Chapter 6: Shadows

A. INTRODUCTION

This chapter assesses the potential for the Proposed Actions to cast new shadows that would adversely impact nearby sunlight-sensitive resources. Following the guidelines of the *City Environmental Quality Review (CEQR) Technical Manual*, sunlight-sensitive resources include publicly accessible parks and open space, features of historic resources that depend on sunlight, and natural resources that depend on sunlight. Therefore, this section is closely linked to the data and assessments presented in Chapter 5, "Open Space," Chapter 7, "Historic and Cultural Resources," and Chapter 9, "Natural Resources."

Per CEQR guidelines, an assessment of shadows is required if the proposed project would result in new structures 50 feet or greater in height, or of any height if the project site is located adjacent to, or across the street from, a sunlight-sensitive resource. As detailed in Chapter 1, "Project Description," the Reasonable Worst-Case Development Scenario (RWCDS) identifies 133 development sites (63 projected development sites and 70 potential development sites) within the Project Area. The Proposed Actions could result in new buildings that are greater than 50 feet in height compared to buildings that could be developed in the No Action condition. In addition, some of these buildings would be adjacent to or across the street from sunlight-sensitive resources. Therefore, a shadow analysis was prepared to determine the potential for development resulting from the Proposed Actions to result in significant adverse shadow impacts on sunlight-sensitive resources.

PRINCIPAL CONCLUSIONS

The detailed shadow analysis concludes that development resulting from the Proposed Actions would result in significant adverse shadow impacts to two sunlight-sensitive resources: Our Lady of Peace Church due to increased shadows on stained glass windows and at the Douglas and Degraw Pool in Thomas Greene Playground due to increased spring/summer shadows on this public open space resource.

In addition to these two resources, the detailed analysis identified other sunlight-sensitive resources that would receive new shadows as a result of the Proposed Actions. The new shadows affecting these resources would not be significant due to their limited extent, duration, or for other reasons as explained in detail below.

B. DEFINITIONS AND METHODOLOGY

This analysis has been prepared in accordance with the guidelines of the 2014 *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 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* such as parks, beaches, playgrounds, plazas, schoolyards (if open to the public during non-school hours), greenways, and 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); and
- *Project-generated open space*, which 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 discussion of how shadows would affect the new space may be warranted.

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 of analysis 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 refines the area that could be affected by project shadow. This refinement accounts for the fact that shadows can never be cast between a certain range of angles south of the development 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 a 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 compared to shadows anticipated under No Action development is considered. The results of the analysis and assessment are documented with graphics, a table of incremental shadow durations, and narrative text.

C. PRELIMINARY SCREENING ASSESSMENT

Projected and potential developments expected as a result of the Proposed Actions could occur on 133 sites within the Project Area. The maximum building height for each projected and potential development under With Action and No Action conditions are shown in Appendix A-3. The shadow analysis accounts for rooftop mechanical space and bulkheads. Based on a preliminary screening assessment, 93 of the 133 development sites contain structures with an incremental height of 50 feet or more, warranting further assessment. Nine additional projected and potential development sites fall below the 50-foot incremental height, but require further assessment because they are located adjacent to or across the street from a sunlight-sensitive resource. In total, 102 projected and potential development sites were determined to warrant shadow assessment.

A base map was developed using Geographic Information Systems (GIS)[1] showing the location of the 102 development sites that require shadow assessment (see **Figure 6-1**). In coordination with the open space, historic and cultural resources, and natural resources assessments presented in other chapters of the EIS, potential sunlight-sensitive resources were identified and shown on the map. Open space resources include publicly accessible parks, community gardens, Greenstreets, recreation areas within New York City Housing Authority (NYCHA) developments, and project-generated open spaces. Community gardens assessed in the chapter are either located on property controlled by the New York City Department of Parks and Recreation (NYC Parks), participate in the GreenThumb program, or are located on private property controlled by a foundation with a community garden mission or mandate. Gardens were only considered publicly accessible during their posted hours of operation. Recreation areas within NYCHA developments are restricted to NYCHA residents; however, considering the significant population they serve, these open spaces are analyzed for potential shadow effects.

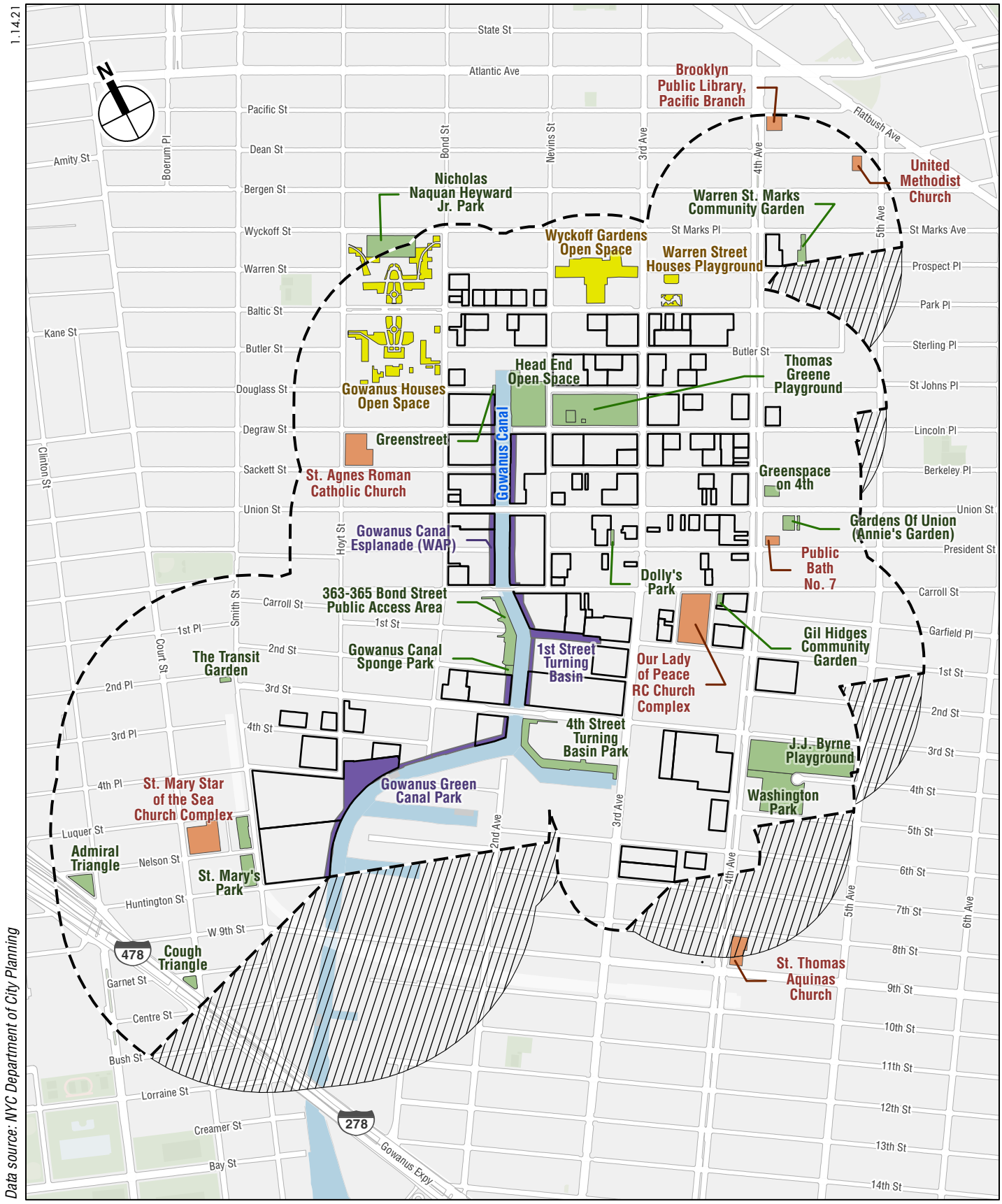
TIER 1 SCREENING ASSESSMENT

For the Tier 1 assessment, the longest shadow that the proposed buildings could cast is calculated, and, using this length as the radius, a perimeter is drawn around the 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.

For each of the 102 development sites requiring shadow assessment, the maximum height, including rooftop mechanical structures, was used to calculate the longest possible shadow. Using this length as the radius, a perimeter was drawn around each of the development sites. **Figure 6-1** illustrates the combined longest shadow study area determined by the Tier 1 assessment relative

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



Tier 1 and Tier 2 Assessment

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-1

to the location of sunlight-sensitive public open space, community gardens, NYCHA open spaces, architectural resources, and natural resources. Open spaces operated by NYCHA, although primarily used by residents of the NYCHA properties, are also illustrated on the map and are analyzed as sunlight-sensitive resources.

The Tier 1 assessment showed that a number of these resources with sun-sensitive features were located in the longest shadow study area. Therefore, further screening was warranted to determine whether any resources could be affected by project-generated shadows.

TIER 2 SCREENING ASSESSMENT

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 development site. In New York City this area lies between -108 and +108 degrees from true north. For the 102 sites requiring shadow assessment, **Figure 6-1** illustrates this triangular area south of the development sites. The complementary area to the north within the longest shadow study area represents the remaining area that could potentially experience new project-generated shadow. A total of 34 sunlight-sensitive resources were identified within the remaining portion of the longest shadow study area that could potentially be cast in new shadow and warrant further assessment.

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 whether project-generated shadow could fall on a sunlight-sensitive resource, three-dimensional (3D) computer modeling software[2] is used to calculate and display the RWCDS'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 development sites. The previous Tier 1 and Tier 2 assessments assumed the maximum building height would cover the entire footprint of the development. However, the Tier 3 assessment accounts for the specific massing and setbacks of buildings on projected and potential development sites, including assumptions for rooftop mechanical equipment and bulkheads as required by the *CEQR Technical Manual*.

REPRESENTATIVE DAYS FOR ANALYSIS

Following the guidance of the *CEQR Technical Manual*, shadows on the summer solstice (June 21), winter solstice (December 21) and spring and fall equinoxes (March 21 and September 21, 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. At times earlier or later than this timeframe window of analysis, the sun is down near the horizon and the sun's rays reach the Earth at very tangential angles, diminishing

[2] Bentley MicroStation

the amount of solar energy and producing shadows that are very long, move fast, and generally blend with shadows from existing structures. 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

The Tier 3 assessment analyses the range of shadows that would occur, in the absence of intervening buildings, from the 102 development sites requiring shadow analysis on the four representative days for analysis. The Tier 3 assessment concluded that 12 public open spaces, four community gardens, four historic resources, two project-generated open spaces, three NYCHA open spaces, and one natural resource could potentially, in the absence of intervening buildings, be cast in new shadow generated from development resulting from the Proposed Actions. **Table 6-1** lists these resources and which analysis days they could potentially receive new shadow. A detailed analysis is needed to determine whether any of the resources identified would receive new shadow originating from the projected or potential development sites, when accounting for existing buildings and other planned developments. The Tier 3 assessment showed that some resources identified in the preceding Tier 1 and Tier 2 assessments would not receive project-generated shadow on any of the four representative analysis days, and these resources therefore did not require further analysis.

Table 6-1
Tier 3 Assessment: Sunlight-Sensitive Resources

	March 21 7:36 AM—4:29 PM	May 6 6:27 AM—5:18 PM	June 21 5:57 AM—6:01 PM	December 21 8:51 AM—2:53 PM
Publicly Accessible Open Spaces				
Greenstreet on Douglass Street	X	X	X	X
Gowanus CSO Facility Open Space	X	X	X	X
Thomas Greene Playground	X	X	X	X
363-365 Bond St. Public Access Area	X	X	X	X
Gowanus Canal Sponge Park	X	X	X	X
J.J. Byrne Playground	X	X	X	
Washington Park	X	X	X	
Whole Foods Public Access Area	X	X	X	X
1st Street Turning Basin	X	X	X	X
St. Mary's Park	X	X	X	X
Cough Triangle			X	
Community Gardens				
Warren St. Marks Community Garden	X	X	X	
Greenspace on 4th	X	X	X	
Garden of Union (Annie's Garden)		X	X	
Gil Hodges Community Garden	X	X	X	X
Historic Resources with Sunlight-Sensitive Features				
St. Agnes Roman Catholic Church				X
Public Bath No. 7	X	X	X	
Our Lady of Peace Roman Catholic Church Complex	X	X	X	X
St. Mary Star of the Sea Church Complex	X	X	X	X
Project-Generated Open Spaces				
Gowanus Green Development Open Space	X	X	X	X
Gowanus Canal Esplanade (WAP)	X	X	X	X
NYCHA Open Spaces				
Gowanus Houses Open Space	X	X	X	X
Wyckoff Gardens Open Space	X	X		X
Warren Street Houses Playground	X	X		X
Sunlight-Sensitive Natural Resources				
Gowanus Canal	X	X	X	X

Note: X indicates that resource could potentially be reached by project-generated shadow on the indicated analysis day, while the absence of an X means it could not.

D. DETAILED SHADOW ANALYSIS

The purpose of the detailed analysis is to determine the extent and duration of incremental shadows that fall on sunlight-sensitive resources as a result of the development resulting from the Proposed Actions and to assess their potential effects. To complete the assessment, a baseline or future No Action condition is established by appending three-dimensional representations of the existing buildings, planned future developments, and developments under the No Action condition within the vicinity of a given development site to the three-dimensional model used in the Tier 3 assessment. The With Action condition and its shadows can then be compared with the baseline No Action condition to determine the incremental shadows that could result under the RWCDS.

