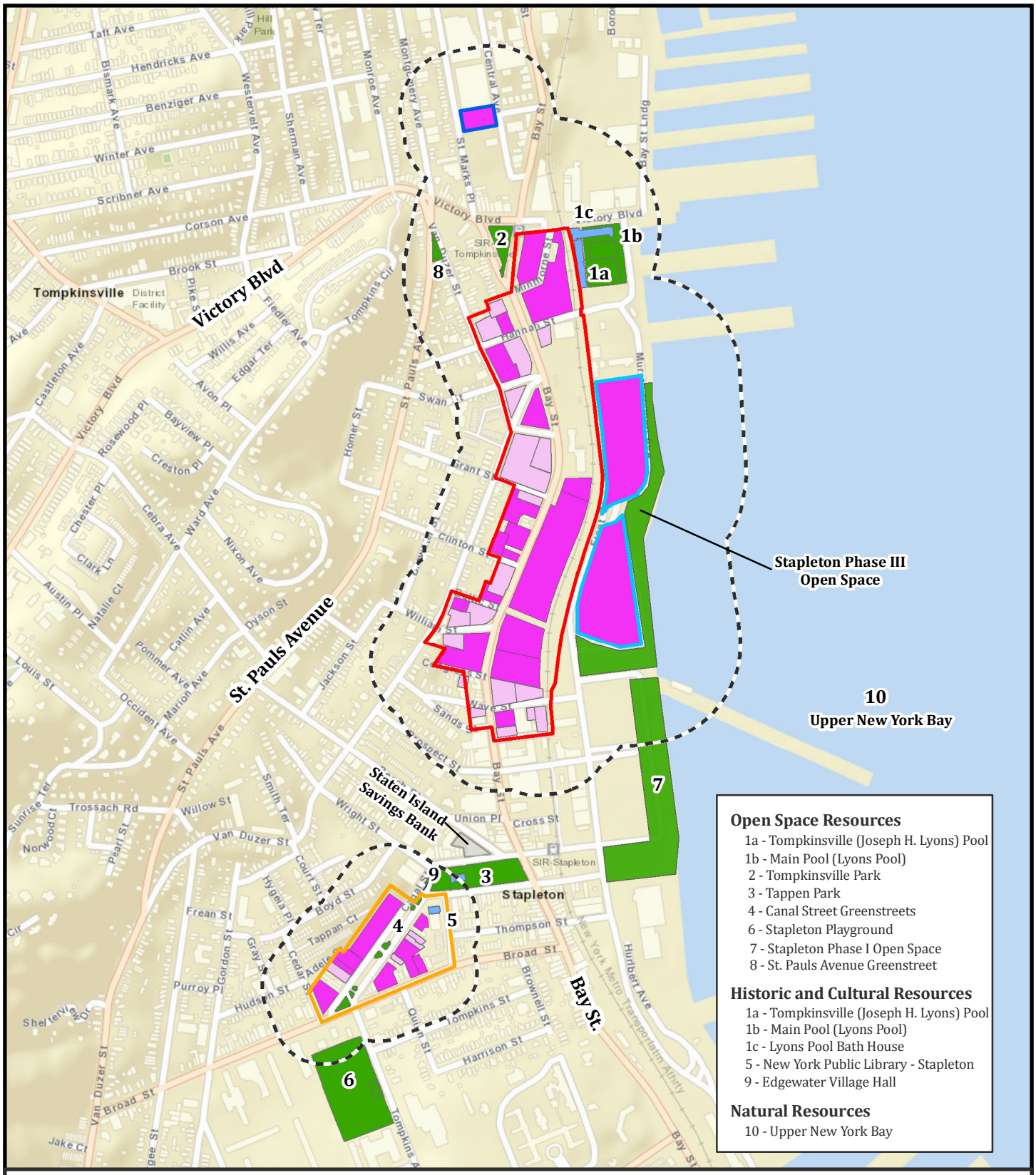


FIGURE 6-1: LONGEST SHADOW STUDY AREA - TIER 1 SCREENING

BAY STREET CORRIDOR REZONING AND RELATED ACTIONS
STATEN ISLAND, NY

0 375 750 1,500 Feet

N

- Bay Street Corridor Project Area
- Canal Street Corridor Project Area
- City Disposition Sites
- Stapleton Waterfront Phase III Sites
- Projected Development Sites
- Potential Development Sites
- Open Space Resources
- Historic and Cultural Resources
- Tier 1: Longest Shadow Study Area Boundary

Map Reference:
Basemap: ESRI
Shapefile: NYC DCP; MapPLUTO Data; NYC DPR

Figure 6-2 provides a base map illustrating the results of the Tier 2 screening assessment (*i.e.*, the portion of the longest shadow study area lying within -108 degrees and +108 degrees from true north as measured from southernmost portions of the Projected Development Sites). A total of 10 resources, including eight open spaces, one historic resource, and one natural resource, were identified in consultation with other City agencies (Department of Parks and Recreation (DPR) and LPC) as sunlight-sensitive resources that warranted Tier 2 assessment. Two historic resources, the Tompkinsville (Joseph H. Lyons) Bath House Building (No. 1c) and the NYPL – Stapleton Branch (No. 5), do not depend on direct sunlight for their enjoyment by the public and do not possess any sunlight-sensitive features as defined by the *CEQR Technical Manual*. These sunlight-sensitive resources are presented in Table 6-2 below.

Table 6-2: Sunlight-Sensitive Resources - Tier 2 Shadow Screening Assessment

Resource No. [1]	Name of Resources	Type of Resource	Sunlight-Sensitive Features
1a	Lyons Pool – Entire Property	Open Space	Main pool, diving pool, spray showers, and vegetation
1b	Lyons Pool – Main Pool	Open Space	
2	Tompkinsville Park	Open Space	Vegetation and passive open space
3	Tappen Park	Open Space	Vegetation and passive open space
4	Canal Street Greenstreets	Open Space	Vegetation
6	Stapleton Playground	Open Space	Vegetation and active open space
7	Stapleton Phase I Open Space	Open Space	Vegetation and passive open space
8	St. Paul's Avenue Greenstreet	Open Space	Vegetation
9	Edgewater Village Hall[2]	Historic Resource	Stained glass windows
10	Upper New York Bay	Natural Resource	Plant and marine life

Note(s): *[1] Numbers keyed to Figures 6-1 and 6-2.*
[2] Edgewater Village Hall is a designated historic building located within Tappen Park.

TIER 3 SCREENING ASSESSMENT

According to the *CEQR Technical Manual*, a Tier 3 screening assessment should be performed to determine if, in the absence of intervening buildings, shadows resulting from a proposed action could reach a sunlight-sensitive resource, thereby warranting a detailed shadow analysis. The Tier 3 screening assessment is used to determine if shadows resulting from a proposed action can reach a sunlight-sensitive resource at any time between 1.5 hours after sunrise and 1.5 hours before sunset on the representative analysis days. Because project-generated shadows could reach several sunlight-sensitive resources, a Tier 3 assessment was performed using three-dimensional (3D) computer mapping software. The 3D model was used to calculate and display project-generated shadows on individual representative analysis days. The model contained 3D representations of the elements in the base map used in the preceding assessments and a 3D model of the Projected and Potential Development Sites.

The Tier 3 screening assessment showed that four sunlight-sensitive resources (No. 6 Stapleton Playground; No. 7 Stapleton Phase I Open Space; No. 8 St. Paul's Avenue Greenstreet; No. 9 Edgewater Village Hall) would not receive project-generated shadows on any of the four analysis days, and these resources therefore did not require any further analysis. Table 6-3 presents a summary of the Tier 3 screening assessment, showing the five open spaces and one natural resource that could, in the absence of intervening buildings, receive project-generated shadows, and on which analysis days the new shadows would occur.

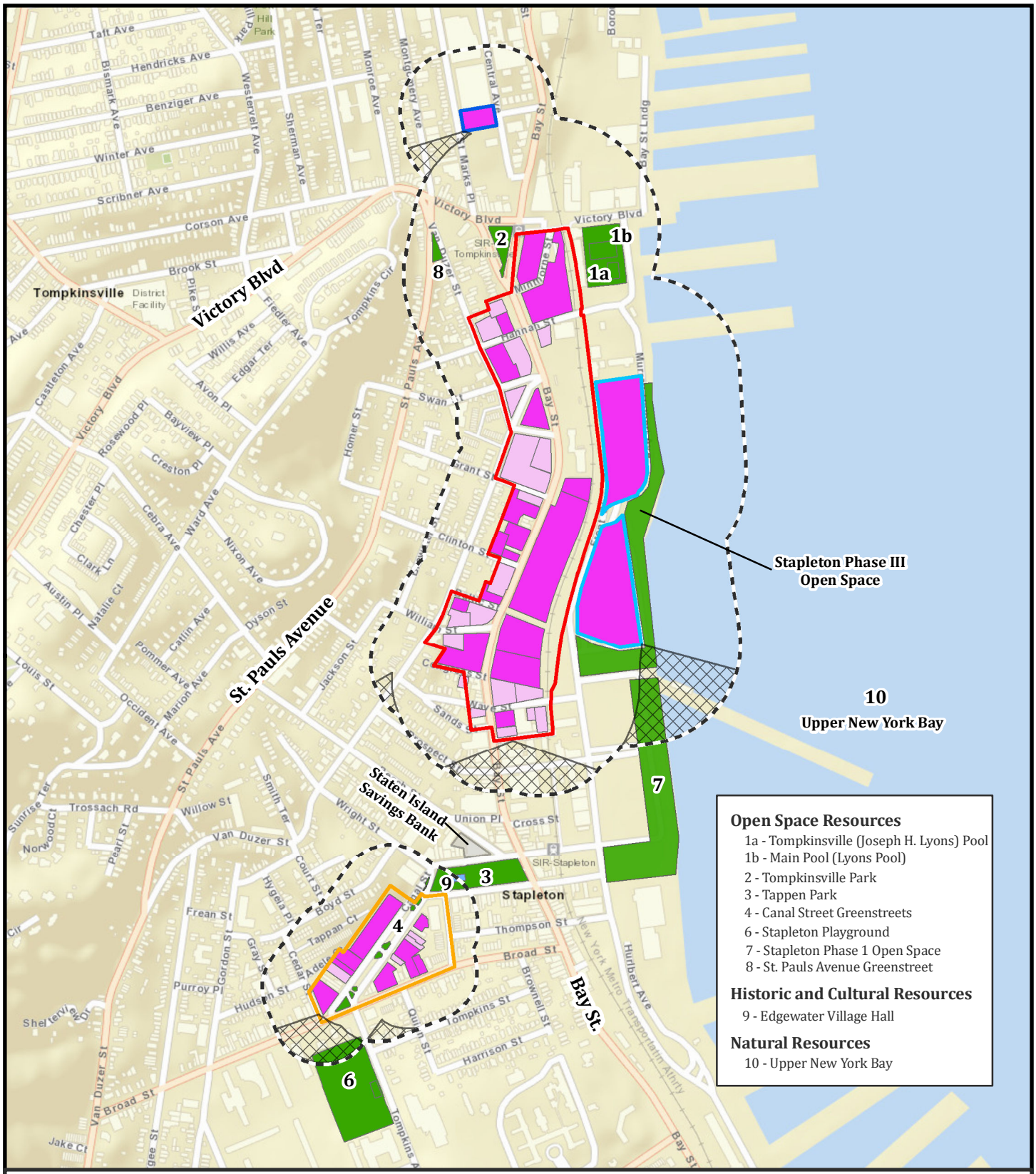


FIGURE 6-2: TIER 2 SHADOW SCREENING ASSESSMENT

BAY STREET CORRIDOR REZONING AND RELATED ACTIONS
STATEN ISLAND, NY

Map Reference:
Basemap: ESRI
Shapefile: NYC DCP; MapPLUTO Data; NYC DPR

0 375 750 1,500 Feet

N

- Bay Street Corridor Project Area
- Canal Street Corridor Project Area
- City Disposition Sites
- Stapleton Waterfront Phase III Sites
- Projected Development Sites
- Potential Development Sites
- Sunlight-Sensitive Historic and Cultural Resources
- Sunlight-Sensitive Open Space Resources
- Tier 1: Longest Shadow Study Area Boundary
- Tier 2: Area that Cannot be Shaded

Table 6-3: Tier 3 Shadow Screening Assessment Results

Map No.[1]	Resource Name	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	Analysis Days
1a	Lyons Pool – Property	Shaded	Shaded	Shaded	Shaded	4
1b	Lyons Pool – Main Pool	Shaded	Shaded	Shaded	Shaded	4
2	Tompkinsville Park	Shaded	Shaded	Shaded	Shaded	4
3	Tappen Park	Not Shaded	Not Shaded	Not Shaded	Shaded	1
4	Canal Street Greenstreets	Shaded	Shaded	Shaded	Shaded	4
6	Stapleton Playground	Not Shaded	Not Shaded	Not Shaded	Not Shaded	0
7	Stapleton Phase I Open Space	Not Shaded	Not Shaded	Not Shaded	Not Shaded	0
8	St. Paul's Avenue Greenstreet	Not Shaded	Not Shaded	Not Shaded	Not Shaded	0
9	Edgewater Village Hall	Not Shaded	Not Shaded	Not Shaded	Not Shaded	0
10	Upper New York Bay	Shaded	Shaded	Shaded	Shaded	4

Note(s): *[1] Numbers Keyed to Figures 6-1 and 6-2.*

E. DETAILED ANALYSIS OF SHADOW IMPACTS

Pursuant to the *CEQR Technical Manual*, detailed shadows analyses were performed for the six sunlight-sensitive resources identified above on four representative days of the year: March 21, the equinoxes; May 6, the midpoint between the summer solstice and the equinox (and equivalent to August 6); June 21, the summer solstice and the longest day of the year; and December 21, the winter solstice and shortest day of the year. These four representative days indicate the range of shadows over the course of the year. CEQR guidance defines the shadow analysis day as 1.5 hours after sunrise to 1.5 hours before sunset. As discussed above, the results of the shadows analysis show the incremental shadows between the No-Action and With-Action conditions (Table 6-4).

As shown in Table 6-4 below, incremental shadows would reach all six of the sunlight-sensitive resources identified in the Tier 3 assessment (Table 6-3). Increases in shadow coverage would occur on all four analysis days at each resource, except for Tappen Park. Figures 6-3 through 6-19 illustrate incremental shadow coverage for the six sunlight-sensitive resources on each analysis day. Based on CEQR guidance, all times reported are Eastern Standard Time and do not reflect adjustments for Daylight Savings Time that is in effect from mid-March to early November.

RESOURCES NO. 1A & 1B: LYONS POOL – ENTIRE PROPERTY & LYONS POOL – MAIN POOL

Lyons Pool is an approximately 2.13-acre property on Murray Hulbert Avenue between Victory Boulevard and Hannah Street.[3] Built in 1936, the Lyons Pool is a Landmarks and Preservation Commission (LPC) designated New York City Landmark (NYCL), and a New York City Interior Landmark; and is listed on the State and National Register of Historic Places (S/NR-listed). The LPC designation includes the Lyons Pool – Entire Property (*i*.e. bath house building, main pool, diving pool, spray showers, mechanical equipment enclosures, perimeter walls and fencing enclosing these structures, and street level brick retaining walls). The main pool measures 165 feet long and 100 feet wide, and is the largest public pool in Staten Island. The area adjacent to the main pool features outdoor spray showers. From 1984 to 1986, Lyons Pool underwent a $6.7 million restoration, which

[3] Due to the closure of the dive pool, the Lyons Pool consists of 2.13 acres of open space.

included reconstruction of the three pools and locker room facilities, and installation of new plumbing, filtration, and electrical systems.