OVERVIEW OF ANALYSIS RESULTS

The analysis found that 23 of the 26 resources identified in the Tier 3 analysis could receive new (incremental) shadow in the With Action condition: 11 public open spaces, three community gardens, two project-generated open spaces, three historic resources, three NYCHA open spaces, and one natural resource. The detailed analysis showed that the other three resources identified in the Tier 3 analysis—Cough Triangle, Garden of Union (Annie's Garden), and St. Agnes Roman Catholic Church—did not receive any incremental shadow due to intervening buildings. **Table 6-2** shows the entry and exit times and total duration of incremental shadow on the 23 affected resources on each of the analysis days. The incremental shadows and their effect on the resources are illustrated in **Figures 6-2 through 6-99**. Figures were created for each analysis day with at least 10 minutes of incremental shadow for every resource **in Table 6-2**.

DETERMINATION OF IMPACT SIGNIFICANCE

The determination of significance of shadow impacts on a sunlight-sensitive resource is based on (1) the information resulting from the detailed shadow analysis describing the extent and duration of incremental shadows; and (2) an analysis of the resource's sensitivity to reduced sunlight. The goal of the assessment is to determine whether the effects of incremental shadows on a sunlight-sensitive resource are significant under CEQR.

A shadow impact occurs when the incremental shadow from a proposed project falls on a sunlight-sensitive resource or feature and reduces its direct sunlight exposure. Determining whether this impact is significant or not depends on the extent and duration of the incremental shadow and the specific context in which the impact occurs.

Per CEQR, 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:

- 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 would be sufficient sunlight in the future without the proposed actions). In the growing season, 4 to 6 hours a day of sunlight is a minimum requirement.
- 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).

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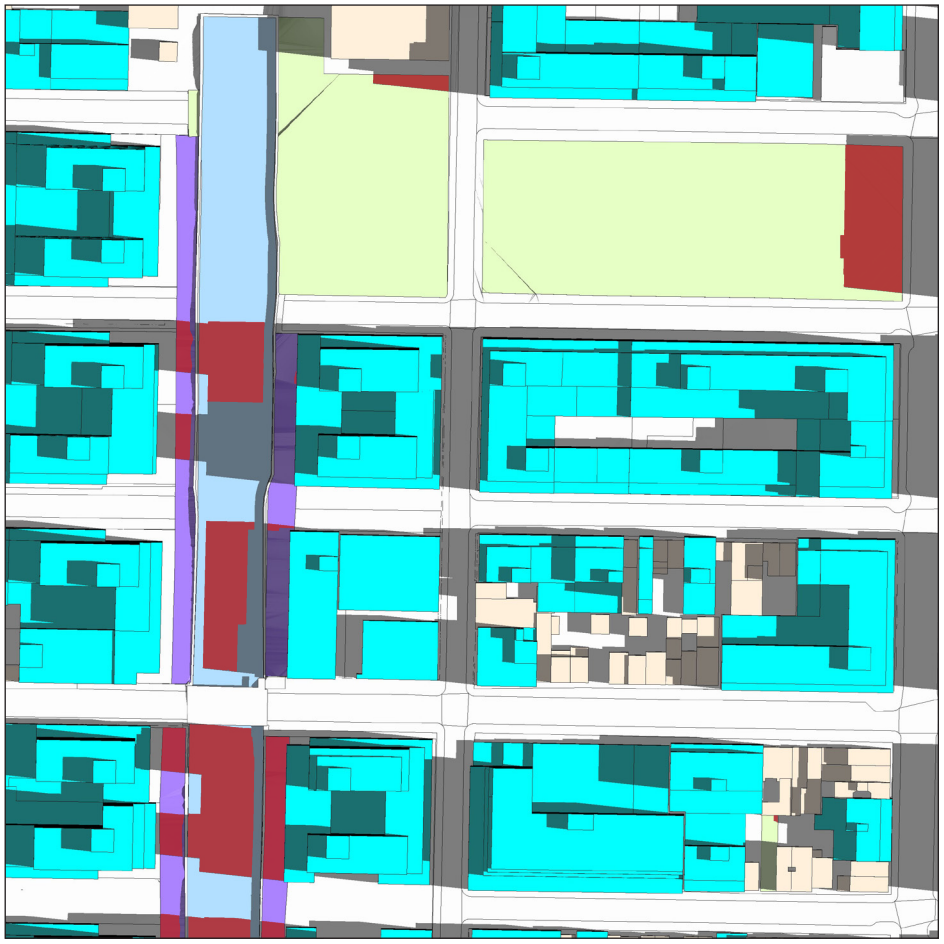

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

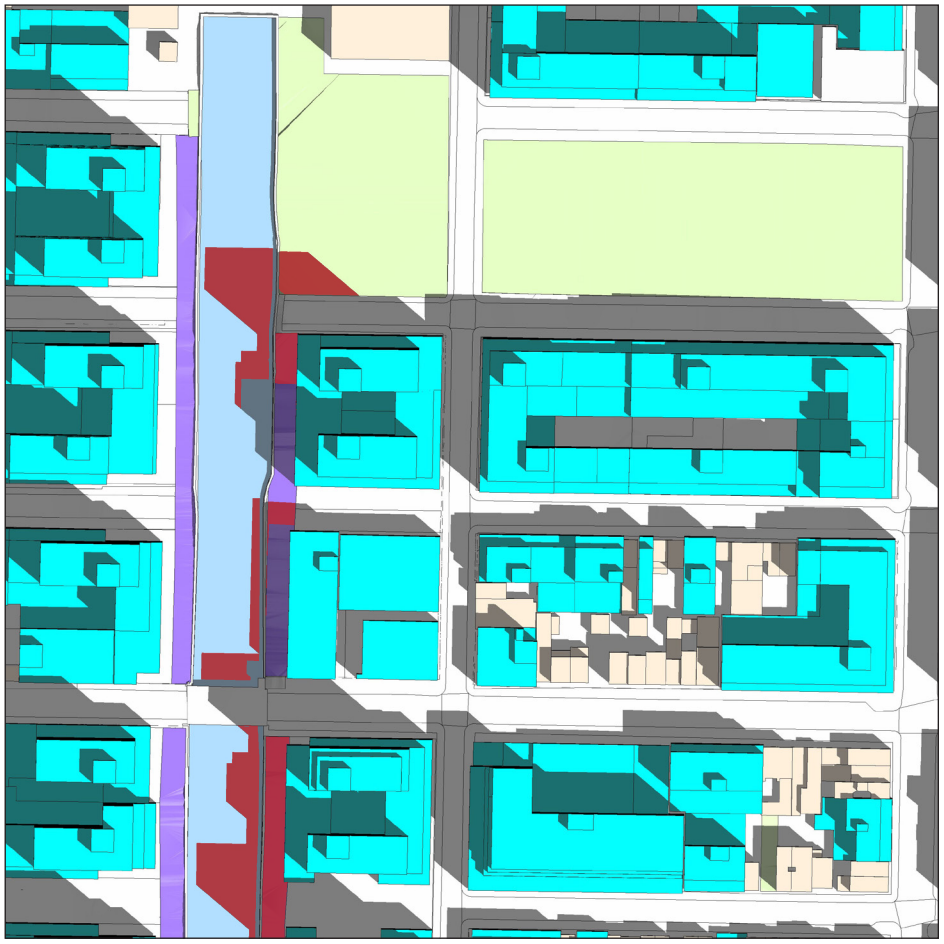
Projected and Potential Development Sites Requiring Shadow Analysis

March 21 / September 21

1.14.21



10:00 AM



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Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

March 21 / September 21

1.14.21



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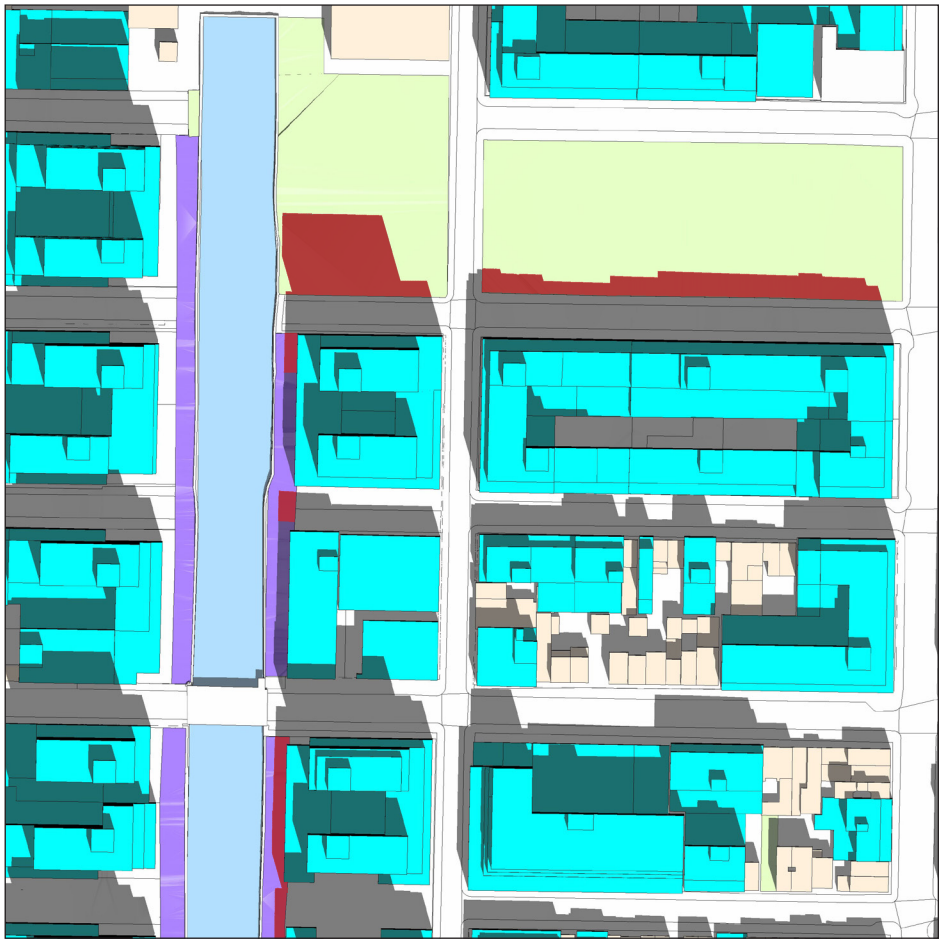

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Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

March 21 / September 21

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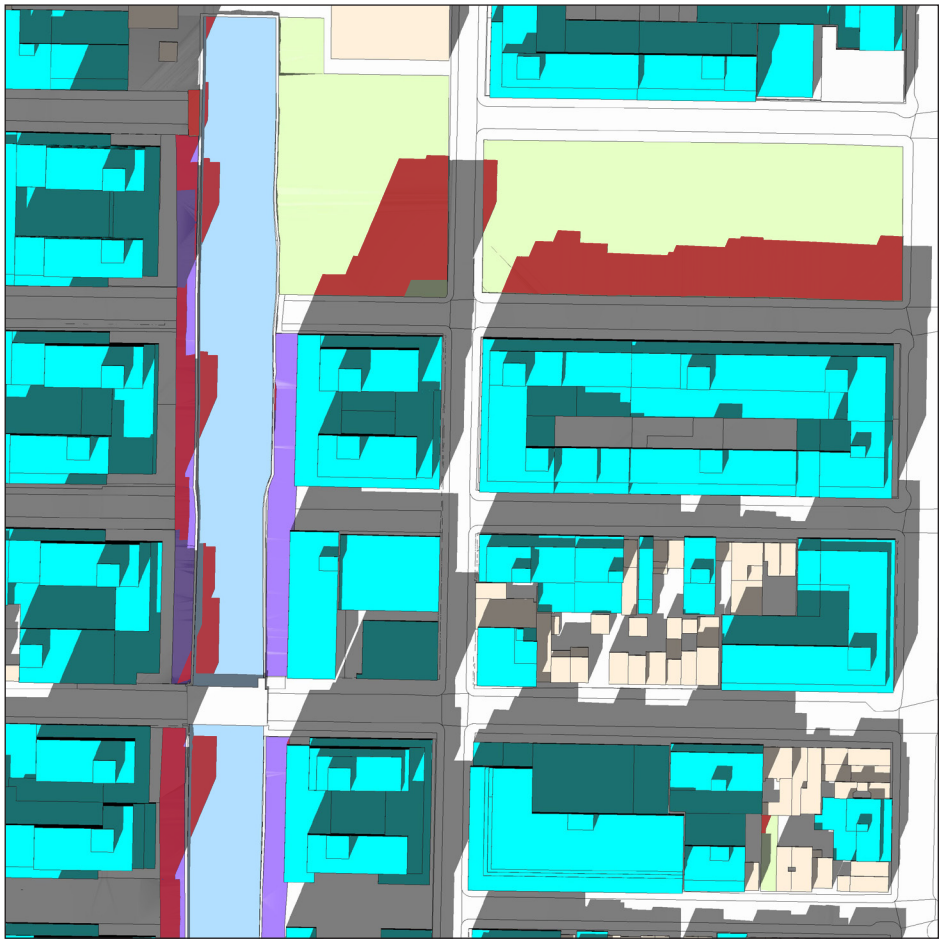

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

March 21 / September 21

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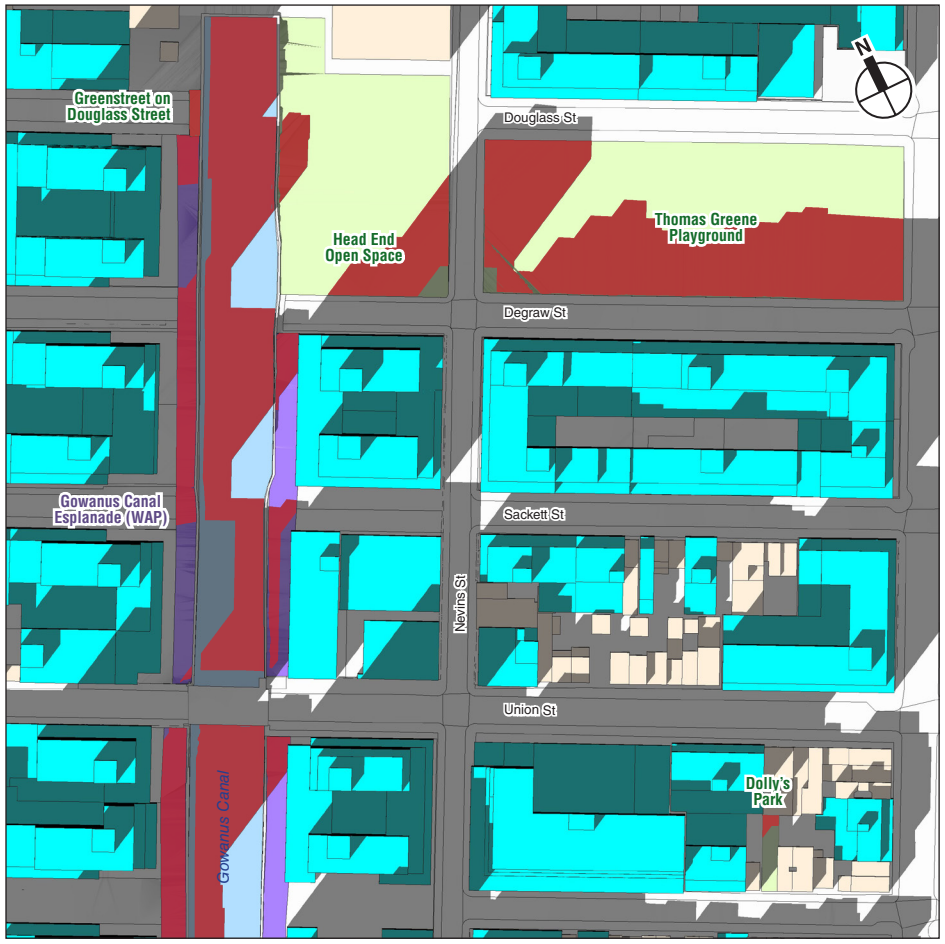

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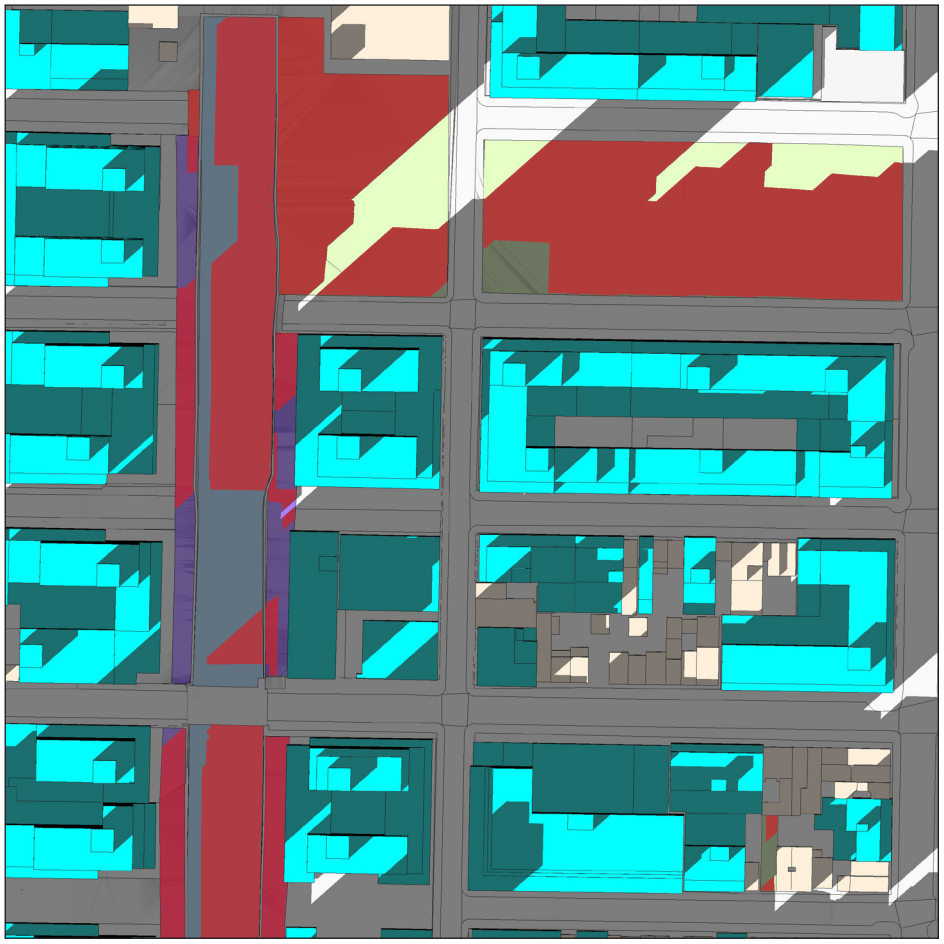

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Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

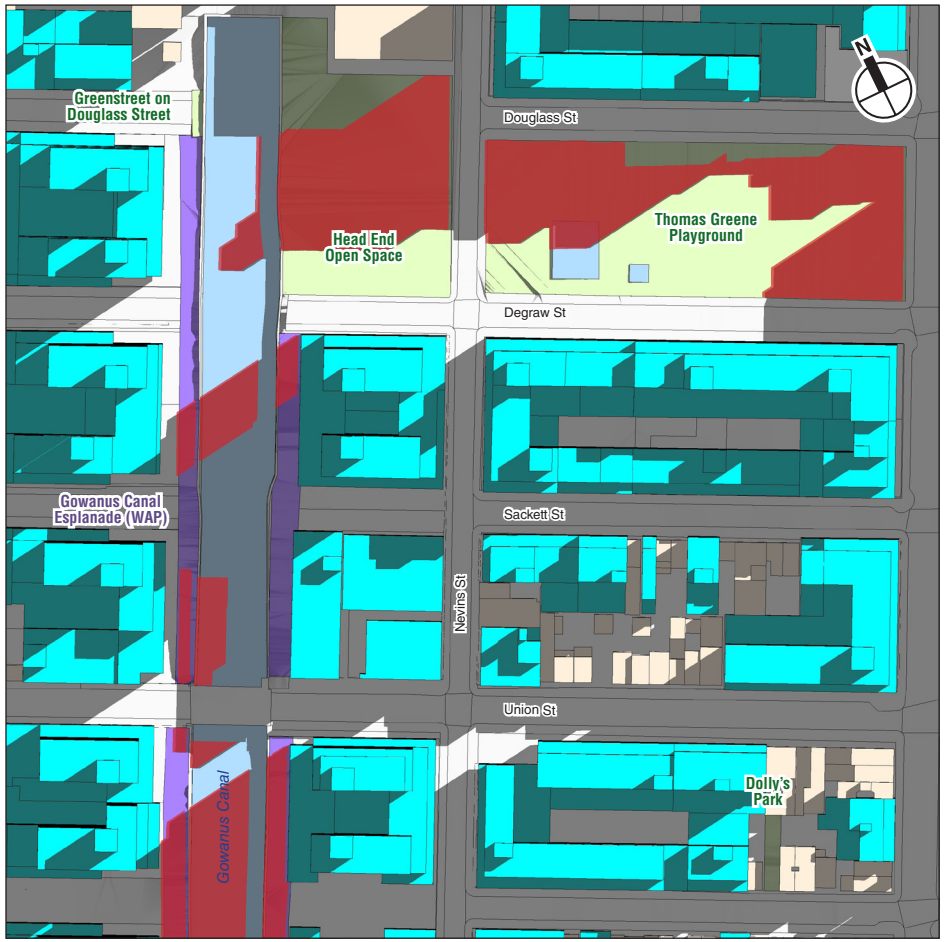
Projected and Potential Development Sites Requiring Shadow Analysis

March 21 / September 21

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-6

1.14.21



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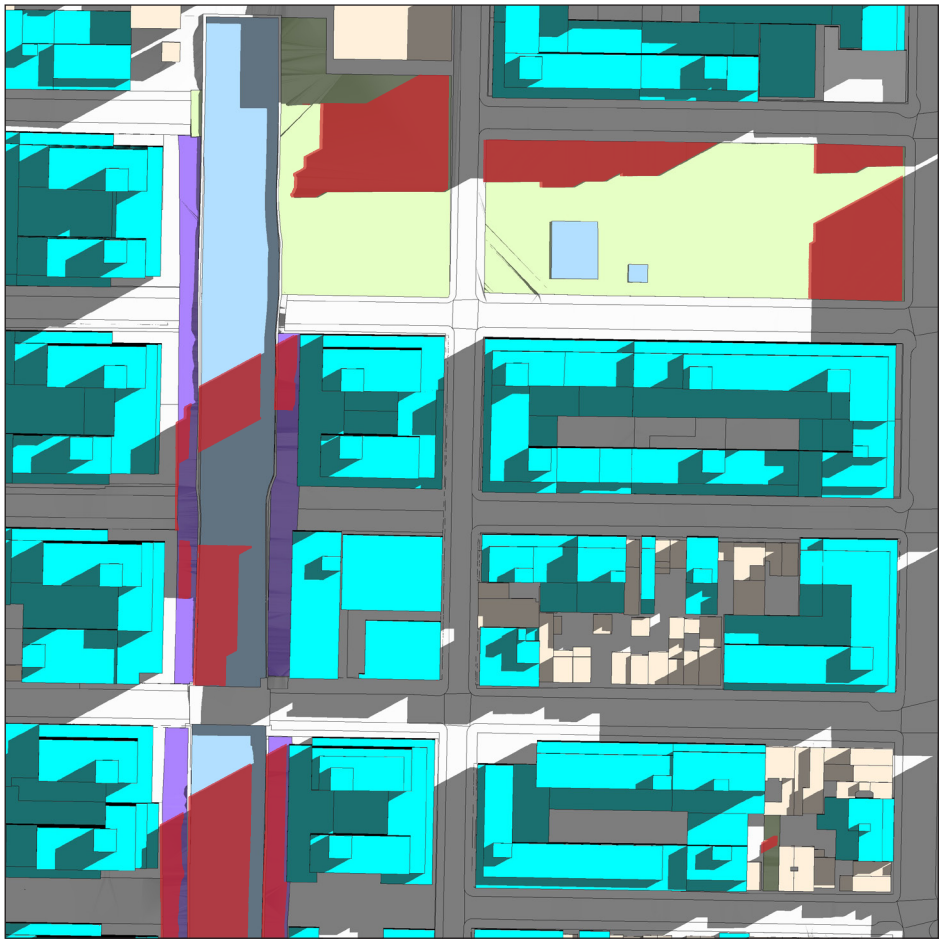

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Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

May 6 / August 6

Figure 6-7

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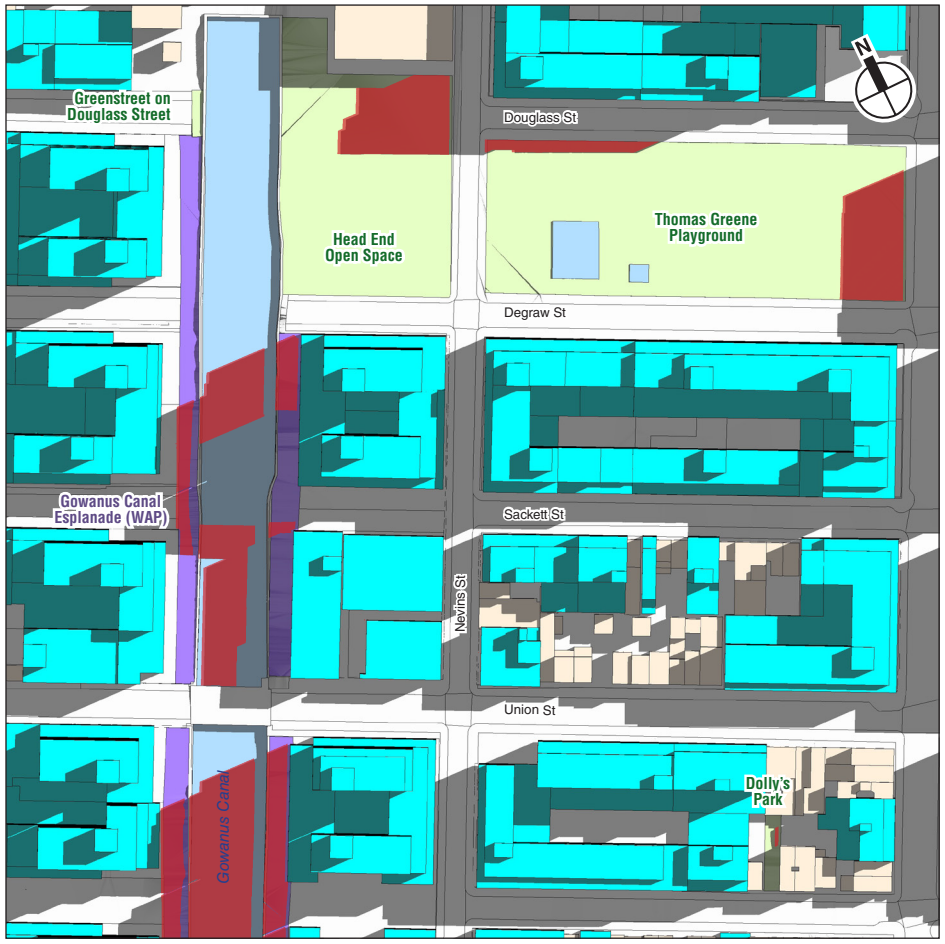