Table 6-4: Incremental Shadow Duration on Sunlight-Sensitive Resources (With-Action Condition)

No. [1]	Sunlight-sensitive Resource	Shadow Enter-Exit/ Incremental Shadow Duration	Analysis Days			
			March 21/Sept. 21	May 6/August 6	June 21	December 21
			7:36 AM – 4:29 PM	6:27 AM – 5:18 PM	5:57 AM – 6:01 PM	8:51 AM – 2:53 PM
1a	Lyons Pool - Property	Shadow enter-exit time	1:43 – 4:29 PM	2:48 – 5:18 PM	3:13 – 6:01 PM	12:54 – 2:53 PM
		Incremental shadow duration	2 hours 46 minutes	2 hours 30 minutes	2 hours 48 minutes	1 hour 59 minutes
1b	Lyons Pool - Main Pool	Shadow enter-exit time	4:22 – 4:29 PM	4:18 – 5:18 PM	4:33 – 6:01 PM	1:50 – 2:53 PM
		Incremental shadow duration	7 minutes	1 hour	1 hour 28 minutes	1 hour 3 minutes
2	Tompkinsville Park	Shadow enter-exit time	7:36 – 10:12 AM	6:27 – 9:47 AM	5:57 – 9:34 AM	8:51 – 10:44 AM
		Incremental shadow duration	2 hours 36 minutes	3 hours 20 minutes	3 hours 37 minutes	1 hour 53 minutes
3	Tappen Park	Shadow enter-exit time	-	-	-	2:35 – 2:48 PM
		Incremental shadow duration	-	-	-	13 minutes
4	Canal Street Greenstreets	Shadow enter-exit time	7:36 – 10:22 AM 3:39 – 4:29 PM	6:27 – 8:41 AM 3:44 – 5:18 PM	5:57 – 8:07 AM 4:00 – 6:01 PM	8:51 AM – 12:25 PM
		Incremental shadow duration	2 hours 46 minutes 50 minutes	2 hours 14 minutes 1 hour 34 minutes	2 hours 10 minutes 2 hours 1 minute	3 hours 34 minutes
10	Upper New York Bay	Shadow enter-exit time	2:24 – 4:29 PM	2:54 – 5:18 PM	3:17 – 6:01 PM	12:58 – 2:53 PM
		Incremental shadow duration	2 hours 5 minutes	2 hours 24 minutes	2 hours 44 minutes	1 hour 55 minutes

Note(s):
[1] Numbers Keyed to Figures 6-1 and 6-2.
All times are Eastern Standard Time (EST); Daylight Savings Time was not accounted for per CEQR Technical Manual guidance. Table 6-4 indicates the entry and exit times and total duration of incremental shadow for each sunlight-sensitive resource.

The Proposed Actions would result in new incremental shadows of varying duration and coverage on the **property** on all four analysis days. Incremental shadows would last for a total of approximately 2 hours and 46 minutes (from 1:43 to 4:29 PM) on March 21; 2 hours and 30 minutes (from 2:48 to 5:18 PM) on May 6; 2 hours and 48 minutes (from 3:13 to 6:01 PM) on June 21; and 1 hour and 59 minutes (from 12:54 to 2:53 PM) on December 21.

The Proposed Actions would result in new incremental shadows of varying duration and coverage on the **main pool** on all four analysis days. Incremental shadows on the main pool would last for a total of 7 minutes (from 4:22 to 4:29 PM) on March 21; 1 hour (from 4:18 to 5:18 PM) on May 6; 1 hour and 28 minutes (from 4:33 to 6:01 PM) on June 21; and 1 hour and 3 minutes (from 1:50 to 2:53 PM) on December 21.

MARCH 21

As shown in Figure 6-3, on March 21, there would be no incremental shadow coverage on either the **property** or the **main pool** during the AM hours. Incremental shadows would reach the Lyons Pool **property** at 1:43 PM. From 1:43 PM to approximately 3:45 PM, there would be no incremental shadows cast on the main pool, spray shower, or diving pool. By 4:29 PM, which is the end of the analysis period, the northern portion of the **property** and the southern portion of the **property**, which includes the spray shower feature and diving pool, would be partially covered by incremental shadows. The duration of incremental shadows on the spray showers would be approximately 40 minutes (3:49 to 4:29 PM). The duration of incremental shadows on the diving pool would be approximately 11 minutes. (4:18 to 4:29 PM) (Figure 6-3). Incremental shadows would be cast on

the **main pool** for a total duration of approximately 7 minutes (4:22 to 4:29 PM) during this analysis day.

MAY 6

As shown in Figure 6-4, on May 6, there would be no incremental shadow coverage on either the **property** or the **main pool** during the AM hours. Incremental shadows would reach the Lyons Pool property at 2:48 PM. Incremental shadows would reach the **main pool** at 4:18 PM. From 4:18 PM to 5:18 PM, incremental shadows would cross the length of the pool from west to east. By 5:18 PM, the end of the analysis period, the majority of the main pool and a small eastern portion of the property would experience incremental shadow coverage.

JUNE 21

As shown in Figure 6-5, on June 21, there would be no incremental shadow coverage during the AM hours. Incremental shadows would reach the Lyons Pool **property** at approximately 3:13 PM and the **main pool** at approximately 4:33 PM. From 4:33 PM to 6:01 PM, incremental shadows would travel west to east along the length of the **main pool**. The spray shower feature and diving pool would be cast in incremental shadows beginning at approximately 5:36 PM for approximately 25 minutes. By 6:01 PM, a substantial eastern portion of the property, including portions of the main pool, spray shower, and diving pool, would experience incremental shadow coverage.

DECEMBER 21

As shown in Figure 6-6, on December 21, there would be no incremental shadow coverage on either the Lyons Pool **property** or the **main pool** during the AM hours. Incremental shadow coverage would reach the property at approximately 12:54 PM. Incremental shadows would reach the **main pool** at approximately 1:50 PM. By the end of the analysis period at 2:53 PM, the majority of the **property** and the **main pool** would be cast in incremental shadows. The duration of incremental shadows on the **property** would be approximately 1 hour and 59 minutes. (12:54 to 2:53 PM). Incremental shadows would be cast on the **main pool** for a total duration of approximately 1 hour and 3 minutes (1:50 to 2:53 PM) during this analysis day.

Assessment

In New York City, outdoor public pools are open from late June to Labor Day. Therefore, on the March 21 analysis day, no outdoor public pools in NYC would be in use. Consequently, the Lyons Pool **main pool** and spray shower would also be closed for public use; therefore, there would be minimal use of the outdoor area on the Lyons Pool **property** during the March 21 analysis day. The open space resource would continue to receive adequate sunlight during the growing season (at least the four- to six-hour minimum specified in the *CEQR Technical Manual*), and vegetation would not be affected. In addition, it is anticipated that the incremental shadows on the Lyons Pool **property**, which includes the bath house, main swimming pool, diving pool, spray shower, mechanical equipment enclosures, perimeter walls and fencing, would not result in a significant adverse impact during this analysis day, because the usability of the resource would not be reduced considerably.

On the May 6/August 6 and June 21 analysis days, incremental shadows would generally start to cover portions of the **main pool** and spray shower, in the southern portion of the property, in the early evening hours between 4:00 PM and 6:00 PM. During these analysis days, the pools would be in use from 7:00 AM to 8:30 PM on weekdays and 11:00 AM to 7:00 PM on weekends, with a break for pool cleaning between 3:00 PM to 4:00 PM.[4,5] Throughout the day, the active recreational uses on the **property** would continue to receive direct sunlight on both analysis days (Figures 6-4 and 6-5). Therefore, incremental shadows on active recreational uses during the months surrounding the summer solstice, when temperatures are warmer, would not significantly affect the usability of the open space. In addition, the incremental shadows cast on the **main pool** would be in the early evening hours for a maximum duration of 1 hour and 28 minutes on the June 21 analysis day. The **main pool** would receive direct sunlight for the majority of the day on both the May 6/August 6 and June 21 analysis days. Therefore, with the **main pool** only receiving one and a half hour or less of shadow coverage during the day and the natural heating of the pool, it is expected that public enjoyment would not be significantly impacted.[6] Furthermore, the open space would continue to receive adequate sunlight during the growing season (at least the four- to six-hour minimum specified in the *CEQR Technical Manual*), and vegetation would not be affected.

As noted above, outdoor public pools are open from late June to Labor Day. Therefore, on the December 21 analysis day, no outdoor public pools in NYC would be in use. While the **main pool** and spray shower would receive sizable incremental shadow coverage on December 21, the outdoor areas would continue to receive some direct sunlight as shadows move from east to west throughout the day. Incremental shadow coverage on December 21, when temperatures would be colder and the use of active water-based recreational space would not be available (compared to when the pool would be operational in the warmer months), would not affect the utilization or public enjoyment of this open space resource. Furthermore, vegetation would not be affected by incremental shadows, as the December 21 analysis day is outside the growing season defined by the *CEQR Technical Manual*. Therefore, the incremental shadows resulting from the Proposed Actions are not anticipated to result in a significant adverse impact on the usability of Lyons Pool.

RESOURCE NO. 2: TOMPKINSVILLE PARK

Tompkinsville Park is a 0.42-acre neighborhood park located at the intersection of Bay Street and Victory Boulevard. The triangular-shaped park includes seating areas, trees, and fenced-in patches of grass and vegetation interspersed throughout. A statue named *The Hiker* (1916) honoring soldiers who served in the Spanish-American War is located along the northern boundary of the park.

The Proposed Actions would result in new incremental shadows of varying duration and coverage on all four analysis days at Tompkinsville Park. Incremental shadows would cover the park for a duration of approximately 2 hours and 36 minutes (from 7:36 to 10:12 AM) on March 21; 3 hours and 20 minutes (from 6:27 to 9:47 AM) on May 6; 3 hours and 37 minutes (from 5:57 to 9:34 AM) on June 21; and 1 hour and 53 minutes (from 8:51 to 10:44 AM) on December 21.

[4] DPR. Lyons Pool. https://www.nycgovparks.org/parks/lyons-pool/facilities/outdoor-pools/lyons-pool
[5] DPR. Adult Lap Swim. https://www.nycgovparks.org/reg/lap-swim
[6] Natural heating of Lyons Pool was confirmed by DPR employees at Lyons Pool.