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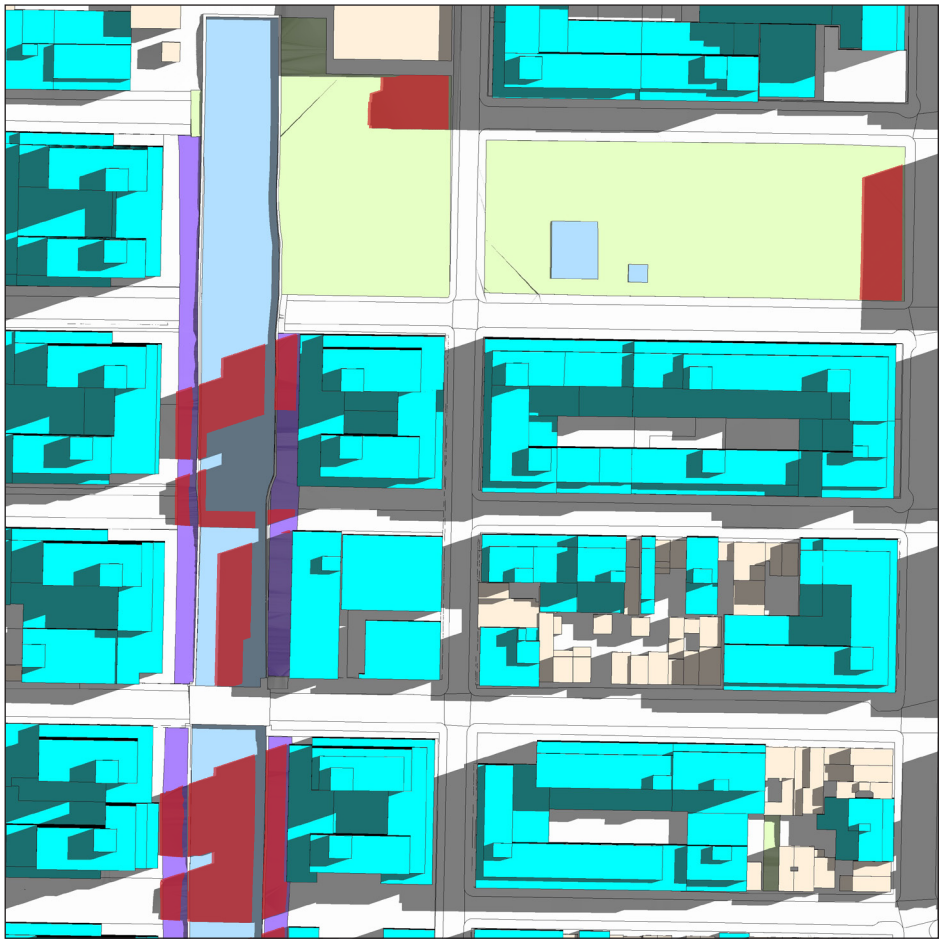

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

May 6 / August 6

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-8

1.14.21



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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

May 6 / August 6

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-9



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Publicly Accessible Open Space

Project Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

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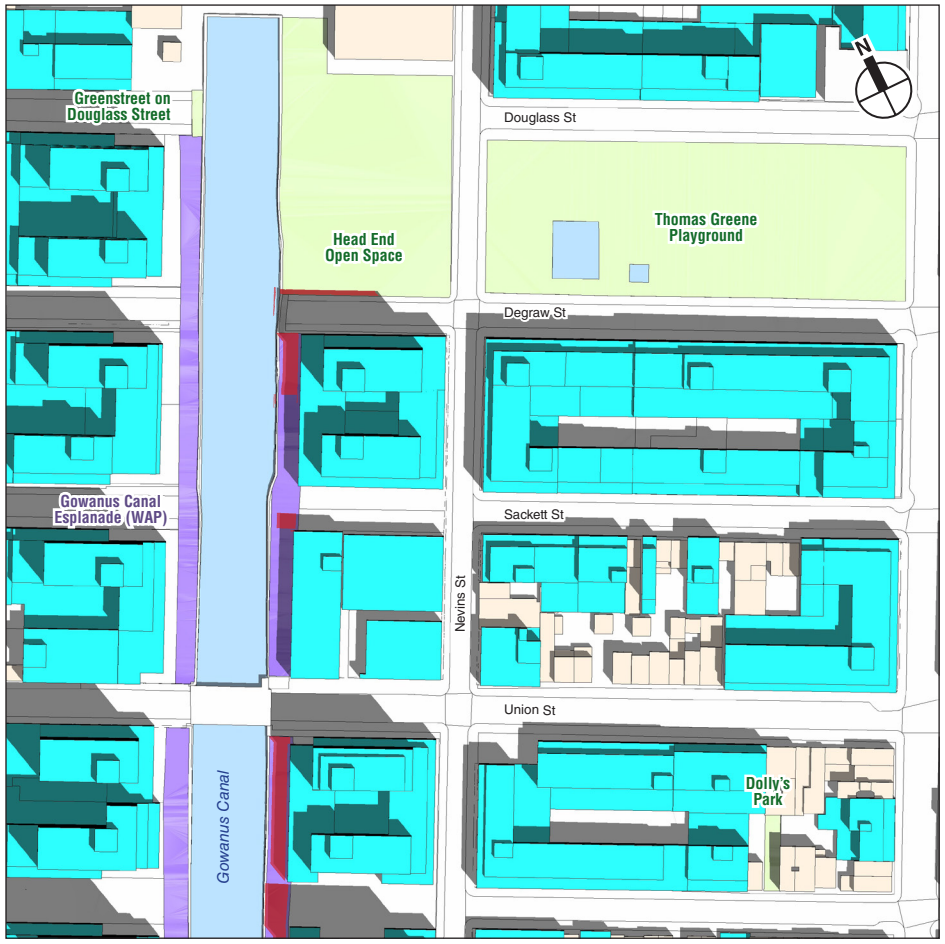

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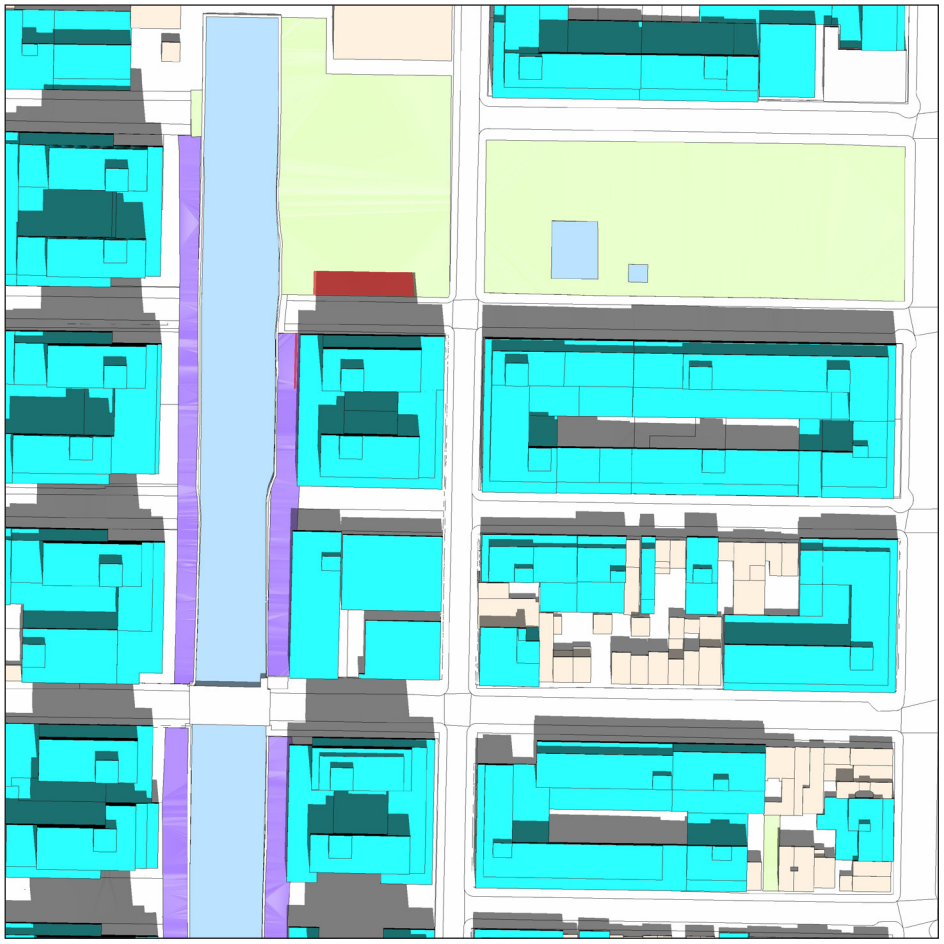

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

May 6 / August 6

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-11

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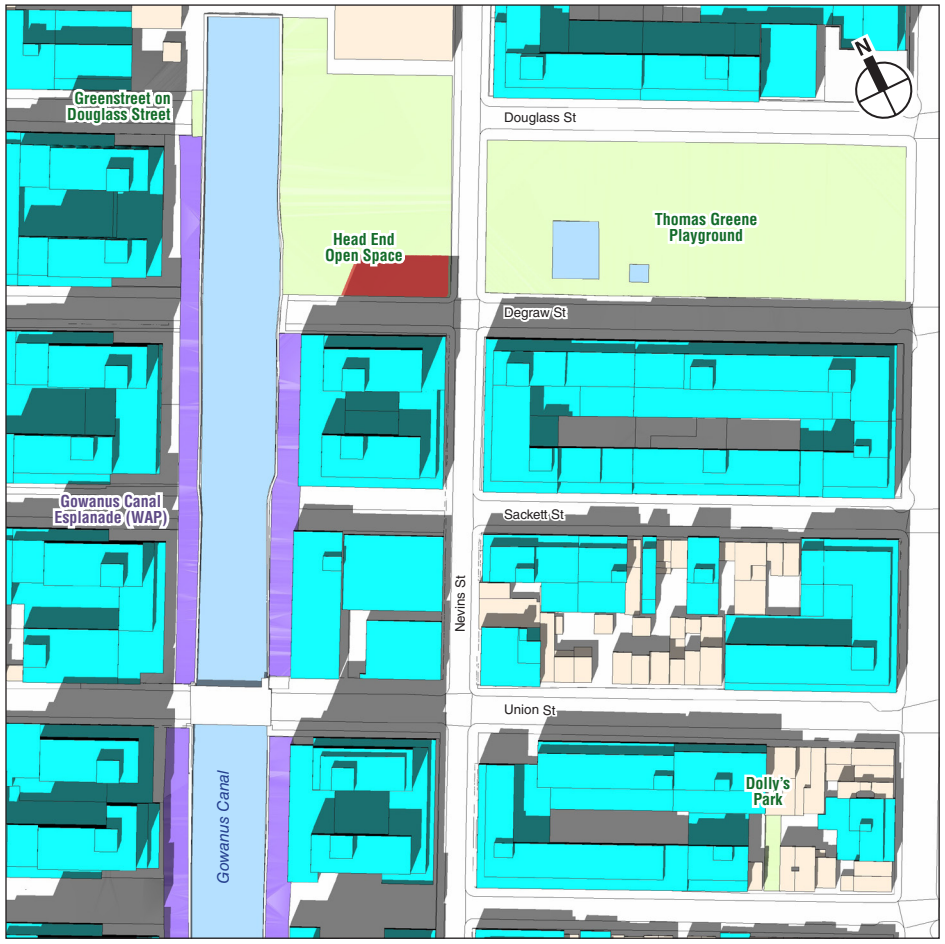