FIGURE 6-3: LYONS POOL - ENTIRE PROPERTY AND MAIN POOL INCREMENTAL SHADOW - MARCH 21/SEPTEMBER 21

3:00 PM

3:45 PM

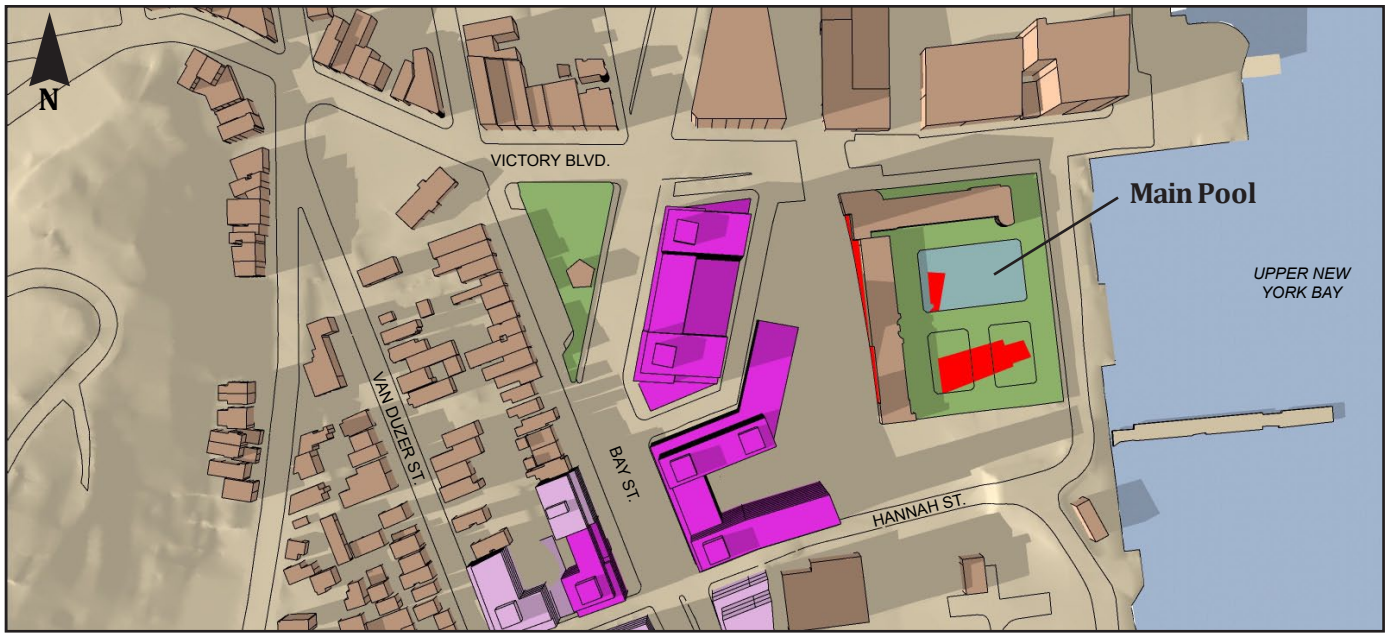
Projected Development

Open Space

Incremental Shadow

Potential Development

FIGURE 6-3: LYONS POOL - ENTIRE PROPERTY AND MAIN POOL INCREMENTAL SHADOW - MARCH 21/SEPTEMBER 21



4:29 PM

Projected Development

Open Space

Incremental Shadow

Potential Development

FIGURE 6-4: LYONS POOL - ENTIRE PROPERTY AND MAIN POOL INCREMENTAL SHADOW - MAY 6/AUGUST 6

3:30 PM

4:30 PM

Projected Development Open Space Incremental Shadow

Potential Development

FIGURE 6-4: LYONS POOL - ENTIRE PROPERTY AND MAIN POOL INCREMENTAL SHADOW - MAY 6/AUGUST 6

5:18 PM

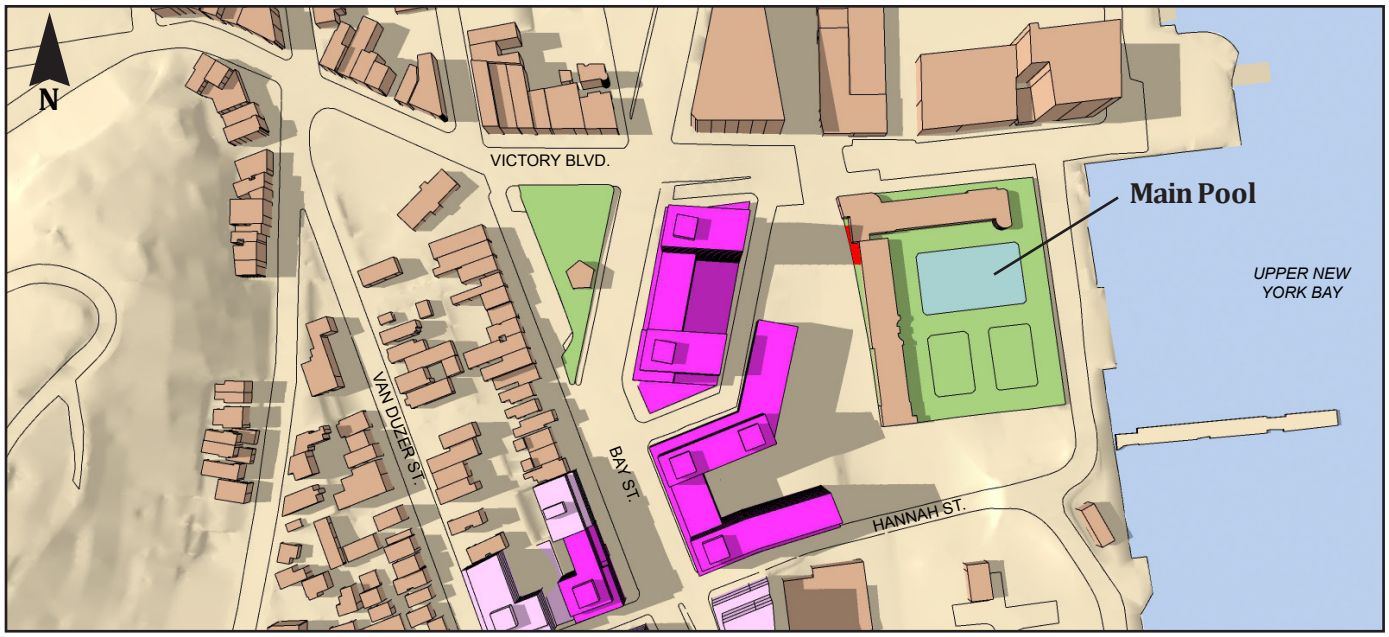
Projected Development

Open Space

Incremental Shadow

Potential Development

FIGURE 6-5: LYONS POOL - ENTIRE PROPERTY AND MAIN POOL INCREMENTAL SHADOW - JUNE 21



4:00 PM

5:00 PM

Projected Development
Open Space
Incremental Shadow
Potential Development

FIGURE 6-5: LYONS POOL - ENTIRE PROPERTY AND MAIN POOL INCREMENTAL SHADOW - JUNE 21

6:01 PM

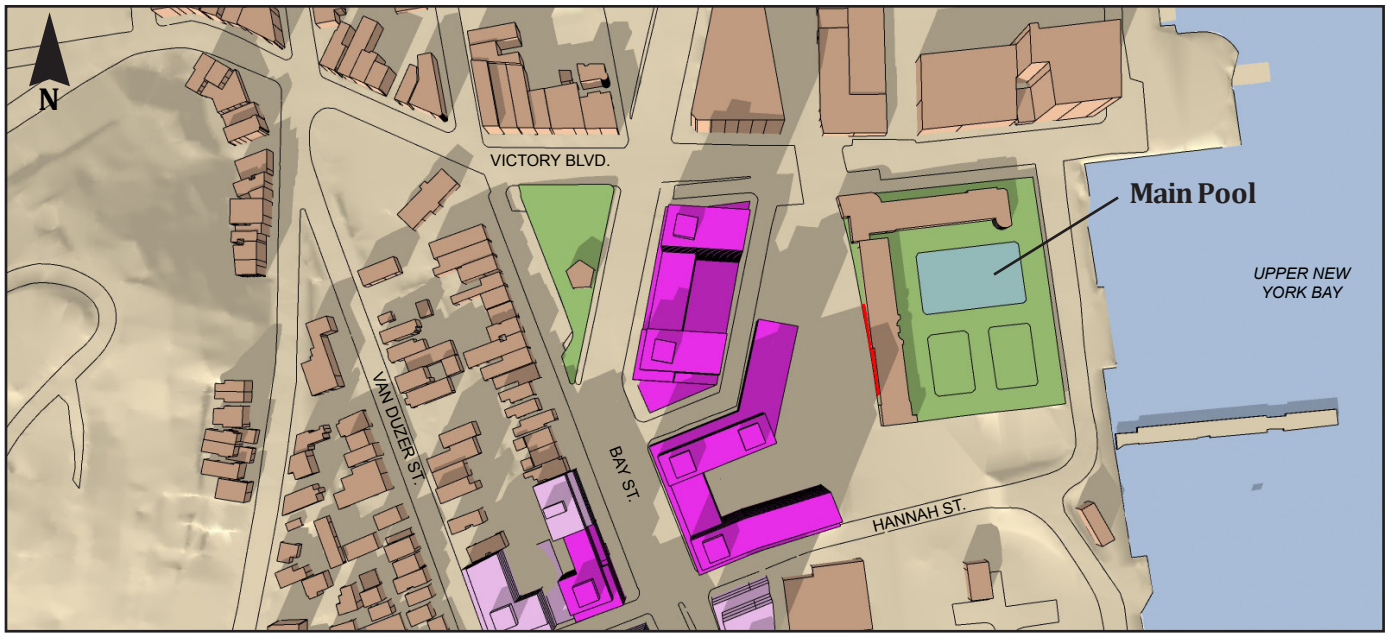
Projected Development

Open Space

Incremental Shadow

Potential Development

FIGURE 6-6: LYONS POOL - ENTIRE PROPERTY AND MAIN POOL INCREMENTAL SHADOW - DECEMBER 21



1:30 PM

2:53 PM

Projected Development
Open Space
Incremental Shadow
Potential Development

MARCH 21

As shown in Figure 6-7, on March 21, incremental shadows would result in a complete loss of sunlight at Tompkinsville Park beginning at 7:36 AM and continuing until 7:43 AM (7 minutes). By 9:00 AM, incremental shadows would cover only a small portion of the northeastern corner and southeastern boundary of the park. The incremental shadows would exit the park at 10:12 AM. There would be no incremental shadow coverage for the remaining morning, afternoon, and evening hours on the March 21 analysis day.

MAY 6

As shown in Figure 6-8, on May 6, incremental shadows would cover the southern portion of Tompkinsville Park starting at 6:27 AM, the beginning of the analysis day. As shadows are not static and move throughout the day, incremental shadows would travel east throughout the morning; however, almost half of Tompkinsville Park would remain shadowed until approximately 7:50 AM. By 8:30 AM, incremental shadows would be limited to small northeastern and southern portions of the park. The incremental shadows would exit the park at 9:47 AM. There would be no incremental shadow coverage for the remaining morning, afternoon, and evening hours on the May 6 analysis day.

JUNE 21

As shown in Figure 6-9, on June 21, the incremental shadows would cover the southern half of Tompkinsville Park starting at 5:57 AM, the beginning of the analysis day. As shadows are not static and move throughout the day, incremental shadows would travel east throughout the morning. Between 7:00 AM and 8:00 AM, incremental shadows would move northeastward, shading the central portion of the park. The incremental shadows would exit the park at 9:34 AM. There would be no incremental shadow coverage for the remaining morning, afternoon, and evening hours on the June 21 analysis day.

DECEMBER 21

As shown in Figure 6-10, on December 21, the incremental shadows would result in a complete loss of sunlight at Tompkinsville Park beginning at 8:51 AM and continuing until 9:13 AM (22 minutes). By approximately 10:30 AM, incremental shadow coverage would be limited to the northeastern corner of Tompkinsville Park. The incremental shadows would exit the park by 10:44 AM. There would be no incremental shadow coverage for the remaining morning, afternoon, and evening hours on the December 21 analysis day.

Assessment

While incremental shadows on the park would result in a complete loss of sunlight on March 21 (7 minutes) and December 21 (22 minutes), the duration would be short and would only occur in the early morning hours shortly after sunrise when the park would likely not be at its peak utilization. Incremental shadows would also not be present on the park for the remaining morning, afternoon, and evening hours on all four analysis days and, therefore, would not adversely impact the enjoyment or utilization of the park for the majority of the day. In addition, park benches within the boundaries

of Tompkinsville Park, which are located in the northern and central areas of the park, are already shaded by existing tree canopy. Therefore, incremental shadows would not result in extensive shadow coverage to an area not currently shaded. The vegetation within the park would continue to receive adequate sunlight for tree growth (at least the four- to six-hour minimum specified in the *CEQR Technical Manual*) and vegetation would not be affected. Therefore, the project-generated shadows are not anticipated to adversely impact the usability of Tompkinsville Park.

RESOURCE NO. 3: TAPPEN PARK

Tappen Park is a 1.78-acre park located at the intersection of Canal Street, Water Street, and Bay Street. The park contains seating areas, grassy lawns, common horse chestnut trees near Canal Street and Edgewater Village Hall (S/NR listed and LPC designated), which is currently used as office space for the District Attorney and other government agencies. The western portion of Tappen Park contains a Romanesque comfort station with wrought iron lanterns, a gazebo, benches, and ornamental brickwork. The park also contains London plane trees and sugar maples.[7]

The Proposed Actions would result in new incremental shadows on the December 21 analysis day at Tappen Park. Incremental shadows would last for a total of approximately 13 minutes (from 2:35 to 2:48 PM). The park would not receive incremental shadow coverage on the other three representative analysis days.

DECEMBER 21

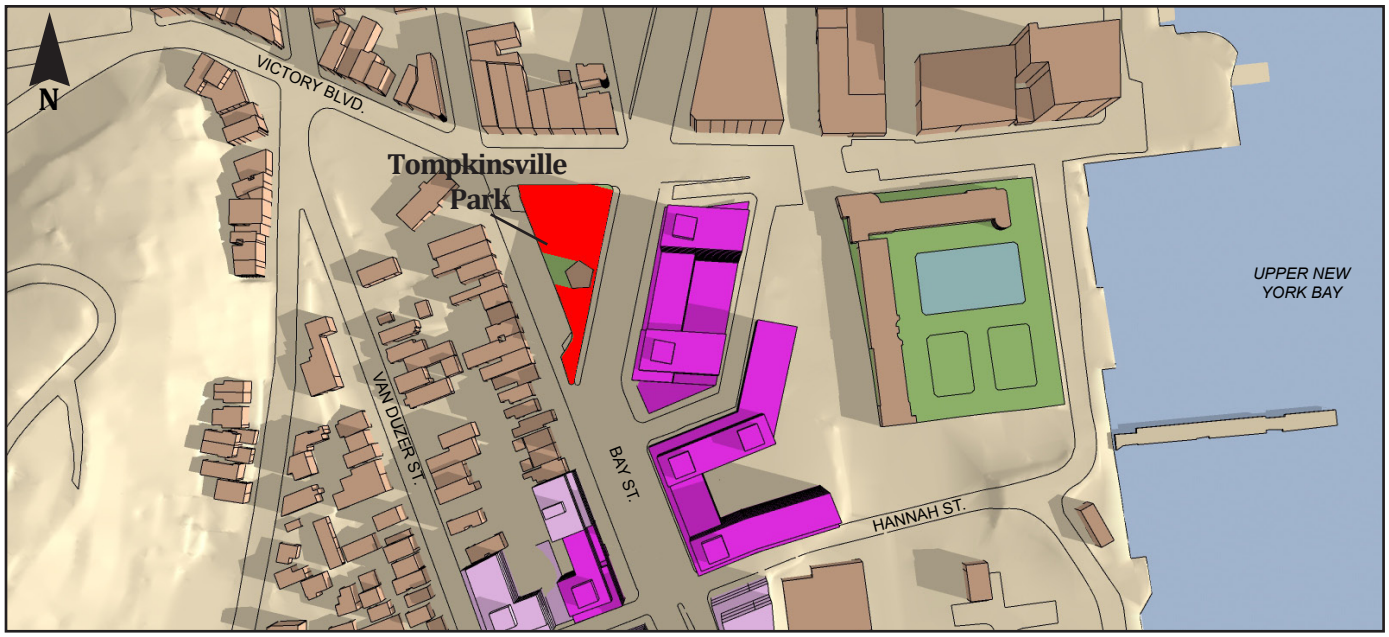
On December 21, incremental shadows would reach hardly discernable southern portions of the park beginning at 2:35 PM. The affected area of the park is comprised of a plaza, trees, landscaping, and benches. As shown in Figure 6-11, between 2:35 and 2:48 PM, incremental shadow coverage would remain limited. There would be no incremental shadow coverage prior to the incremental shadow enter time.

Assessment

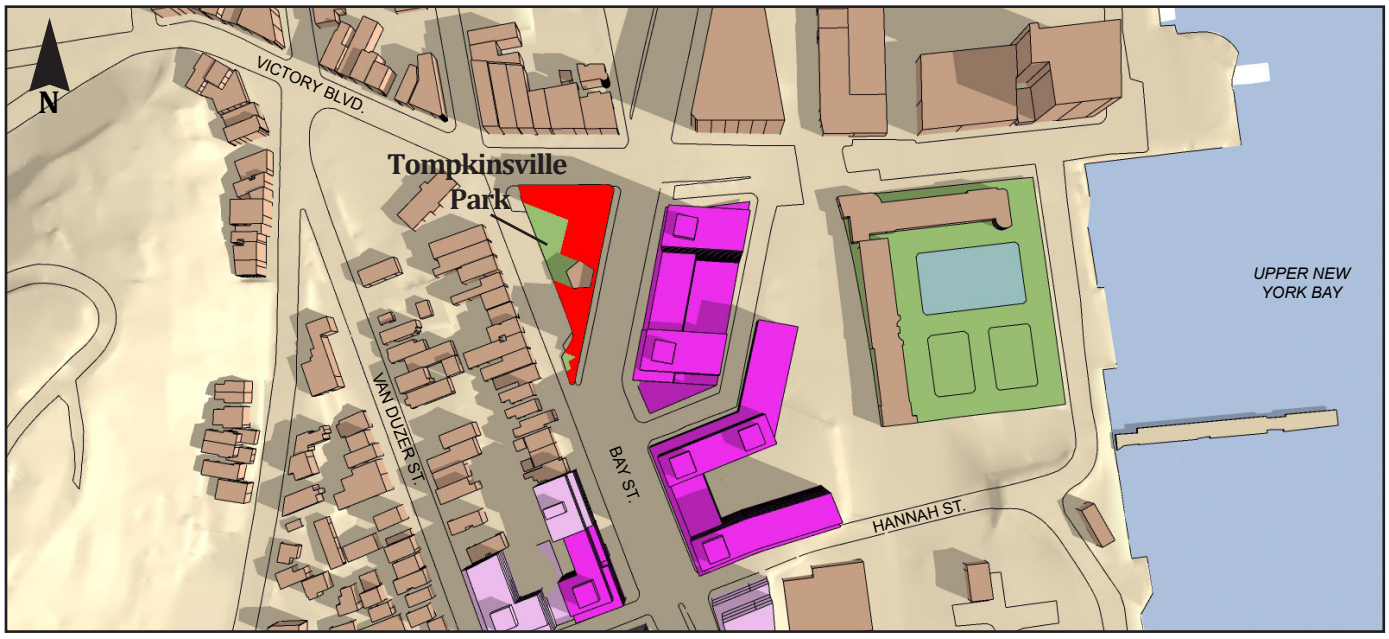
Incremental shadow coverage at Tappen Park would only occur on the December 21 analysis day. On December 21, affected amenities would continue to receive some direct sunlight as shadows move from west to east throughout the day. Incremental shadow coverage on December 21, when temperatures would be colder and the use of Tappen Park would not be as high (compared to warmer months), would not affect the utilization or enjoyment of this open space resource. Additionally, bench seating areas would only be temporarily affected by incremental shadows for a total of 13 minutes, and some benches would receive direct sunlight throughout the day. Furthermore, any vegetation would not be affected by incremental shadows, as the December 21 analysis day falls outside the plant growing season defined by the *CEQR Technical Manual*. Therefore, the incremental shadows that could result from the Proposed Actions are not anticipated to adversely impact the usability of Tappen Park.

[7] New York City Department of Parks and Recreation. https://www.nycgovparks.org/parks/tappen-park/history (Date Accessed June 22, 2016)

FIGURE 6-7: TOMPKINSVILLE PARK INCREMENTAL SHADOW - MARCH 21/SEPTEMBER 21



7:36 AM



8:15 AM

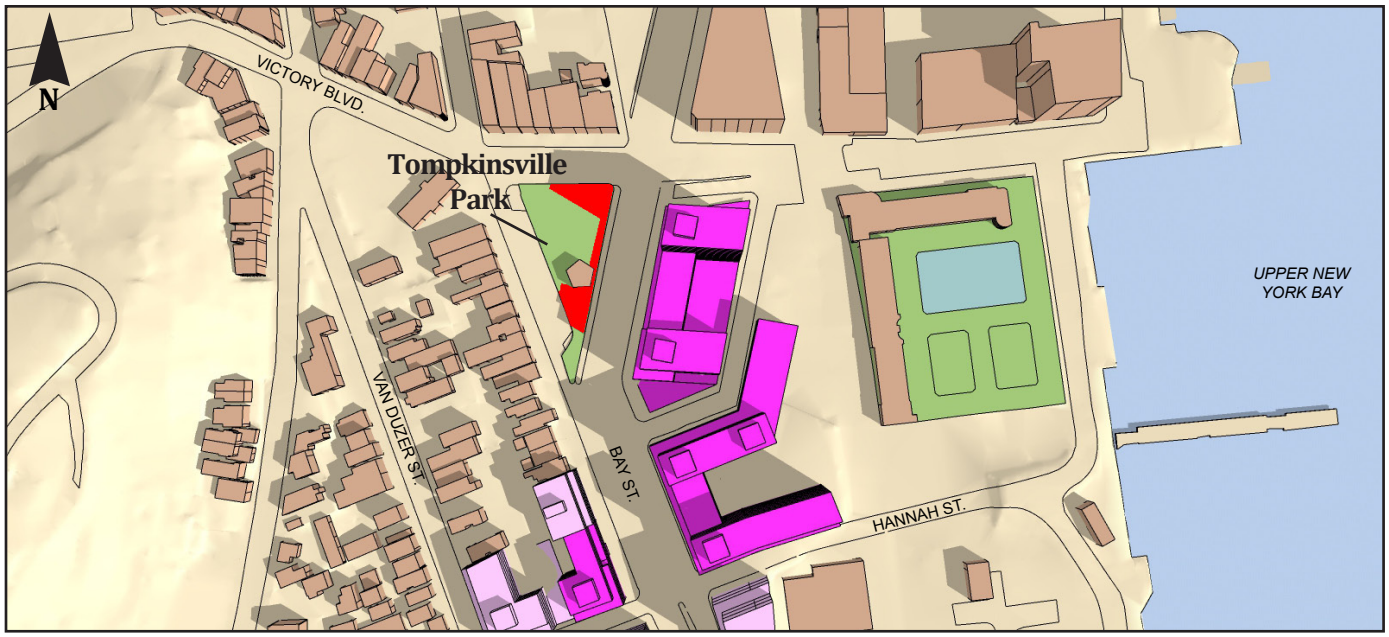
Projected Development

Open Space

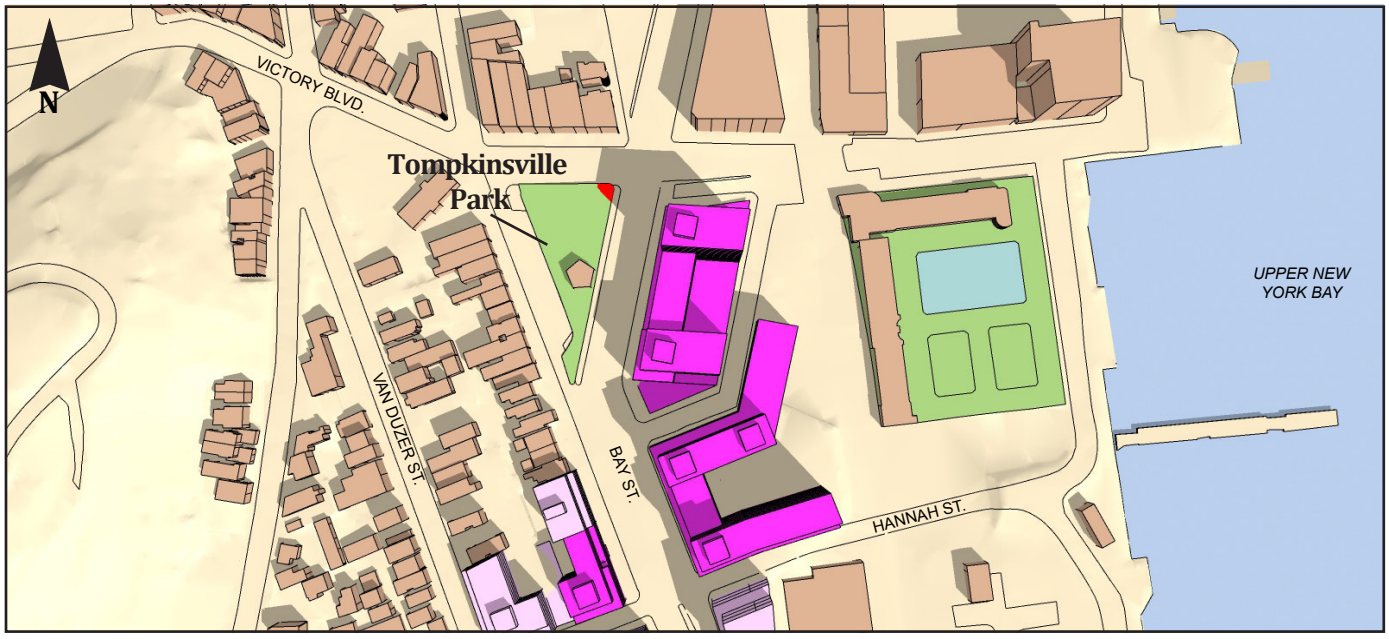
Incremental Shadow

Potential Development

FIGURE 6-7: TOMPKINSVILLE PARK INCREMENTAL SHADOW - MARCH 21/SEPTEMBER 21



9:00 AM

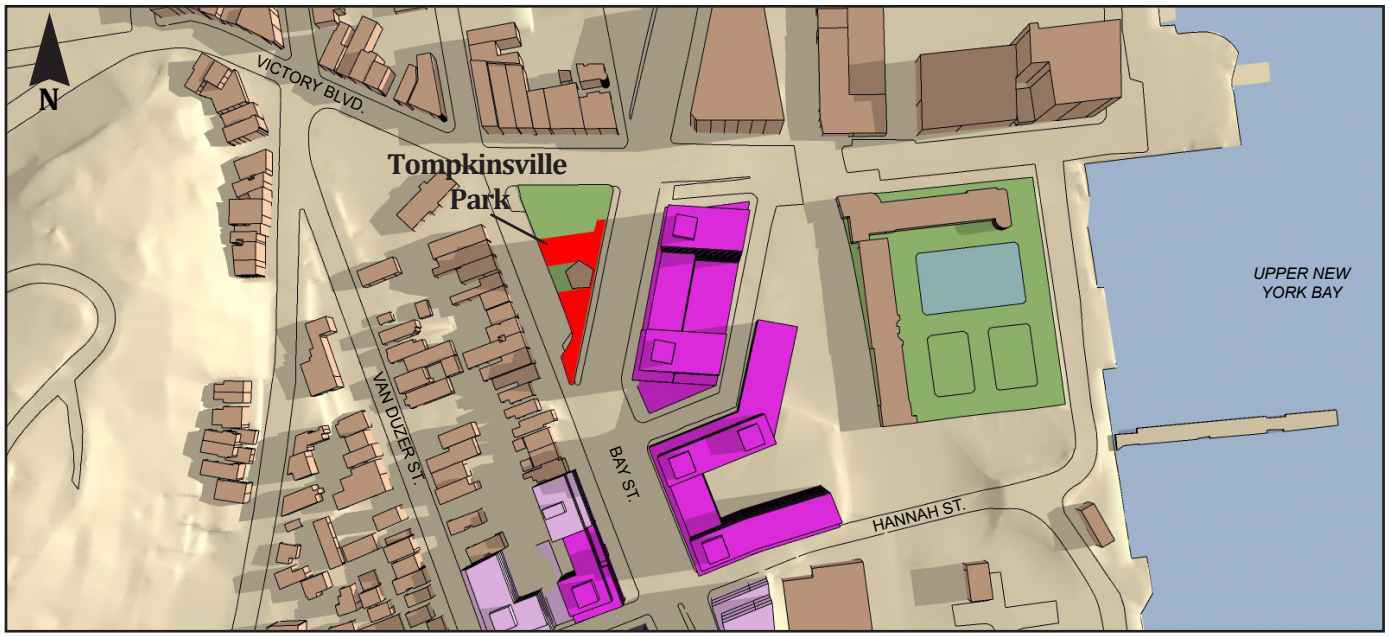


10:00 AM

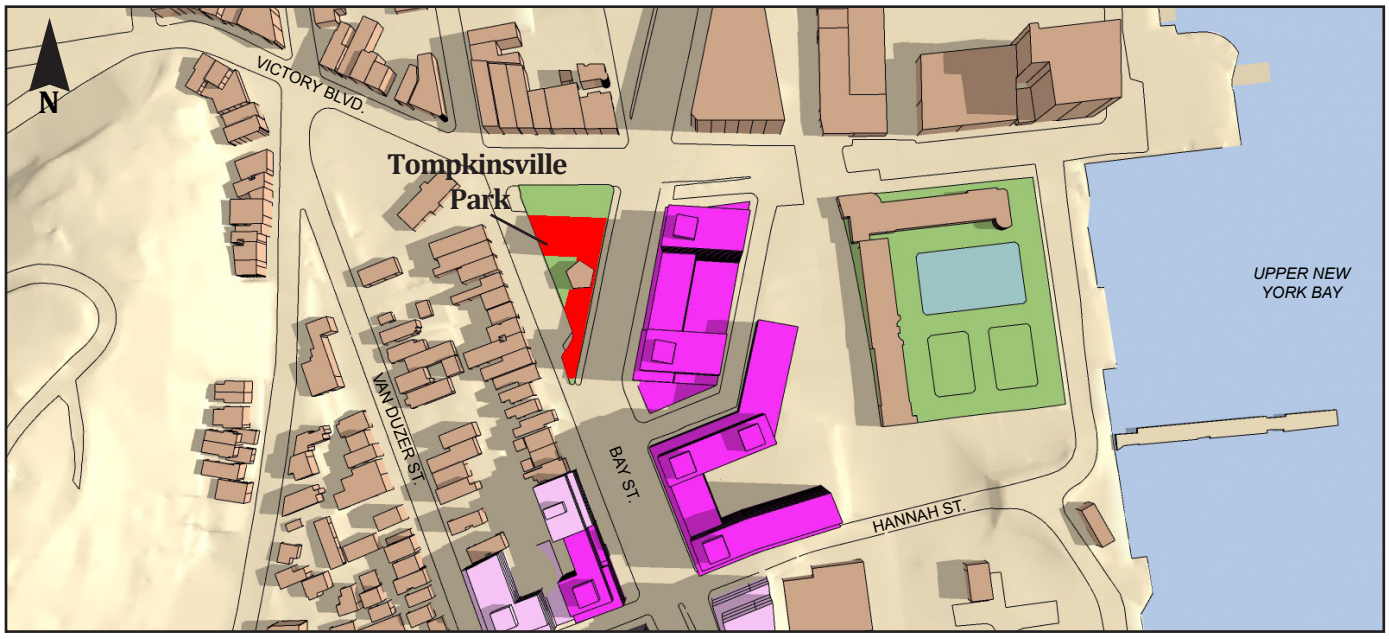
Projected Development Open Space Incremental Shadow

Potential Development

FIGURE 6-8: TOMPKINSVILLE PARK INCREMENTAL SHADOW - MAY 6/AUGUST 6



6:27 AM

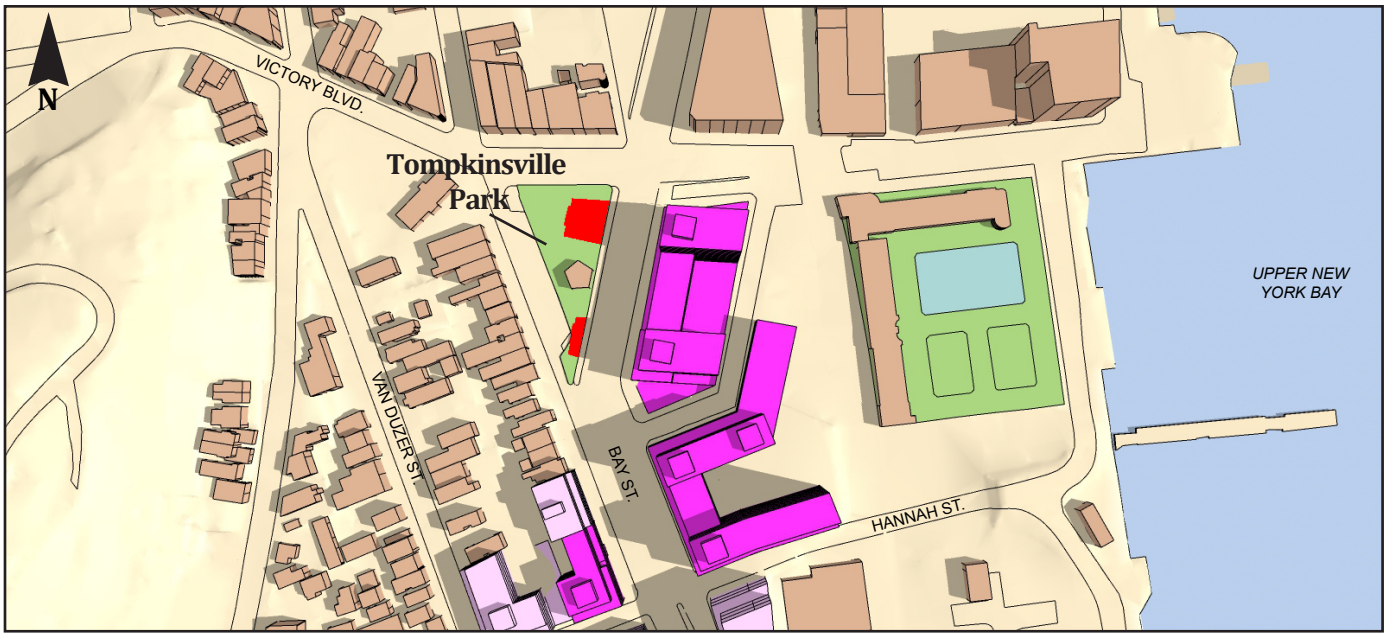


7:30 AM

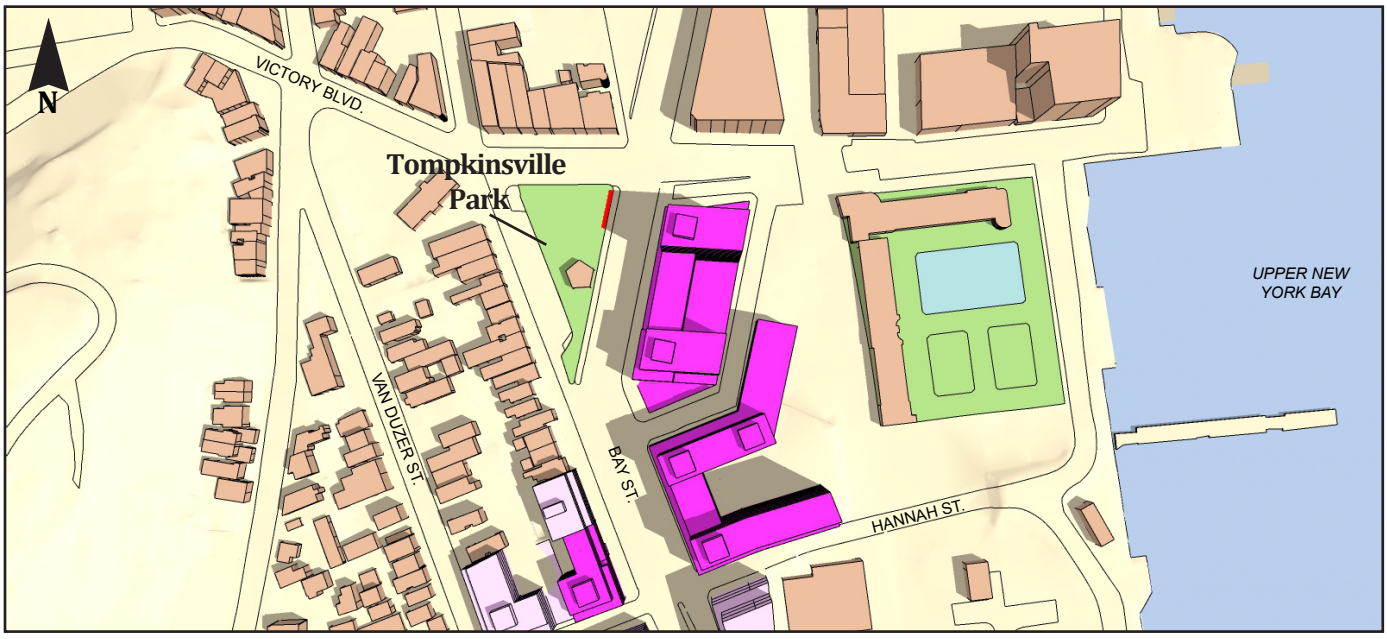
Projected Development Open Space Incremental Shadow