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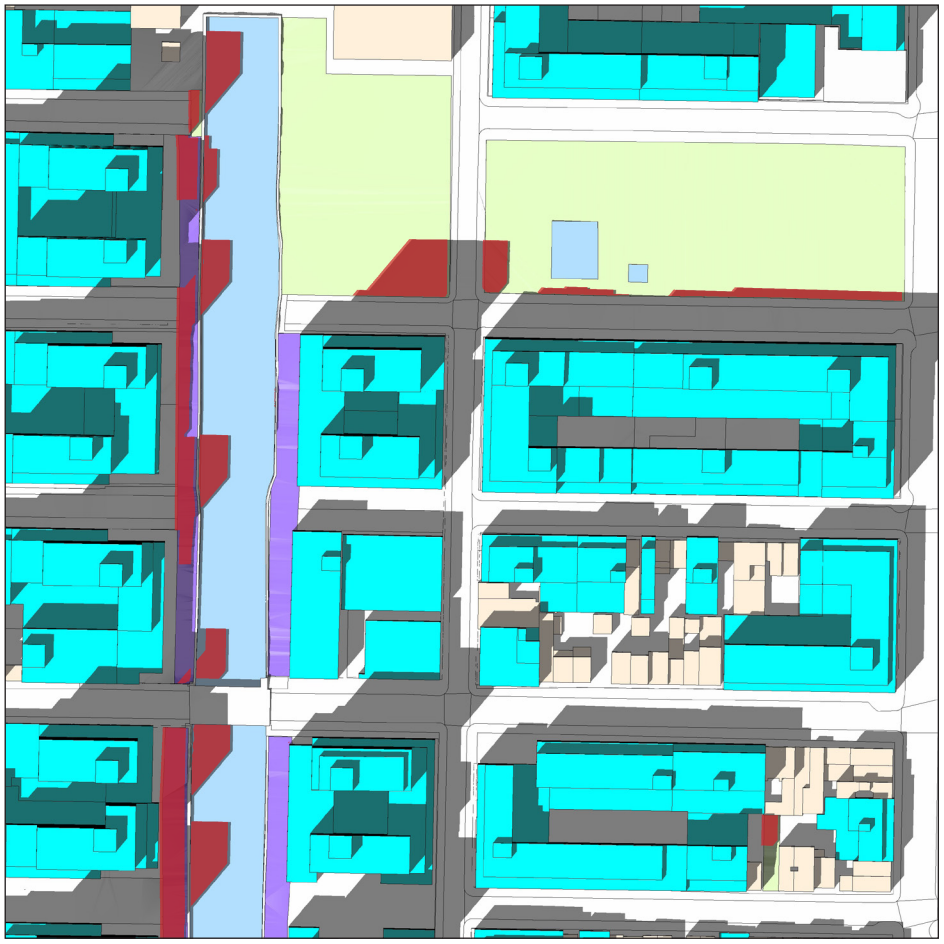

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

May 6 / August 6

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-12

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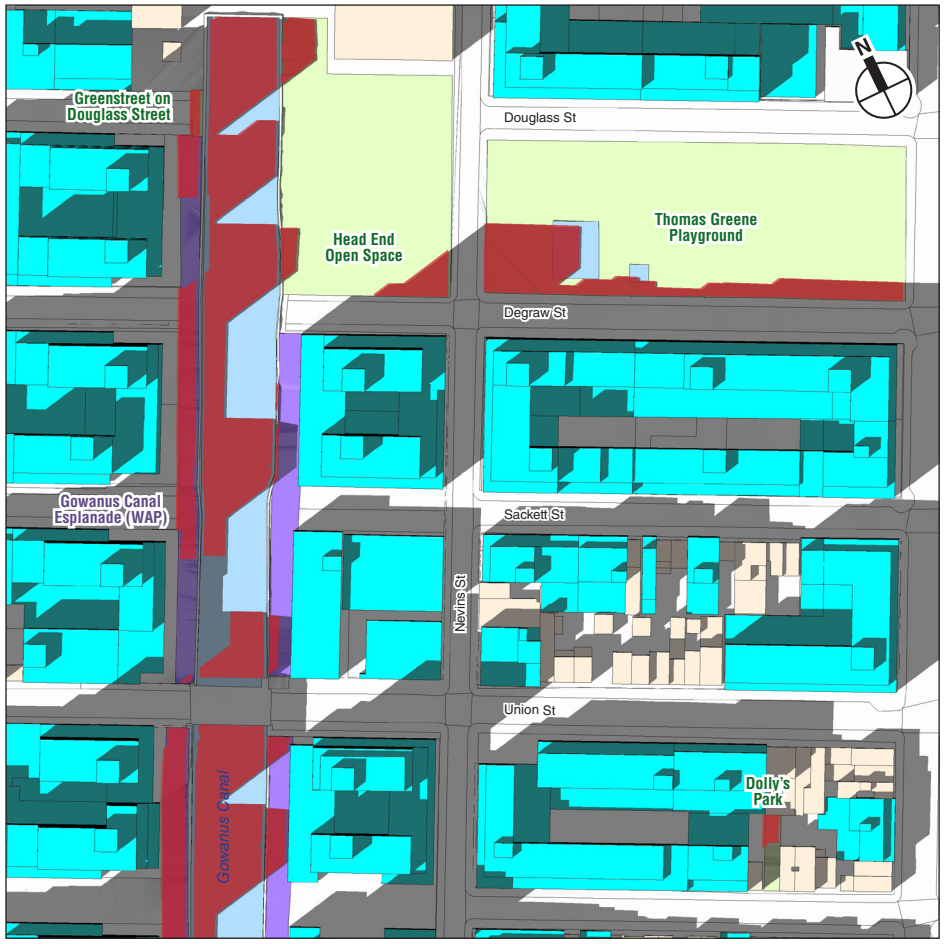

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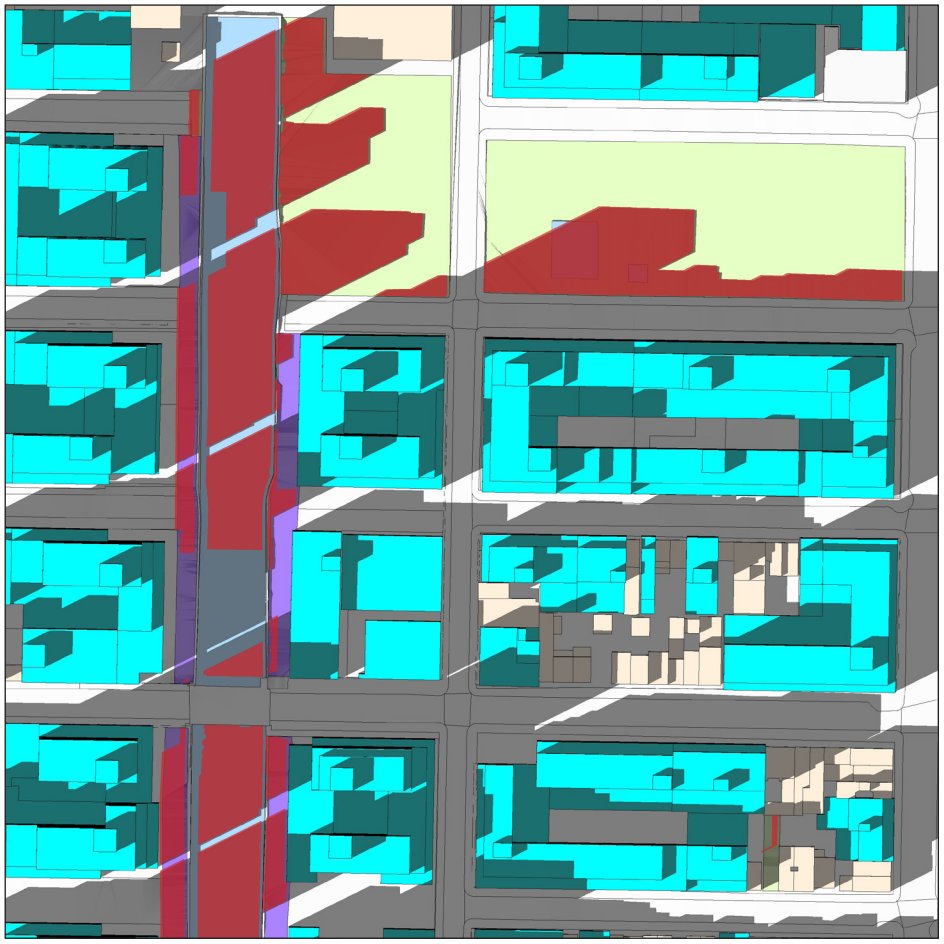

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

May 6 / August 6

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-13

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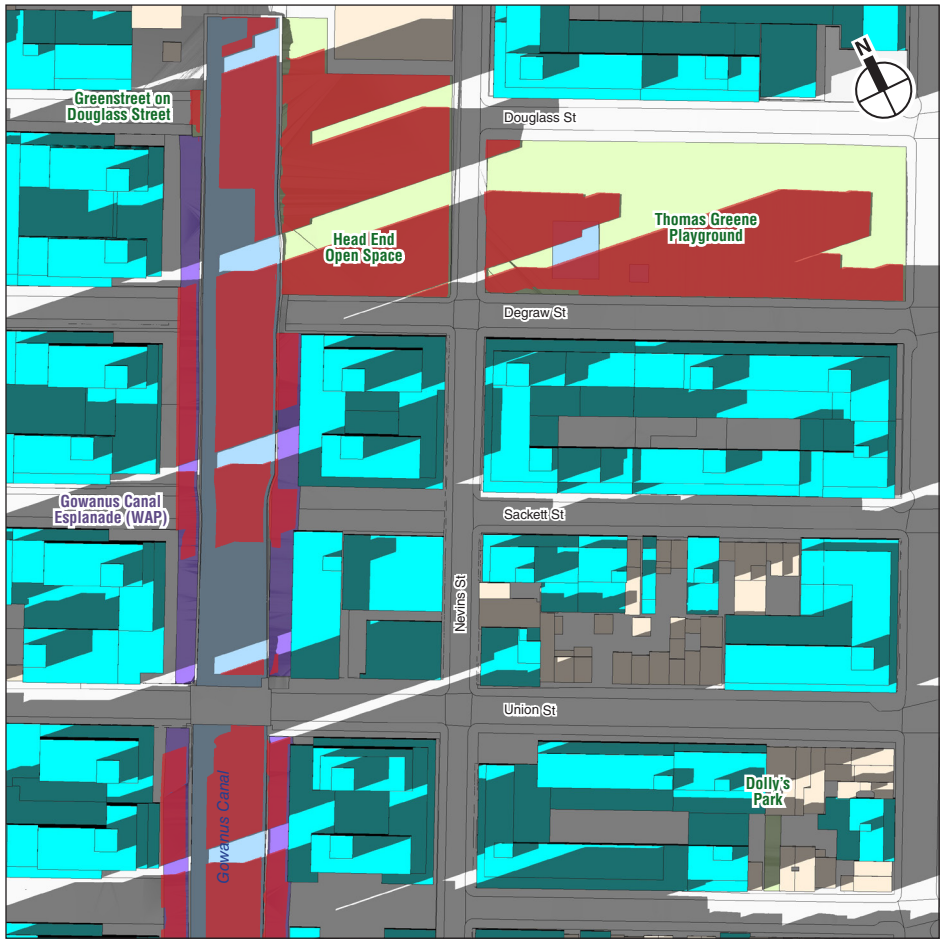

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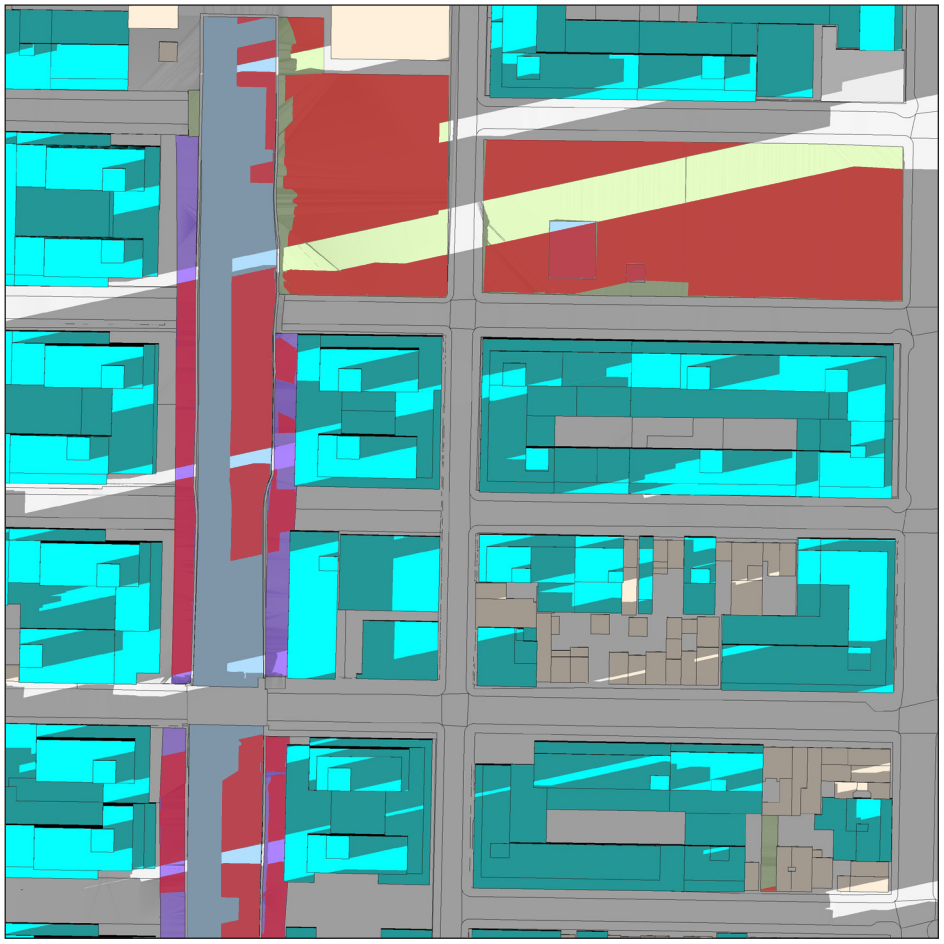