Potential Development

FIGURE 6-8: TOMPKINSVILLE PARK INCREMENTAL SHADOW - MAY 6/AUGUST 6



8:30 AM

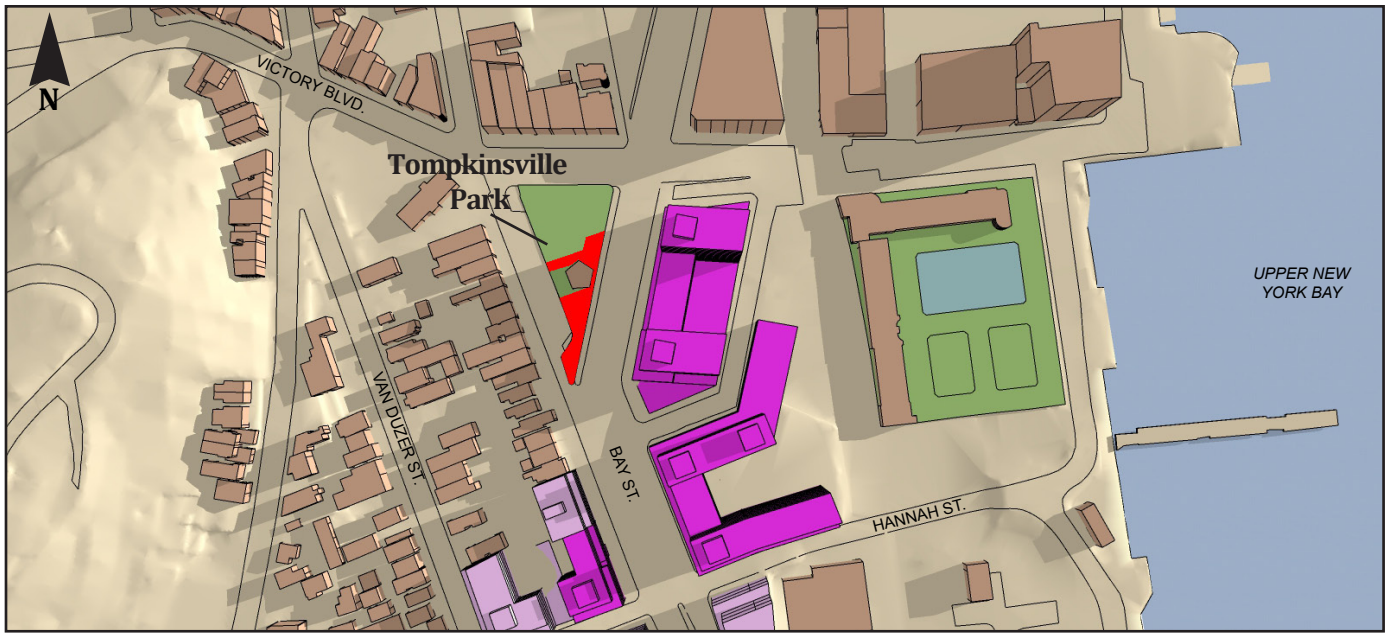


9:30 AM

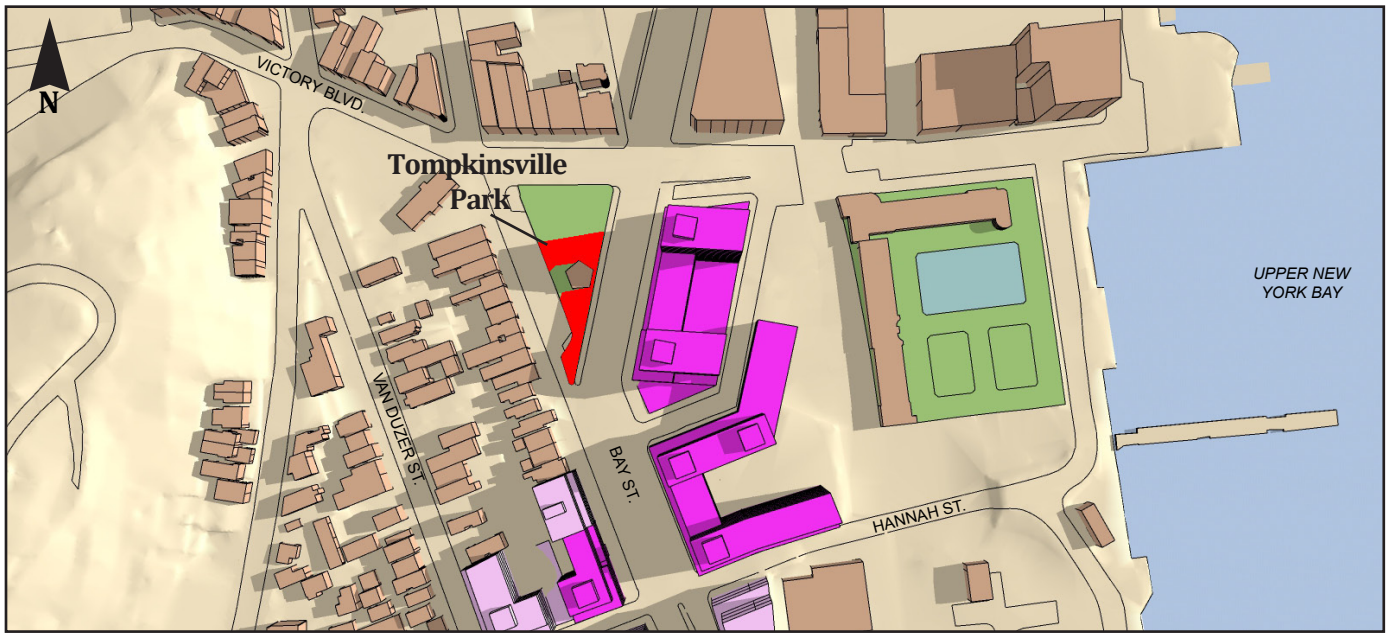
Projected Development Open Space Incremental Shadow

Potential Development

FIGURE 6-9: TOMPKINSVILLE PARK INCREMENTAL SHADOW - JUNE 21



5:57 AM

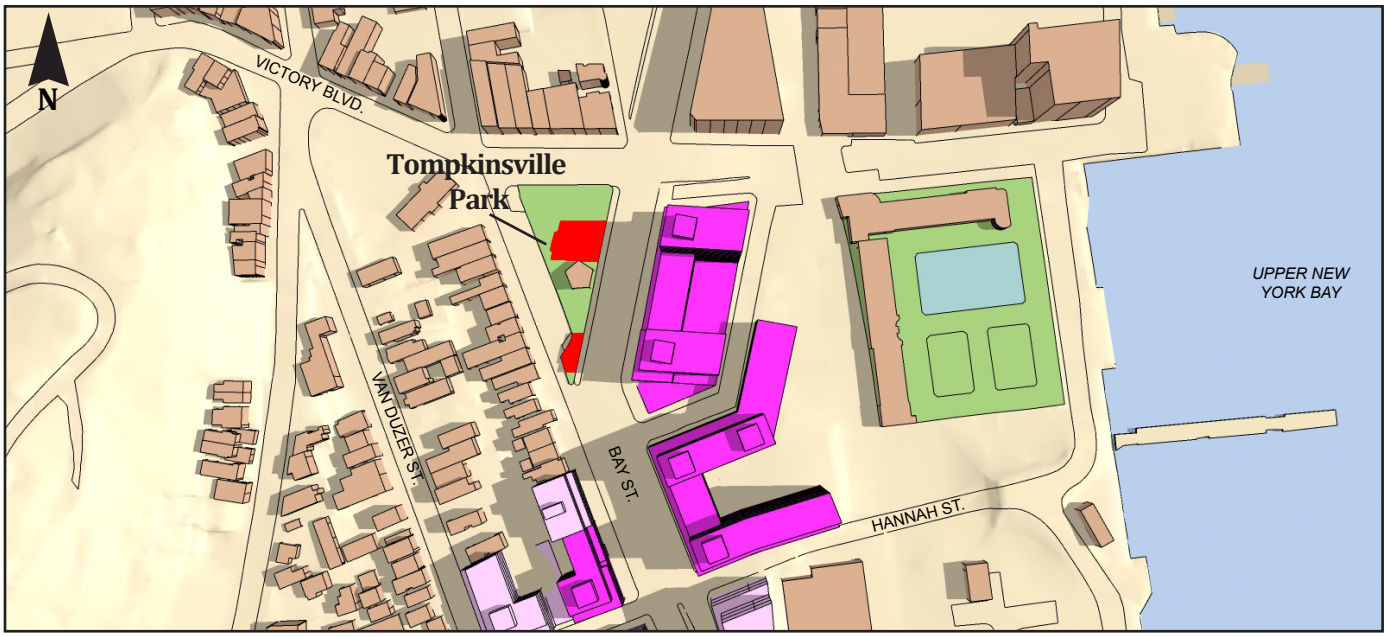


7:00 AM

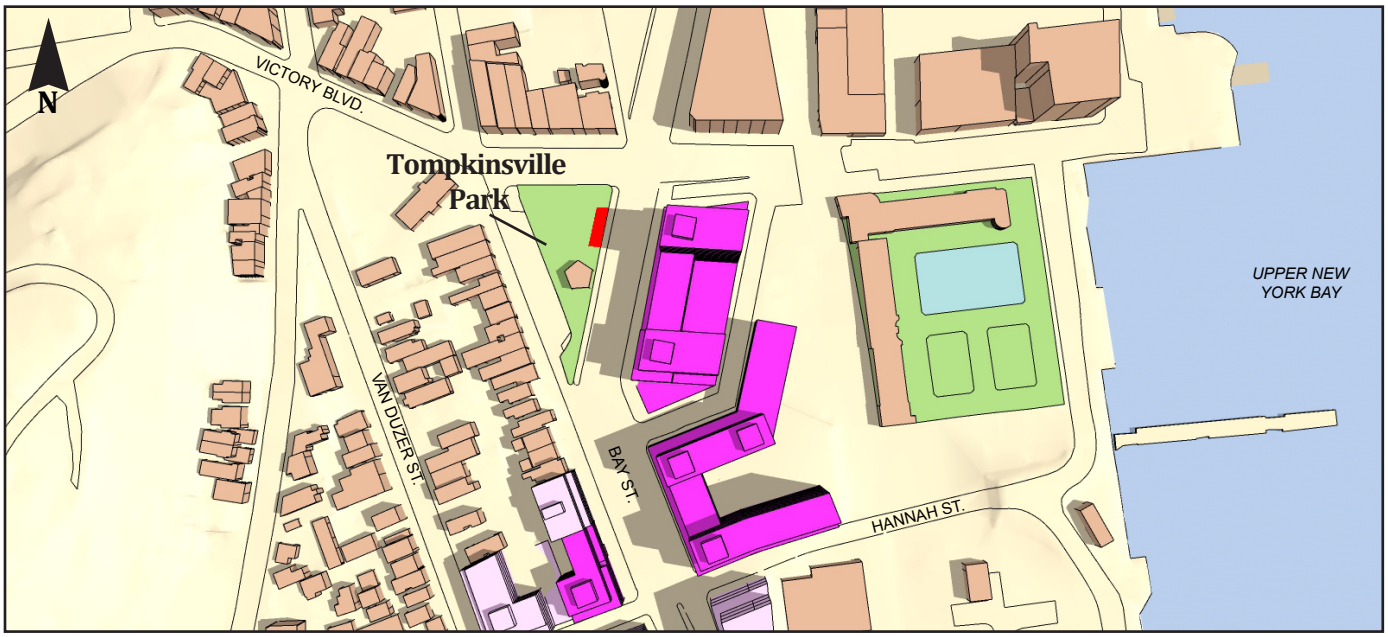
Projected Development Open Space Incremental Shadow

Potential Development

FIGURE 6-9: TOMPKINSVILLE PARK INCREMENTAL SHADOW - JUNE 21



8:00 AM

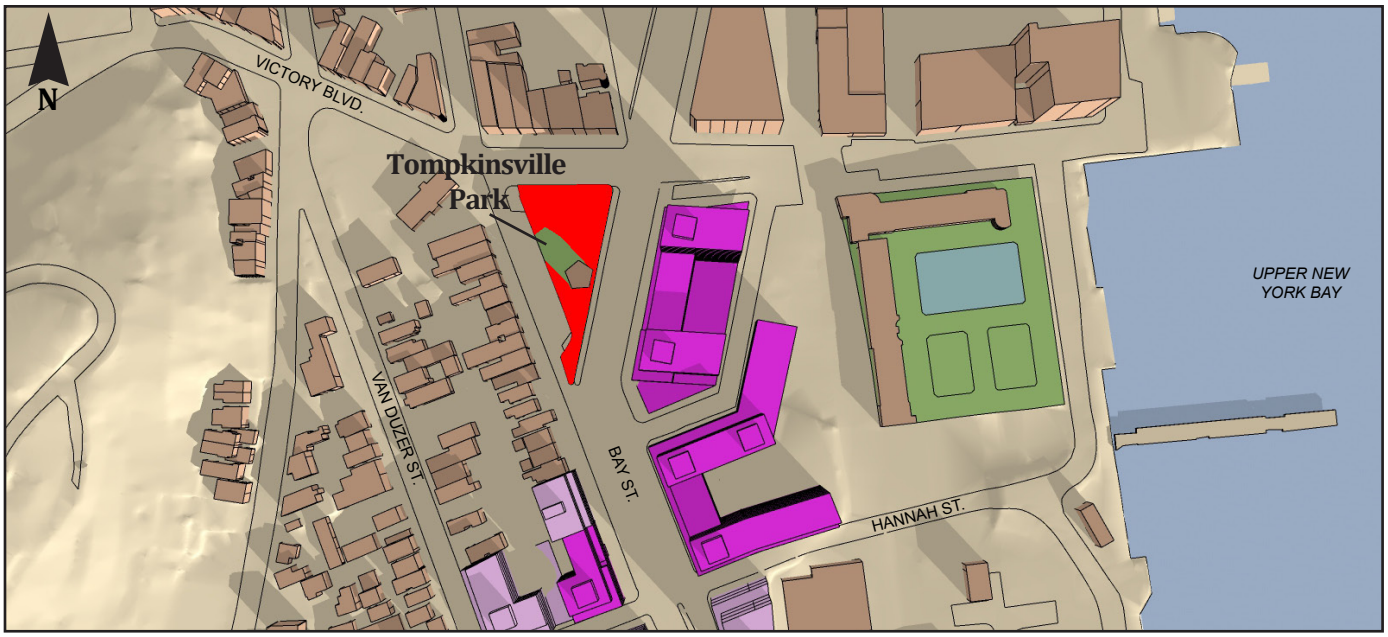


9:00 AM

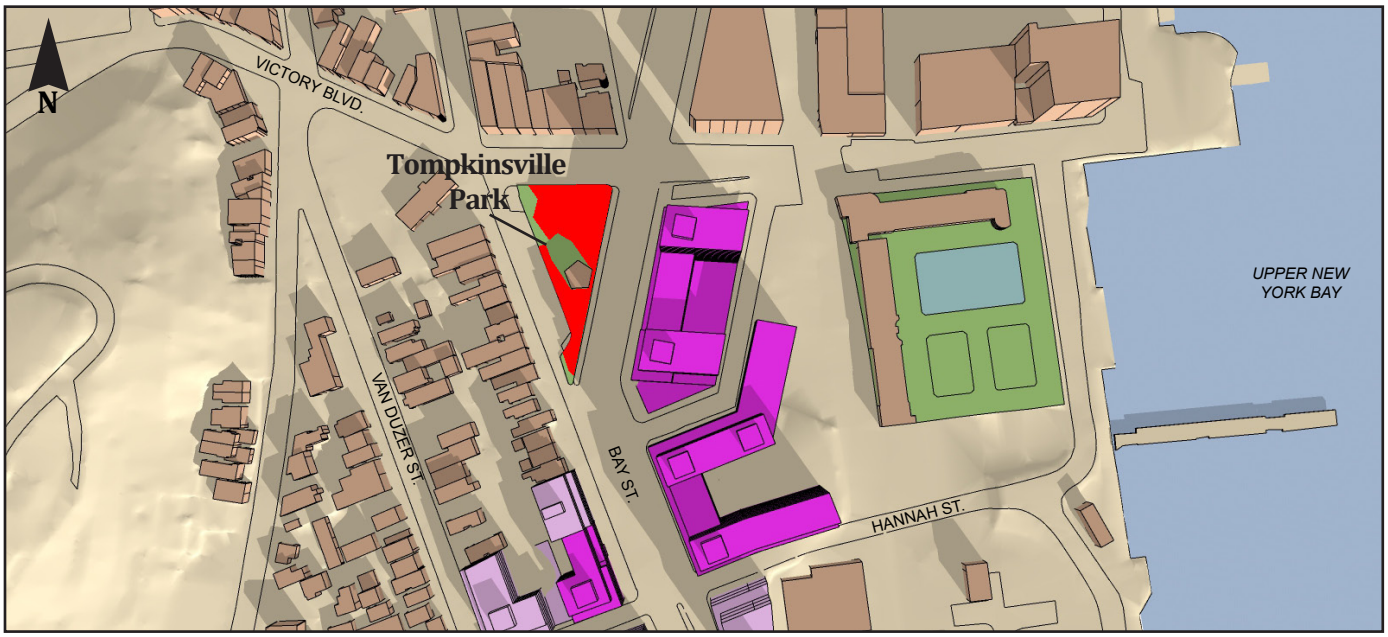
Projected Development Open Space Incremental Shadow