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

May 6 / August 6

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-14

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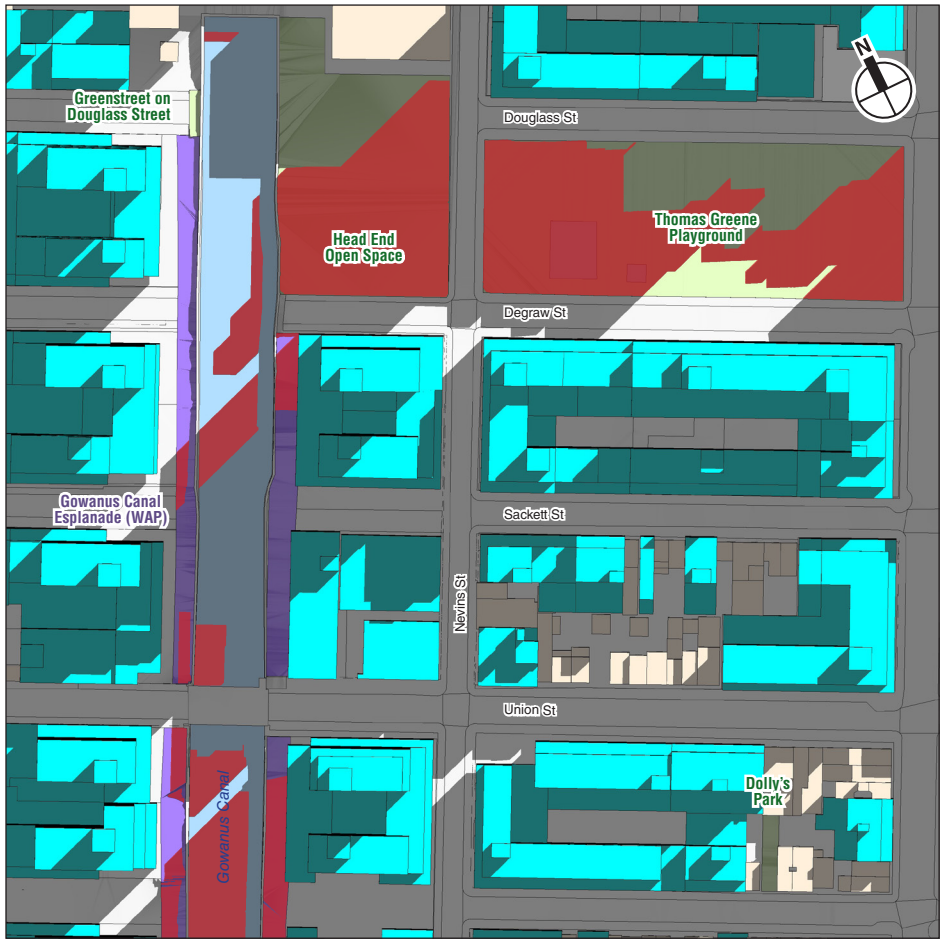

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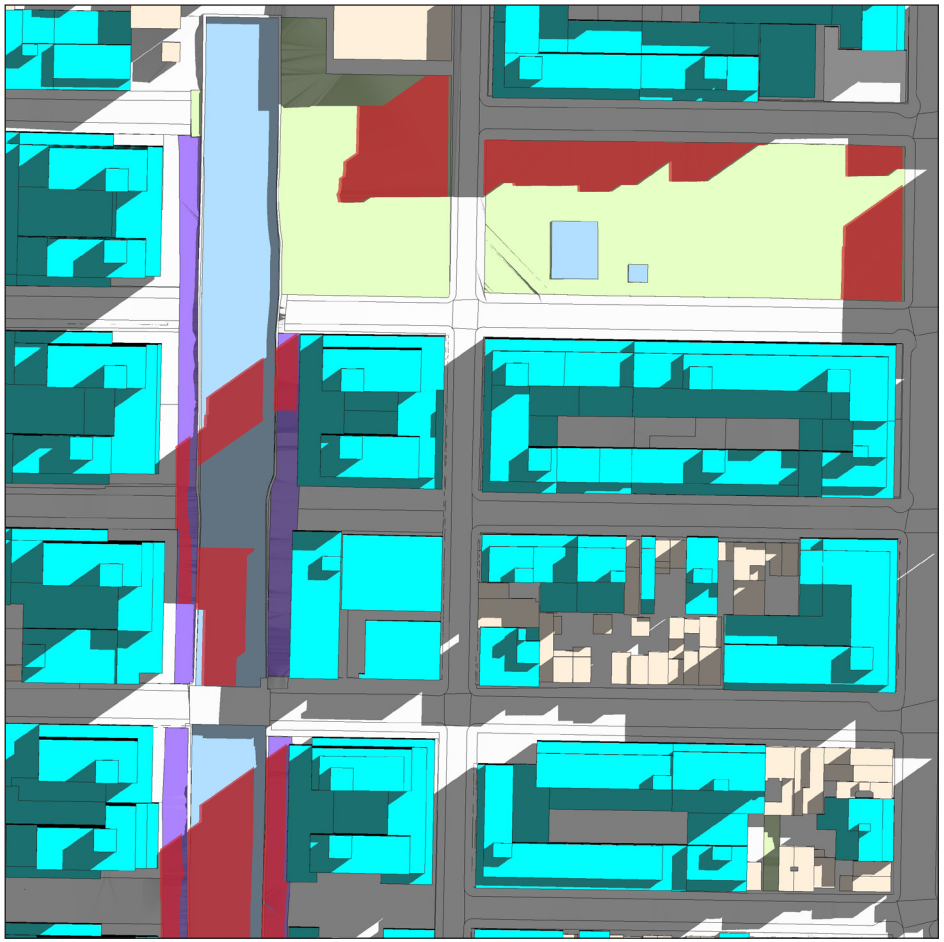

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

June 21

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-15

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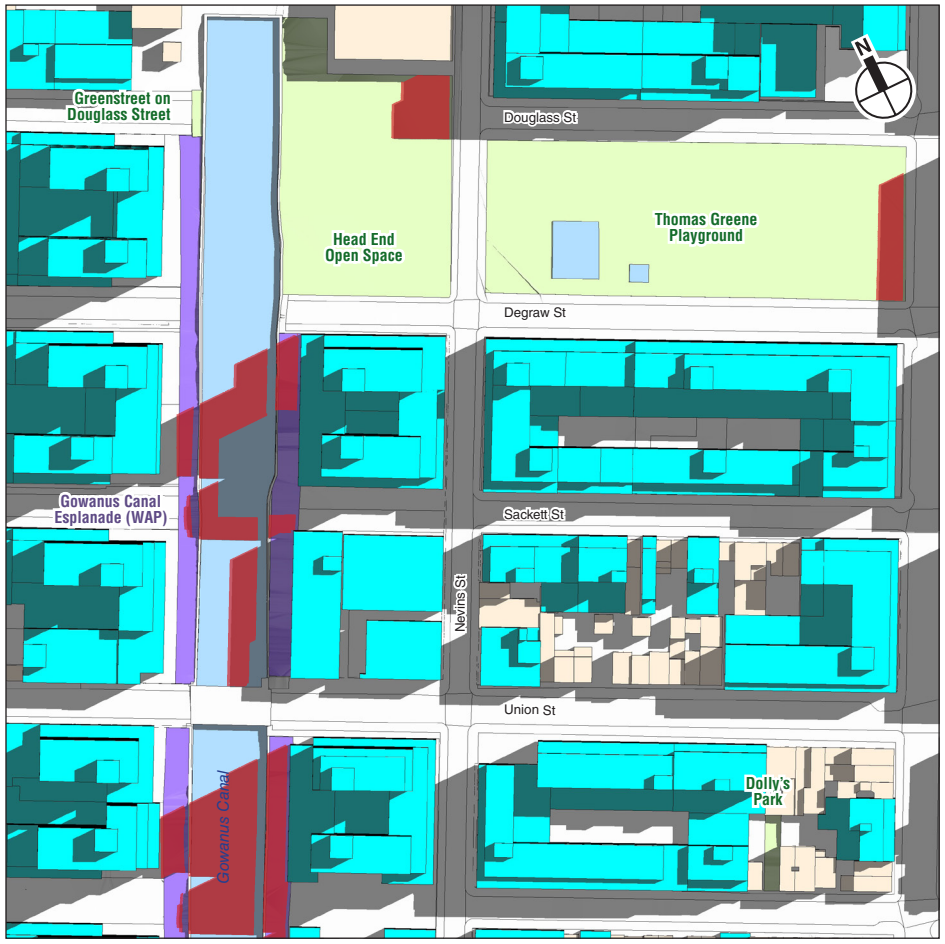


8:00 AM



8:55 AM

Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis



9:45 AM

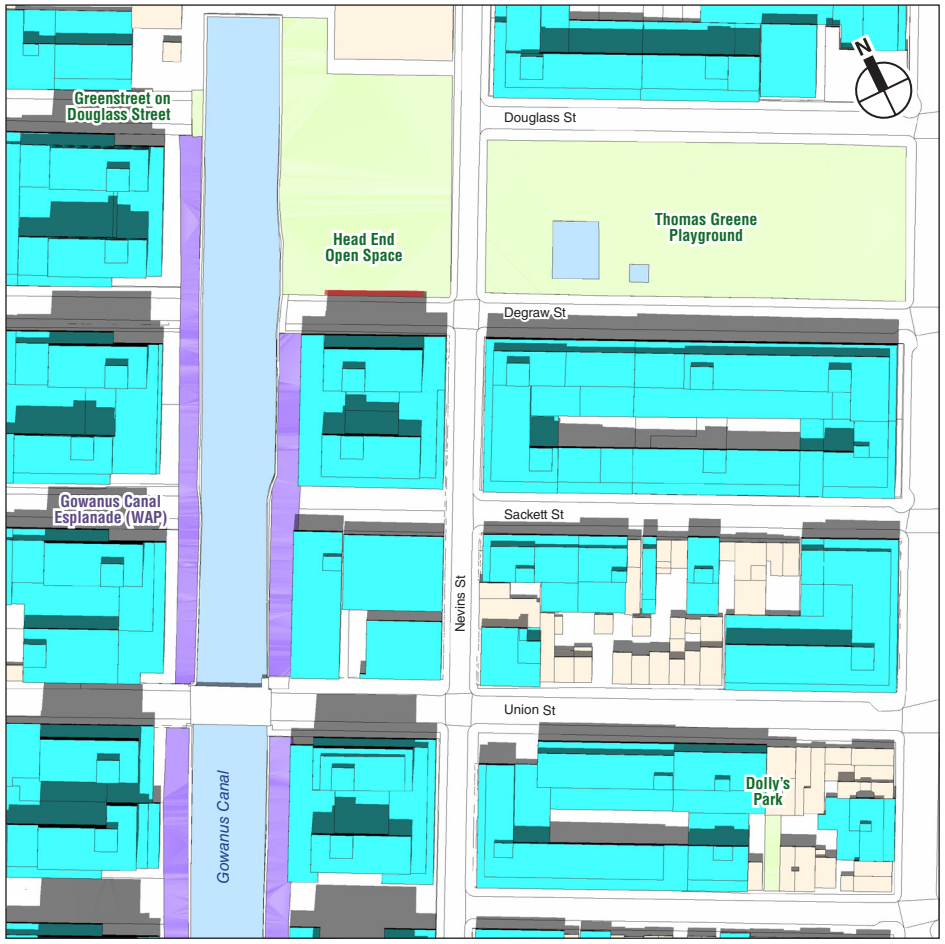
Publicly Accessible Open Space

Project Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

1.14.21



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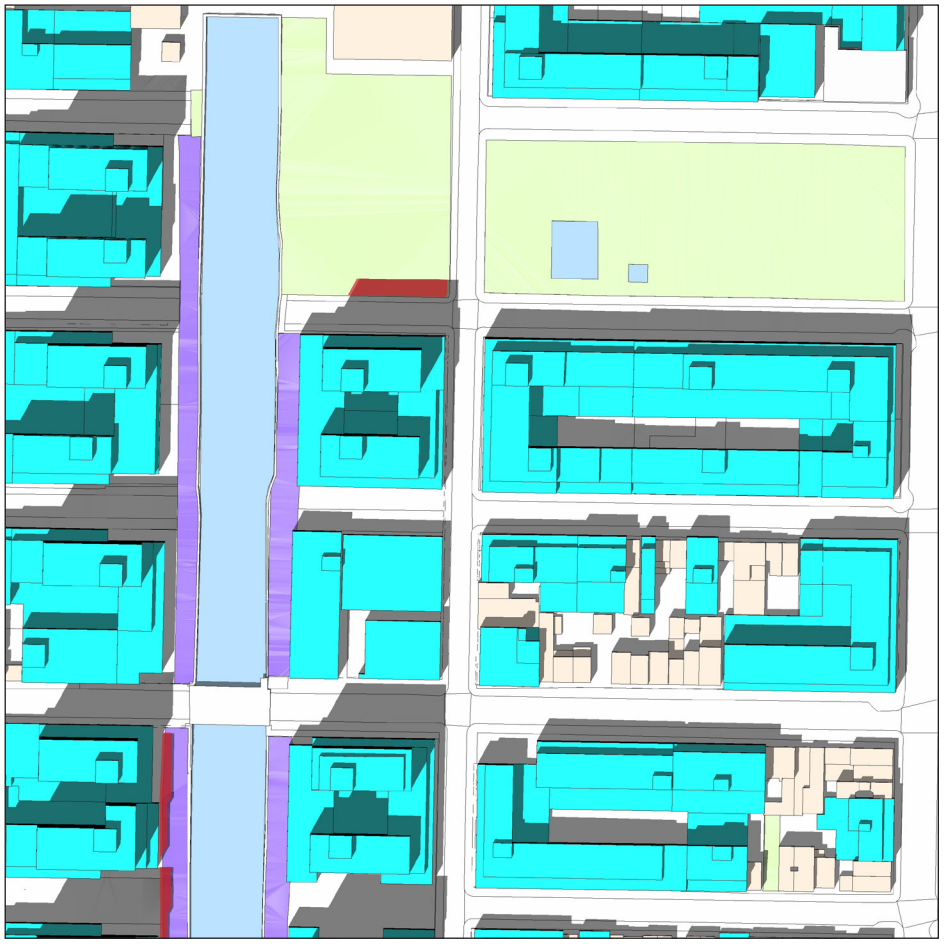


1:30 PM

Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

June 21

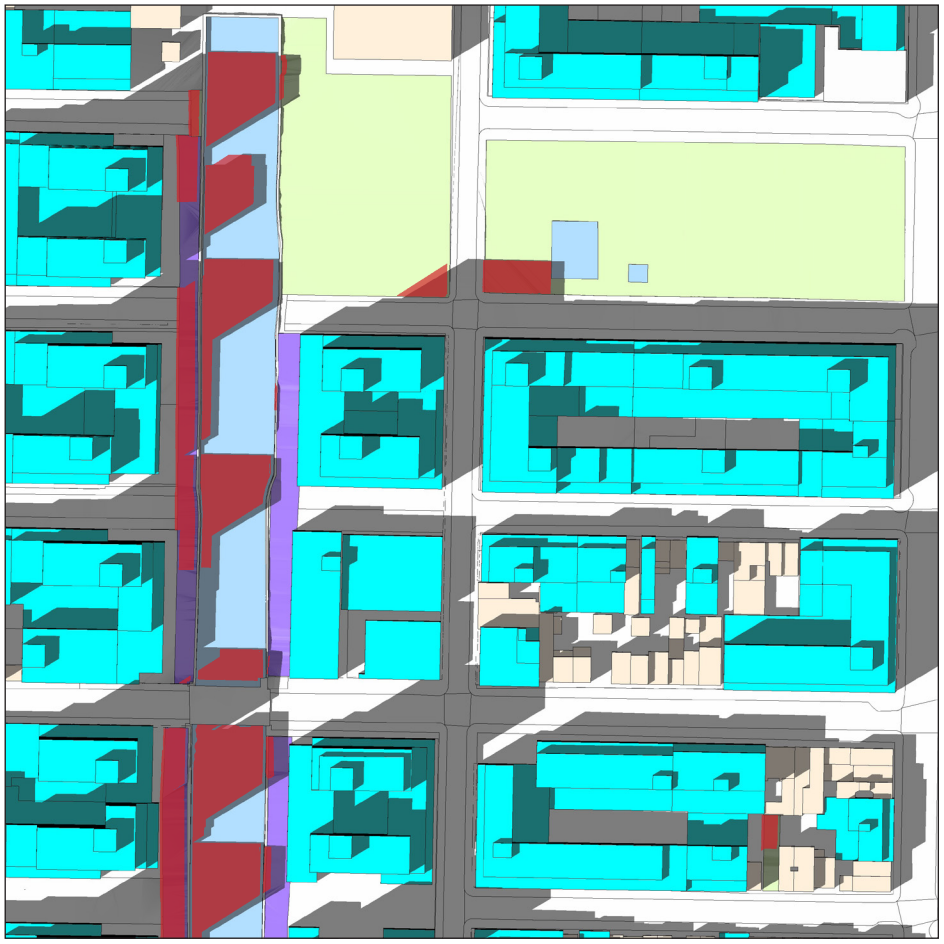
GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-18

1.14.21



2:30 PM



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Publicly Accessible Open Space

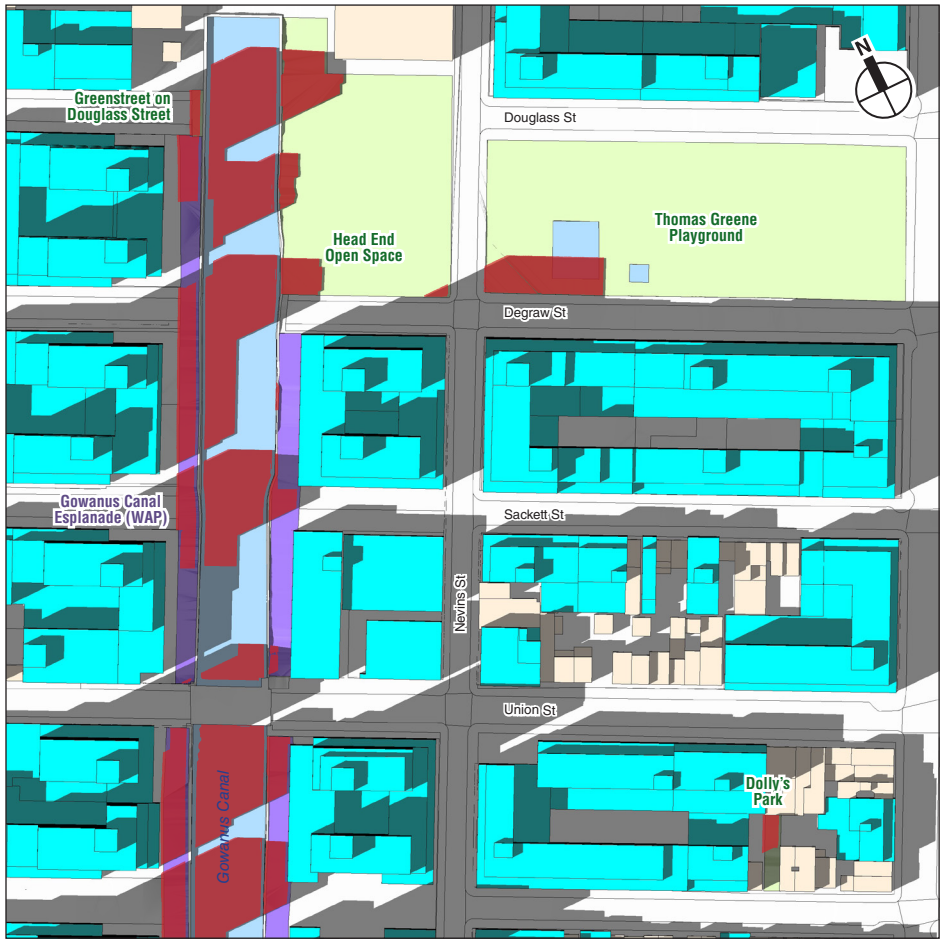
Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

June 21

1.14.21



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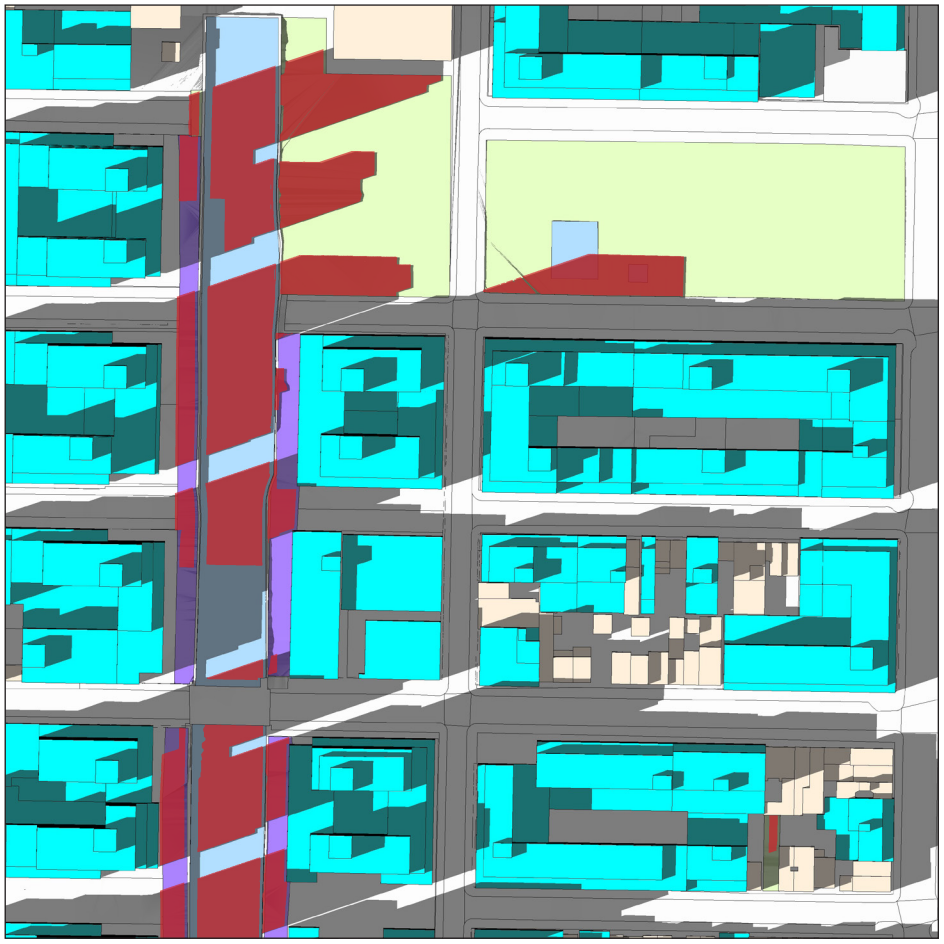

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

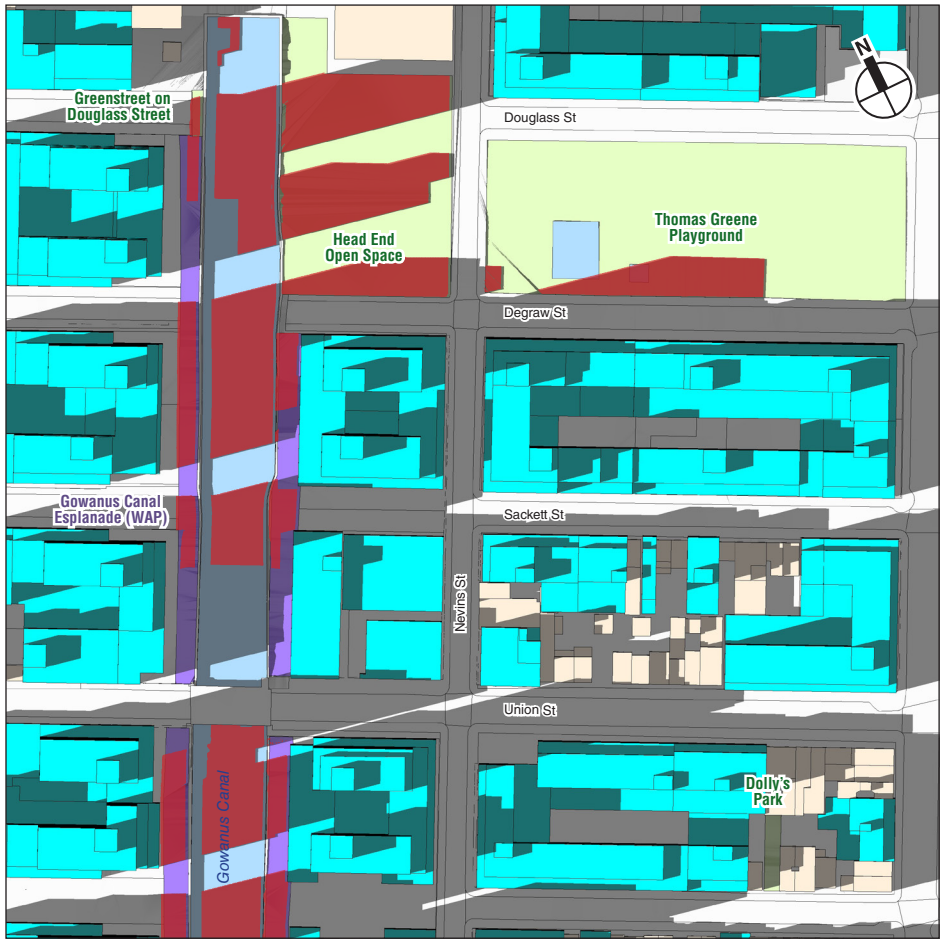
Projected and Potential Development Sites Requiring Shadow Analysis