Potential Development

FIGURE 6-10: TOMPKINSVILLE PARK INCREMENTAL SHADOW - DECEMBER 21



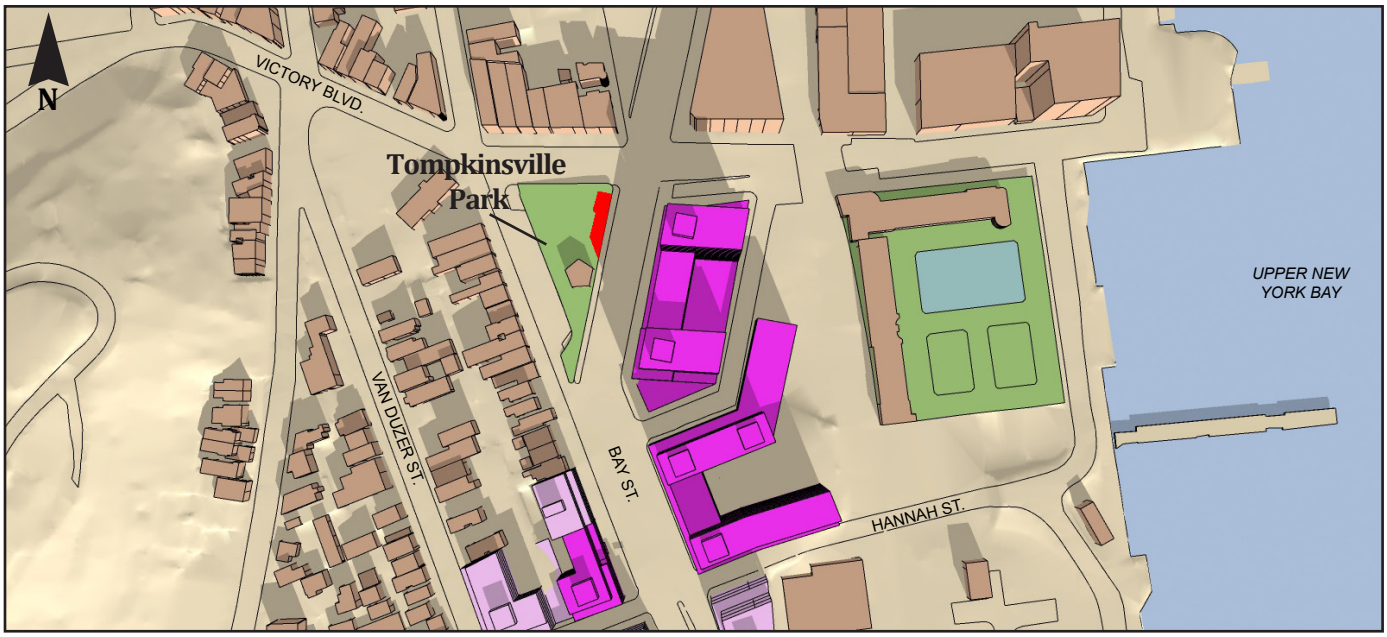
8:51 AM



9:30 AM

Projected Development
Open Space
Incremental Shadow
Potential Development

FIGURE 6-10: TOMPKINSVILLE PARK INCREMENTAL SHADOW - DECEMBER 21



10:30 AM

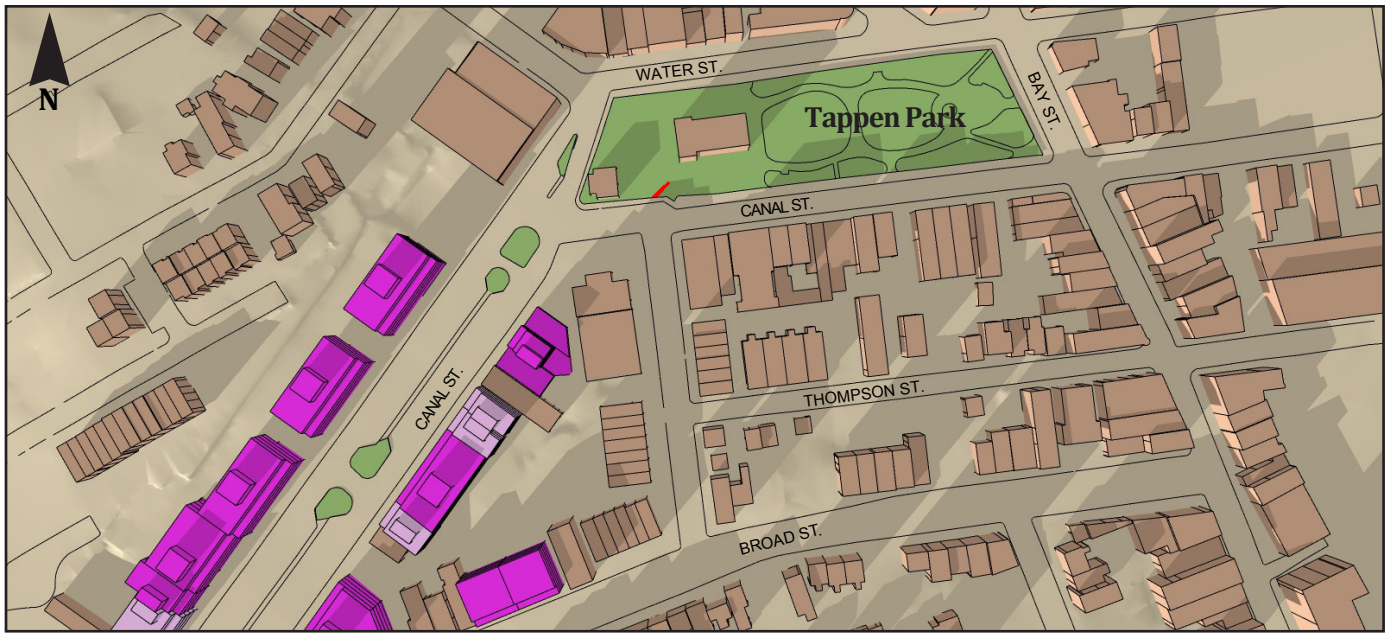
Projected Development

Open Space

Incremental Shadow

Potential Development

FIGURE 6-11: TAPPEN PARK INCREMENTAL SHADOW - DECEMBER 21



2:48 PM

Projected Development

Open Space

Incremental Shadow

Potential Development

RESOURCE NO. 4: CANAL STREET GREENSTREETS

The Canal Street Greenstreets are located in the median of Canal Street between Tappen Park to the north and Broad Street to the south. The Canal Street Greenstreets contain vegetation and tree coverage on separate medians along Canal Street. The majority of the Greenstreets are lined with parking along the centerline of Canal Street.

The Proposed Actions would result in new incremental shadows of varying duration and coverage on all four analysis days on the Canal Street Greenstreets. Incremental shadows would be cast in the morning hours and would exit prior to reentering in the afternoon. Incremental shadows would last for a total of approximately 2 hour and 46 minutes (from 7:36 to 10:22 AM) in the morning and 50 minutes (from 3:39 to 4:29 PM) in the afternoon on March 21; approximately 2 hours and 14 minutes (from 6:27 to 8:41 AM) in the morning and 1 hour and 34 minutes (from 3:44 to 5:18 PM) in the afternoon on May 6; 2 hours and 10 minutes (from 5:57 to 8:07 AM) in the morning and 2 hours and 1 minute (from 4:00 to 6:01 PM) in the afternoon on June 21; and 3 hours and 34 minutes (from 8:51 to 12:25 AM) on December 21.

MARCH 21

As shown in Figure 6-12, on March 21, incremental shadows would reach vegetation in the center median of the Canal Street Greenstreets starting at 7:36 AM, the beginning of the analysis day. The incremental shadows would move east across the center median beginning at 9:00 AM and would exit the Greenstreets at 10:22 AM. Incremental shadows would re-enter the Greenstreets on the western part at 3:39 PM. By 4:29 PM, which is the end the end of the analysis period on March 21, incremental shadows would cover the majority of the Greenstreets' vegetated areas.

MAY 6

As shown in Figure 6-13, on May 6, incremental shadows would reach vegetation in the center median and portions of other medians starting at 6:27 AM, the beginning of the analysis day. By 7:30 AM, incremental shadows would move east across the median and exit at 8:41 AM. Incremental shadows would re-enter the Greenstreets at 3:44 PM. Incremental shadow coverage would increase throughout the afternoon until the end of the analysis day at 5:18 PM. As shown in Figure 6-13, at 5:18 PM, incremental shadows would cover the majority of the Greenstreets' vegetated areas.

JUNE 21

As shown in Figure 6-14, on June 21, incremental shadows would cover the majority of the center median and portions of other medians starting at 5:57 AM, the beginning of the analysis day. Incremental shadows would shift eastward throughout the morning, and would cover limited portions of the center medians by 7:00 AM. Incremental shadows would exit the Greenstreets at 8:07 AM, before re-enter approximately eight hours later at 4:00 PM. Incremental shadow coverage would increase throughout the afternoon until the end of the analysis day at 6:01 PM. As shown in Figure 6-14, at 6:01 PM, incremental shadows would cover the majority of the center median and portions of other medians to the south.

DECEMBER 21

As shown in Figure 6-15, on December 21, incremental shadows would cover portions of the center and northern medians starting at 8:51 AM, the beginning of the analysis day. By 10:30 AM, although shadows would be moving east, incremental shadow coverage on the vegetation would remain about the same. The incremental shadows would exit the Greenstreets at approximately 12:25 PM. There would be no incremental shadow coverage for the remaining afternoon and evening hours.

Assessment

The Canal Street Greenstreets contain green spaces planted with trees and shrubs where there were once paved, traffic islands and medians. During the four shadow analysis days, incremental shadows would be cast predominately on the center median, which contains five trees and two small patches of partially planted areas. The Canal Street Greenstreets do not contain any areas for seating or passive recreation. The most prominent feature is the northbound and southbound angled parking that spans the entirety of Canal Street from Tappen Park to Broad Street; vegetated medians are used to break up the parking into smaller sections. Therefore, the incremental shadows generated by the Proposed Actions would not impact the usability of the space.

The medians would continue to receive adequate sunlight during the growing season (at least the four- to six-hours minimum specified in the *CEQR Technical Manual*) and vegetation would not be affected. In addition, the street is already partially shaded from existing buildings. Therefore, project-generated incremental shadow coverage is not anticipated to adversely impact the Canal Street Greenstreets.

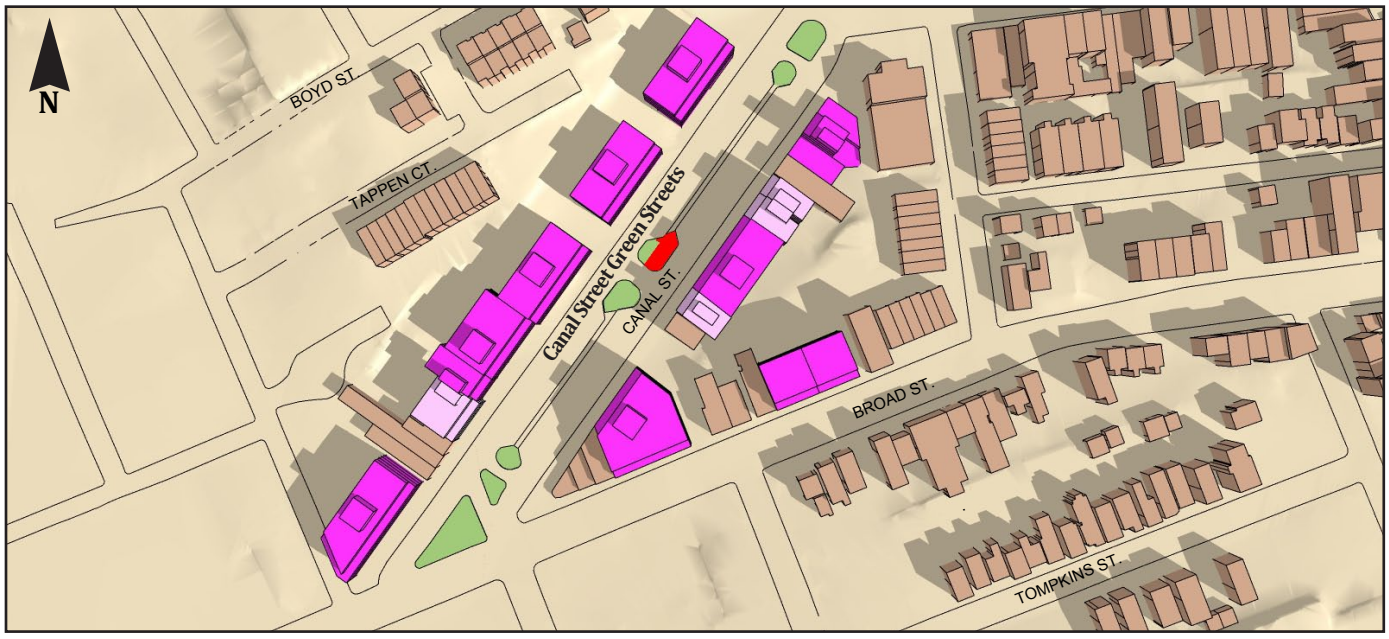
RESOURCE NO. 10: UPPER NEW YORK BAY

The nearest open waterbody in proximity to the Study Area is the Upper New York Bay. As discussed in Chapter 9, "Natural Resources," Upper New York Bay is a tidal open waterbody classified by the NYSDEC as a Class I water, which have the best usage as secondary contact recreation including fishing and boating. However, there are eight fish species with Essential Fish Habitats (EFHs) located within proximity to the Study Area including window pane flounder, winter flounder, sandbar shark, red hake, bluefin tuna, smooth dogfish, longfin inshore squid, and summer flounder. The river is located to the east of Study Area.

The Proposed Actions would result in new incremental shadows of varying duration and coverage on all four analysis days on the Upper New York Bay. Incremental shadows would last for a total of approximately 2 hours and 5 minutes (from 2:24 to 4:29 PM) on March 21; approximately 2 hours and 24 minutes (from 2:54 to 5:18 PM) on May 6; approximately 2 hours and 44 minutes (from 3:17 to 6:01 PM) on June 21; and approximately 1 hour and 55 minutes (from 12:58 to 2:53 PM) on December 21 (see Figures 6-16 through 6-19).

FIGURE 6-12: CANAL STREET GREEN STREETS INCREMENTAL SHADOW - MARCH 21/ SEPTEMBER 21

7:36 AM



9:00 AM

Projected Development Open Space Incremental Shadow

Potential Development

FIGURE 6-12: CANAL STREET GREEN STREETS INCREMENTAL SHADOW - MARCH 21/ SEPTEMBER 21

10:00 AM

4:29 PM

Projected Development

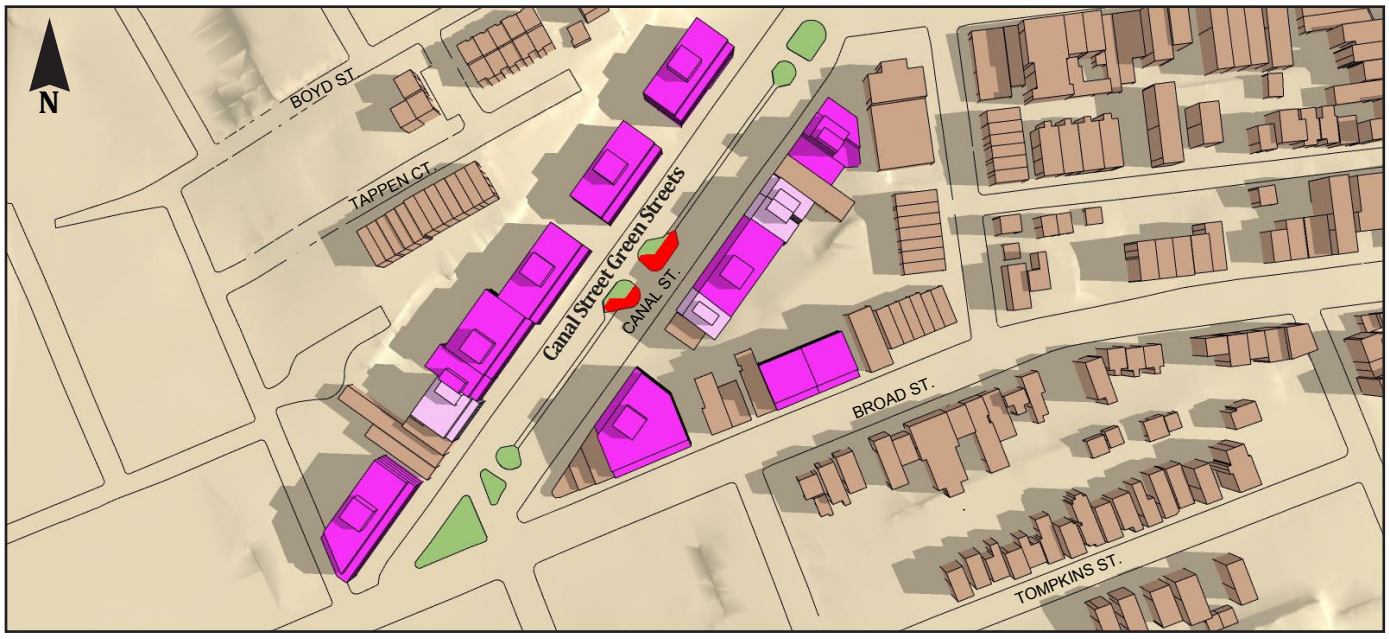
Open Space

Incremental Shadow

Potential Development

FIGURE 6-13: CANAL STREET GREEN STREETS INCREMENTAL SHADOW - MAY 6 /AUGUST 6

6:27 AM



7:30 AM

Projected Development Open Space Incremental Shadow

Potential Development

FIGURE 6-13: CANAL STREET GREEN STREETS INCREMENTAL SHADOW - MAY 6 /AUGUST 6

8:30 AM

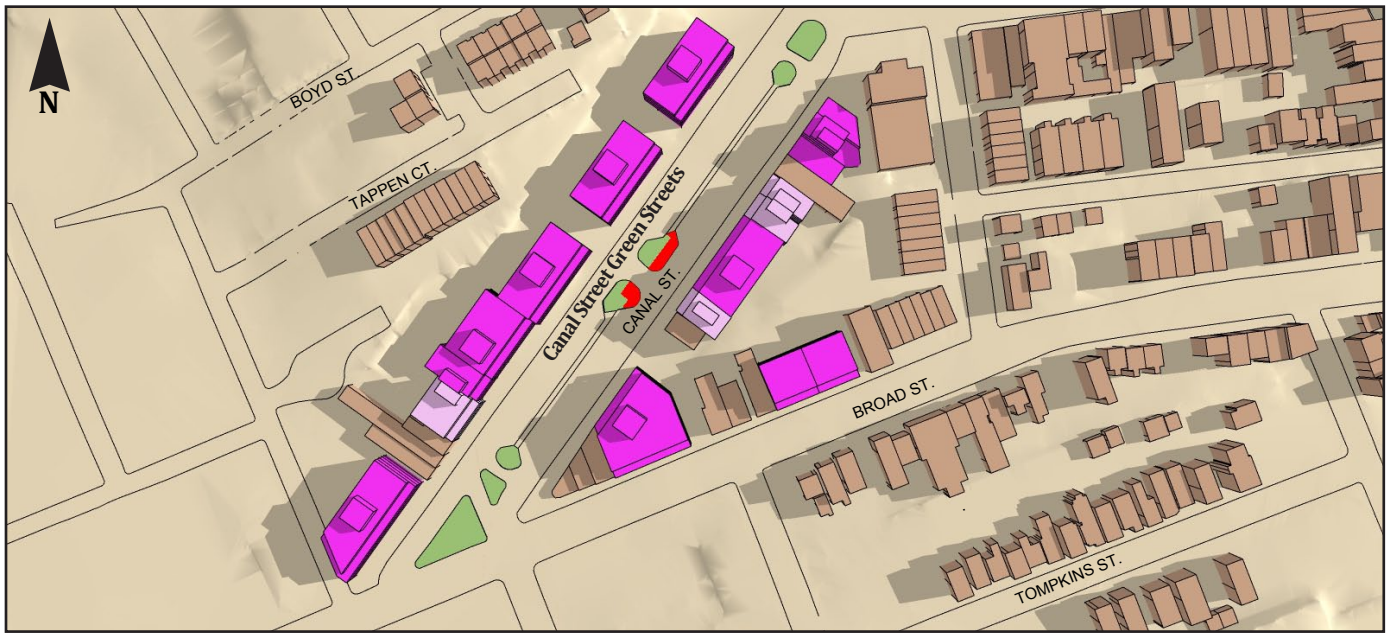
5:18 PM

Projected Development Open Space Incremental Shadow

Potential Development

FIGURE 6-14: CANAL STREET GREEN STREETS INCREMENTAL SHADOW - JUNE 21

5:57 AM



7:00 AM

Projected Development
Open Space
Incremental Shadow
Potential Development

FIGURE 6-14: CANAL STREET GREEN STREETS INCREMENTAL SHADOW - JUNE 21

8:00 AM

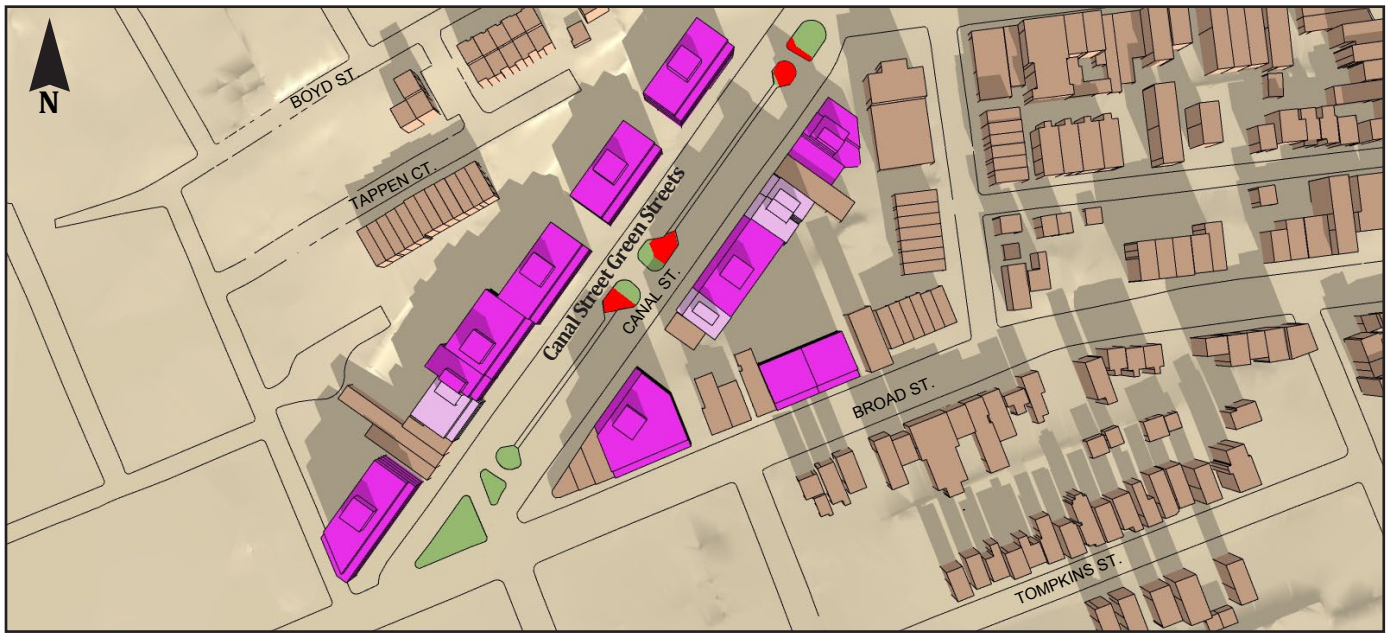
6:01 PM

Projected Development Open Space Incremental Shadow

Potential Development

FIGURE 6-15: CANAL STREET GREEN STREETS INCREMENTAL SHADOW - DECEMBER 21

8:51 AM



10:30 AM

Projected Development
Open Space
Incremental Shadow
Potential Development

FIGURE 6-15: CANAL STREET GREEN STREETS INCREMENTAL SHADOW - DECEMBER 21

12:15 PM

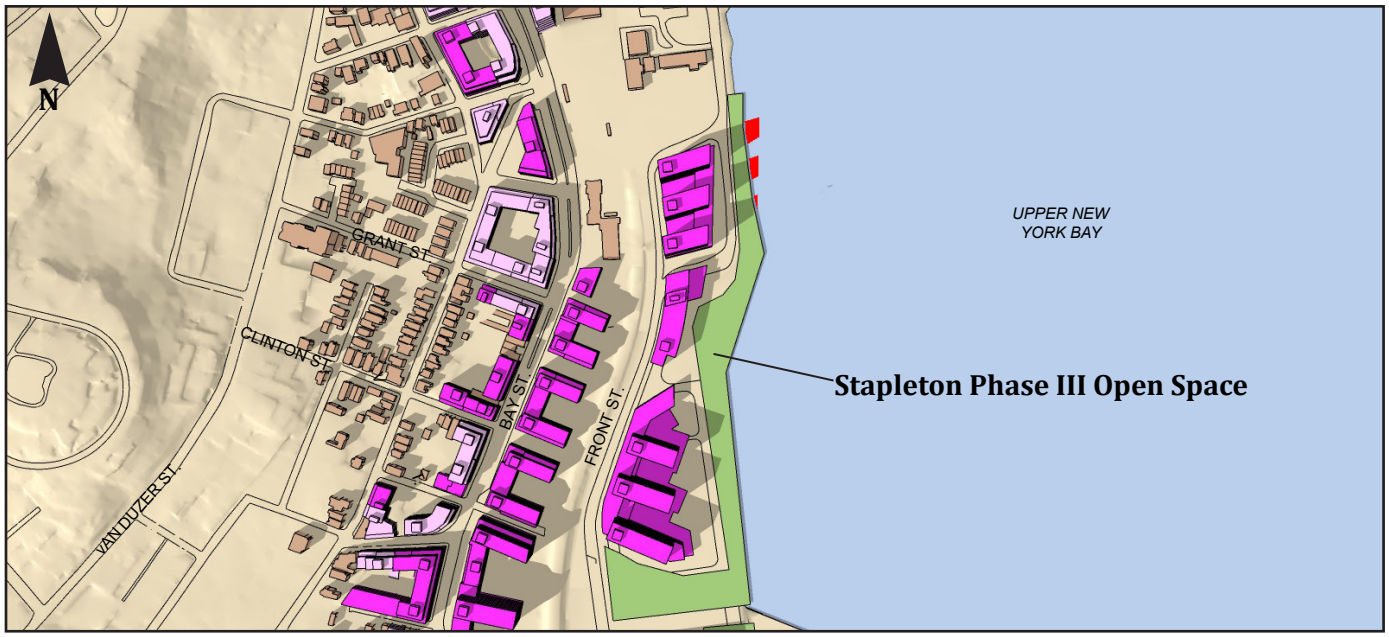
Projected Development

Open Space

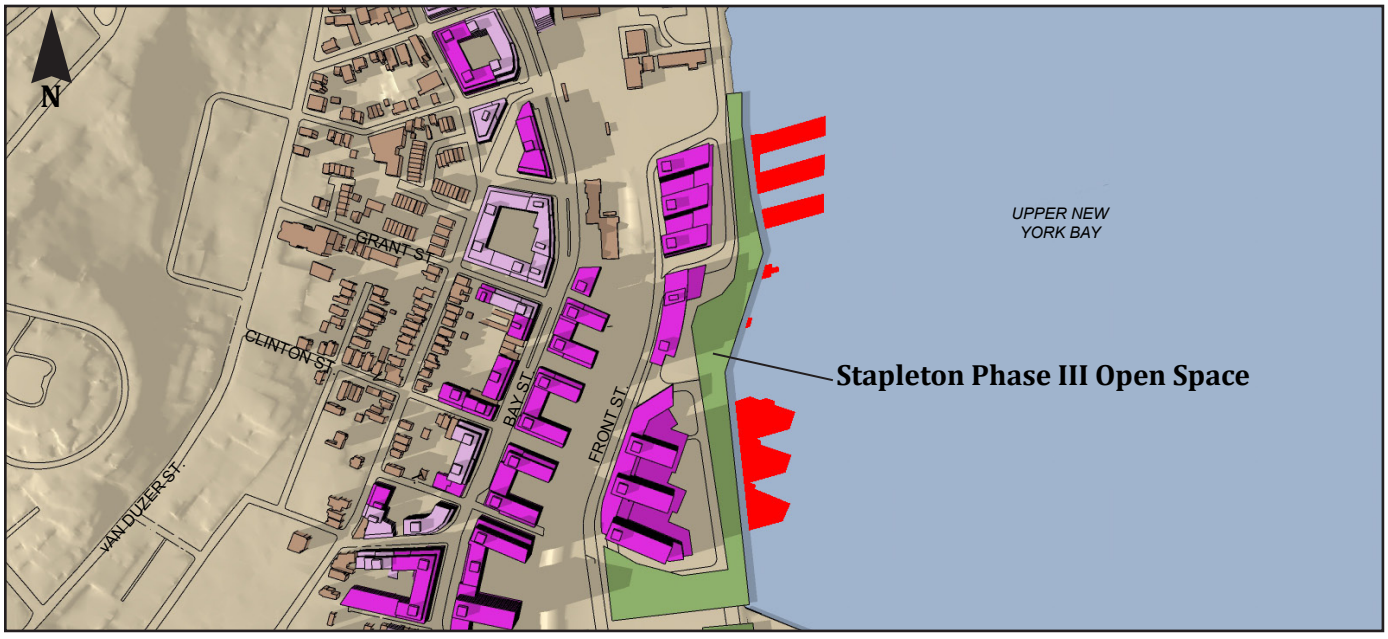
Incremental Shadow

Potential Development

FIGURE 6-16: UPPER NEW YORK BAY INCREMENTAL SHADOW - MARCH 21/ SEPTEMBER 21



3:00 PM



4:29 PM

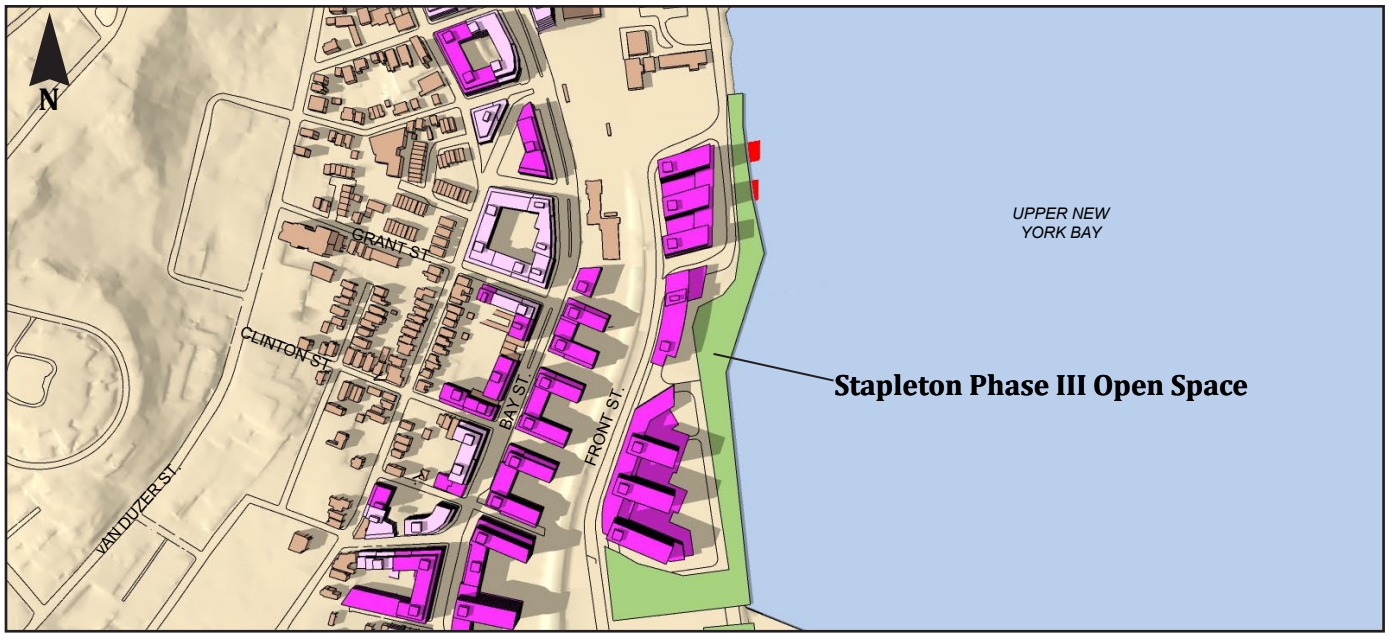
Projected Development

Open Space

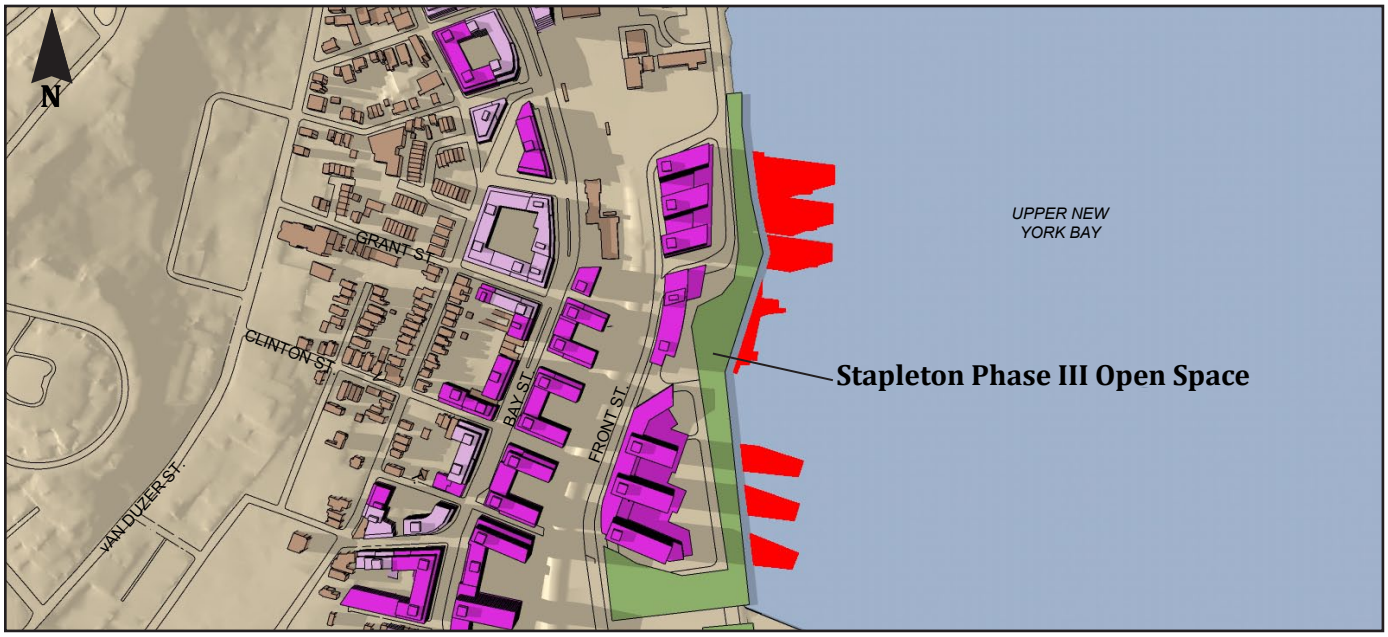
Incremental Shadow

Potential Development

FIGURE 6-17: UPPER NEW YORK BAY INCREMENTAL SHADOW - MAY 6/AUGUST 6



3:30 PM



5:18 PM

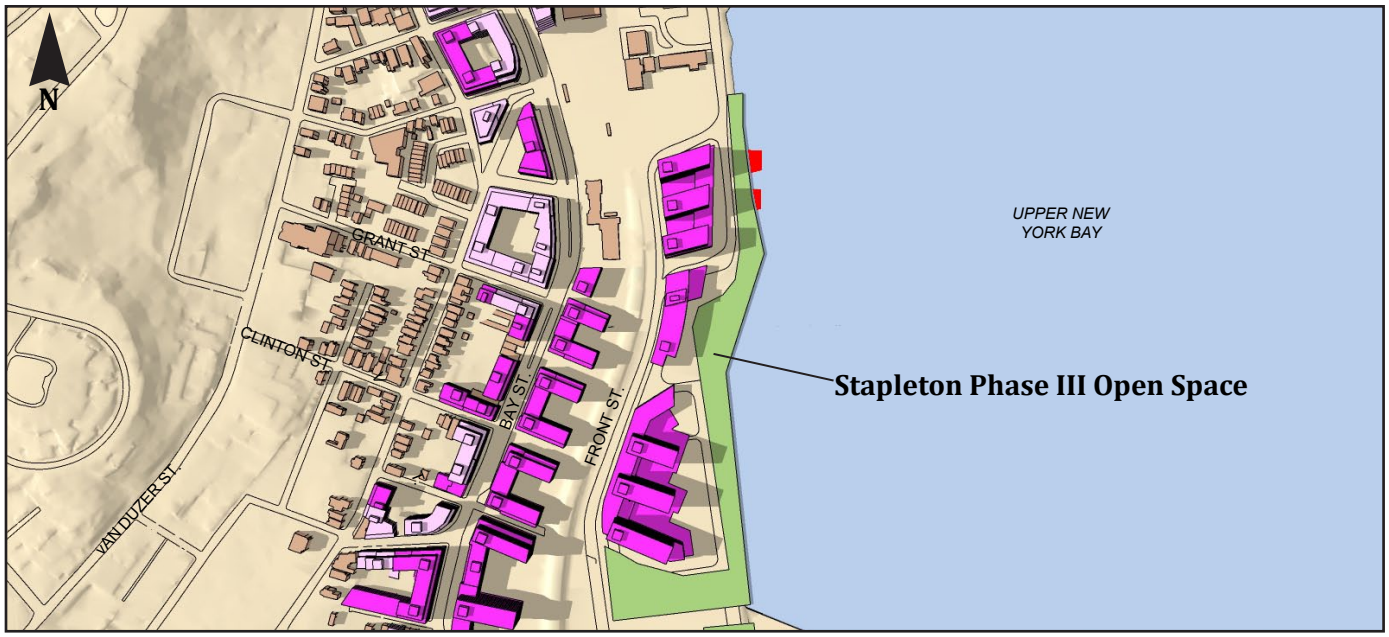
Projected Development

Open Space

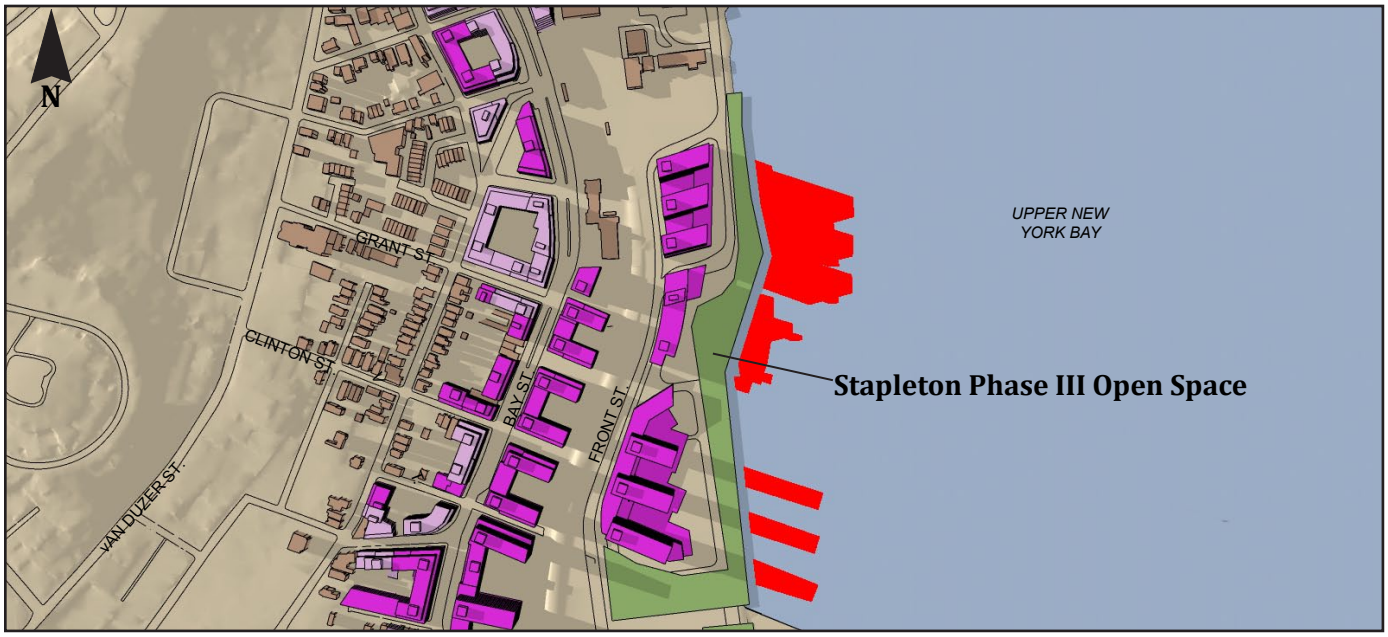
Incremental Shadow

Potential Development

FIGURE 6-18: UPPER NEW YORK BAY INCREMENTAL SHADOW - JUNE 21



4:00 PM



6:01 PM

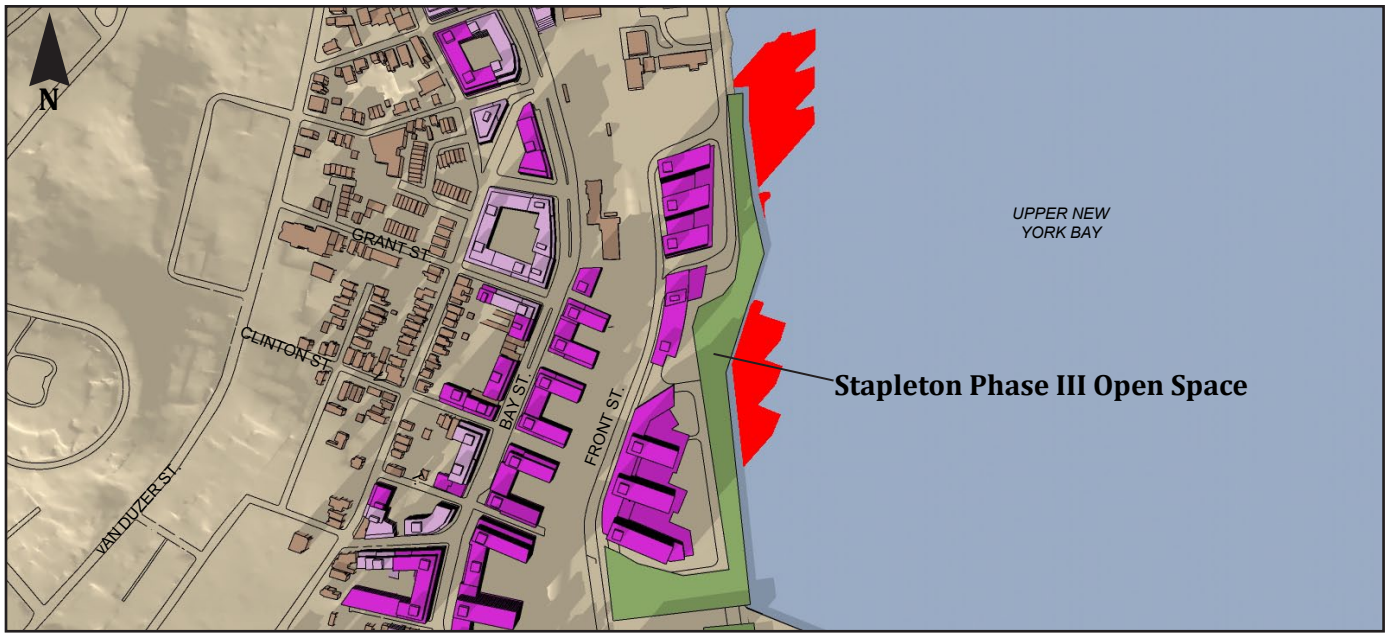
Projected Development

Open Space

Incremental Shadow

Potential Development

FIGURE 6-19: UPPER NEW YORK BAY INCREMENTAL SHADOW - DECEMBER 21



2:53 PM

Projected Development

Open Space

Incremental Shadow

Potential Development

As documented in the *2006 New Stapleton Waterfront Development Plan FEIS*, shadows cast by the development of future buildings anticipated with the Proposed Actions would reach the waters of the Upper New York Bay. Exposure to shadows could cause a decrease in light intensity and could affect primary productivity within affected waters.[8] 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. In addition, 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.

Shadows would enter the bay in the late afternoon when the sun is low on the horizon. At this time of day, the incident angle of sunlight on the surface is acute and a large percentage of available energy is reflected. In addition, due to the distance from the buildings to the water (likely between 100 and 150 feet), abundant diffuse light is available in the water and deep shadows are not anticipated. Therefore, shadows from the proposed buildings are not anticipated to result in significant impairment of the coastal habitat area and significant adverse impacts would not result.

PROJECT-GENERATED OPEN SPACE: STAPLETON PHASE III OPEN SPACE

Pursuant to *CEQR Technical Manual* guidance, shadows on project-generated open space are not considered significant. However, as future project-generated open space is included as part of the analysis provided in Chapter 5, "Open Space," a discussion of how shadows could affect the new open space is provided below.

As discussed in Chapter 5, "Open Space," the Stapleton Phase III Open Space is a 5-acre open space resource planned as part of the proposed development on two Projected Development Sites – Stapleton Waterfront Phase III Sites A and B1. While detailed plans for the open space are not yet available, it is expected that this space would be programmed with mostly passive recreational uses, such as walkways, lawns, and/or benches.

As shown in Figures 6-16 through 6-19, on all representative analysis days, project-generated shadow coverage on the future open space is expected to be greatest during the late afternoon (shortly before the end of the analysis period). As shadows are not static and move from west to east throughout the day, the amount of coverage would be minimal throughout the morning and early afternoon hours on all analysis days and the majority of the open space would receive direct sunlight. It is anticipated that the park would receive at least the four- to six-hours minimum specified in the *CEQR Technical Manual* and vegetation would not be affected.

[8] Chapter 7, "Shadows," *New Stapleton Waterfront Development FEIS,* 2006.