June 21

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-20

1.14.21



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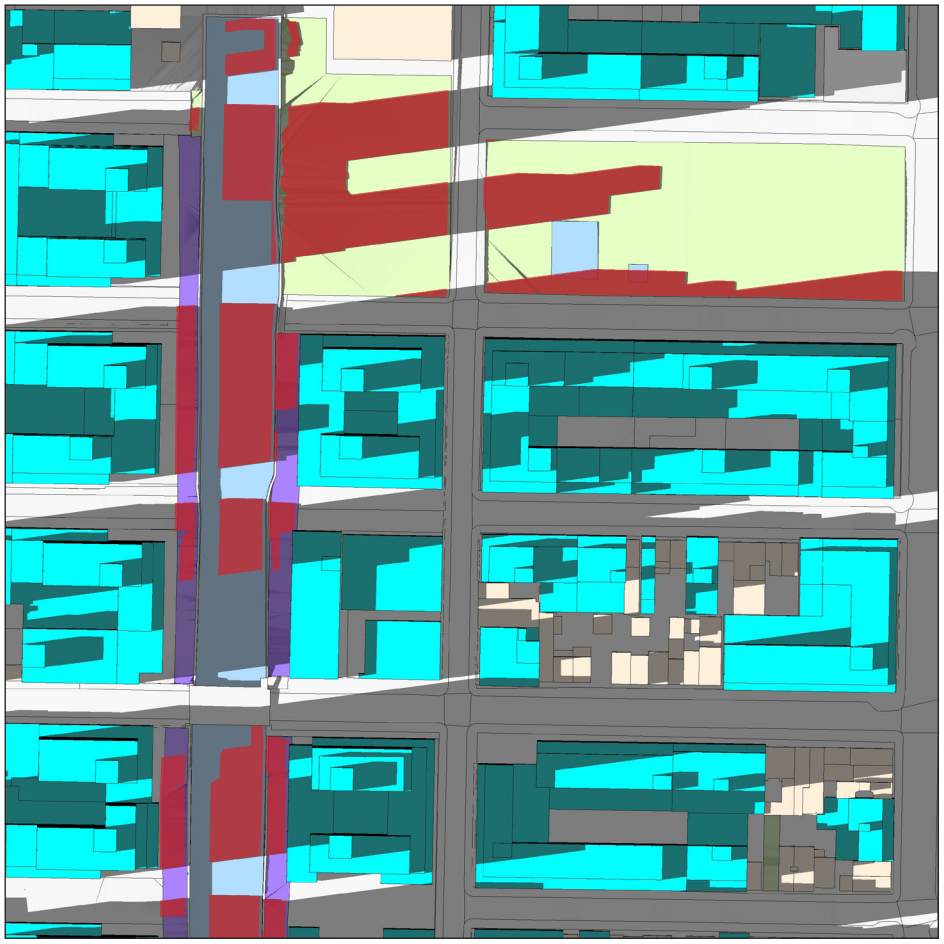

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

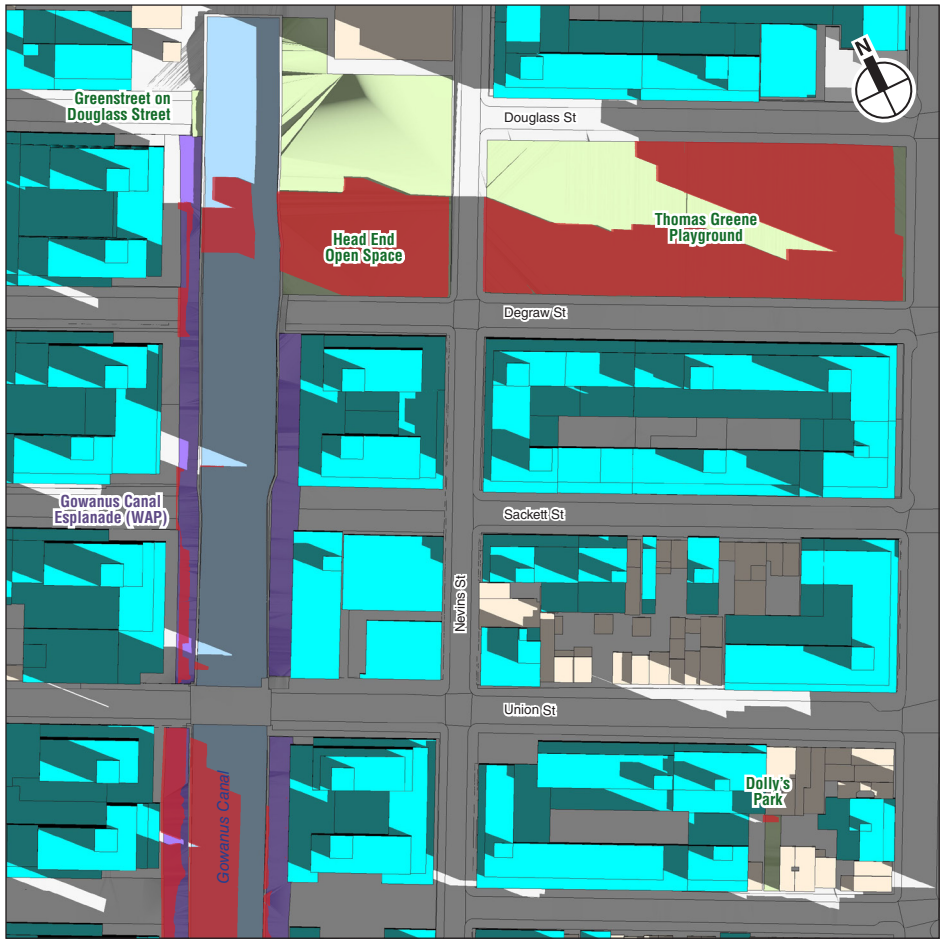
Projected and Potential Development Sites Requiring Shadow Analysis

June 21

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-21

1.14.21



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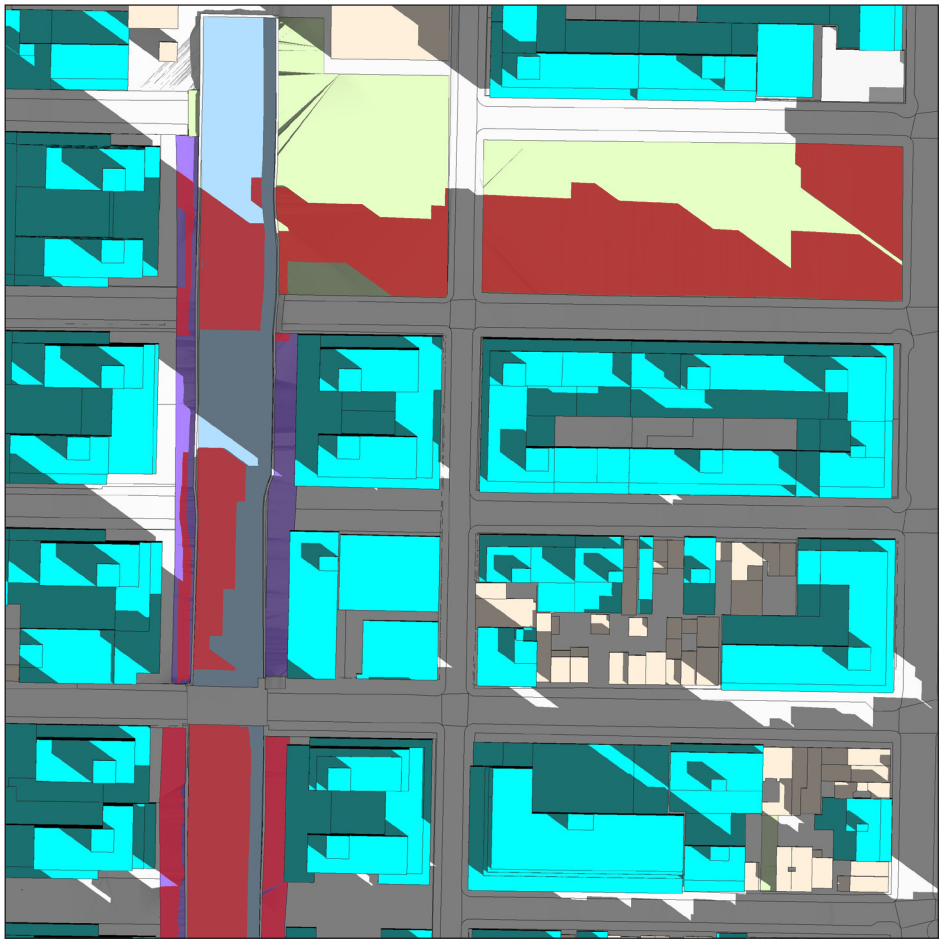

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Publicly Accessible Open Space

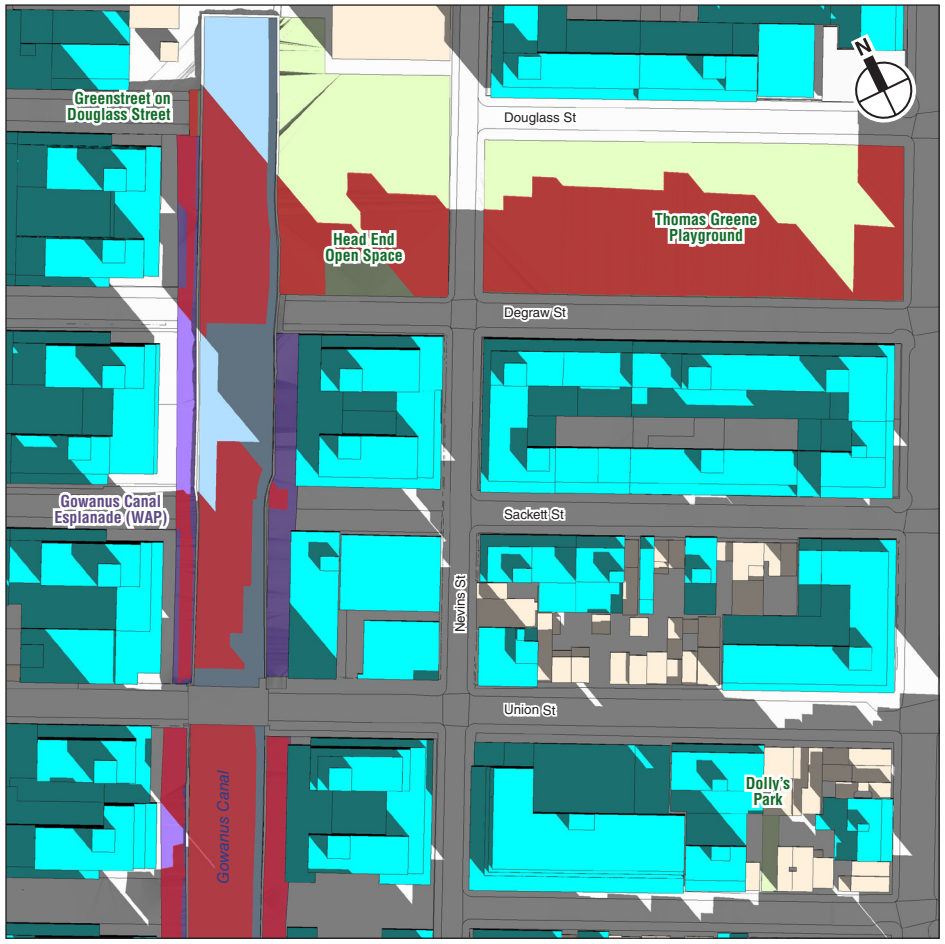
Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

December 21

1.14.21



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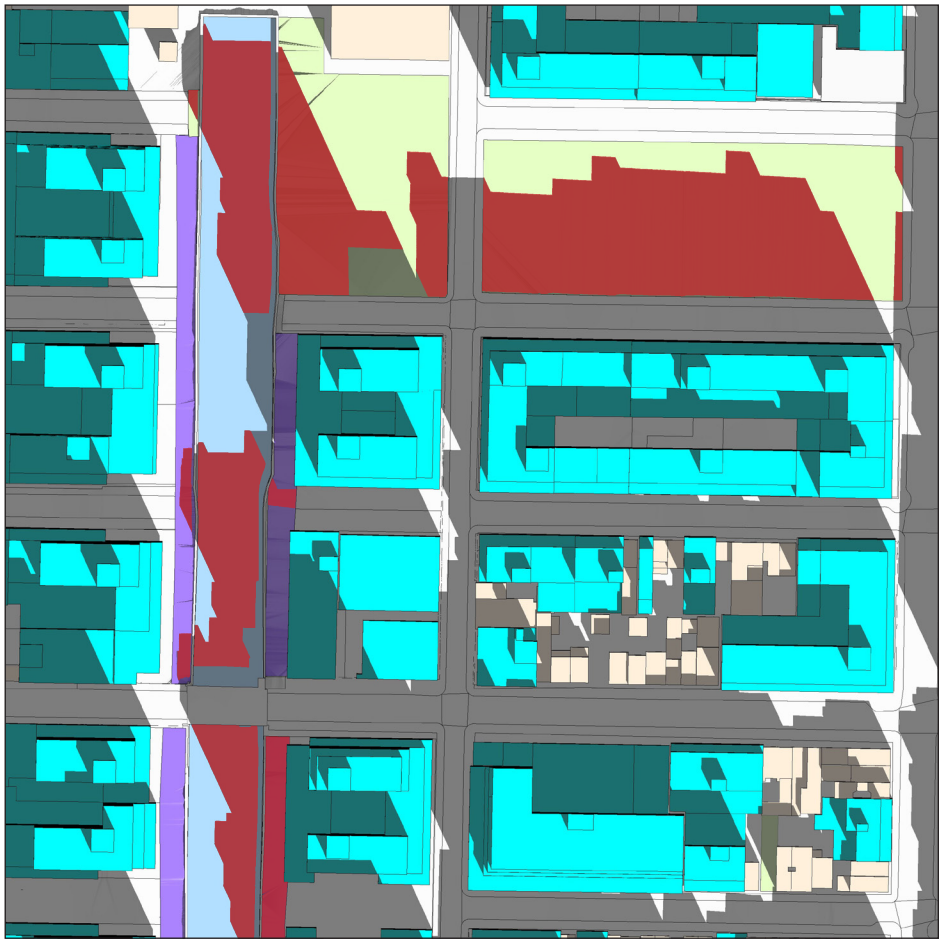

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Publicly Accessible Open Space

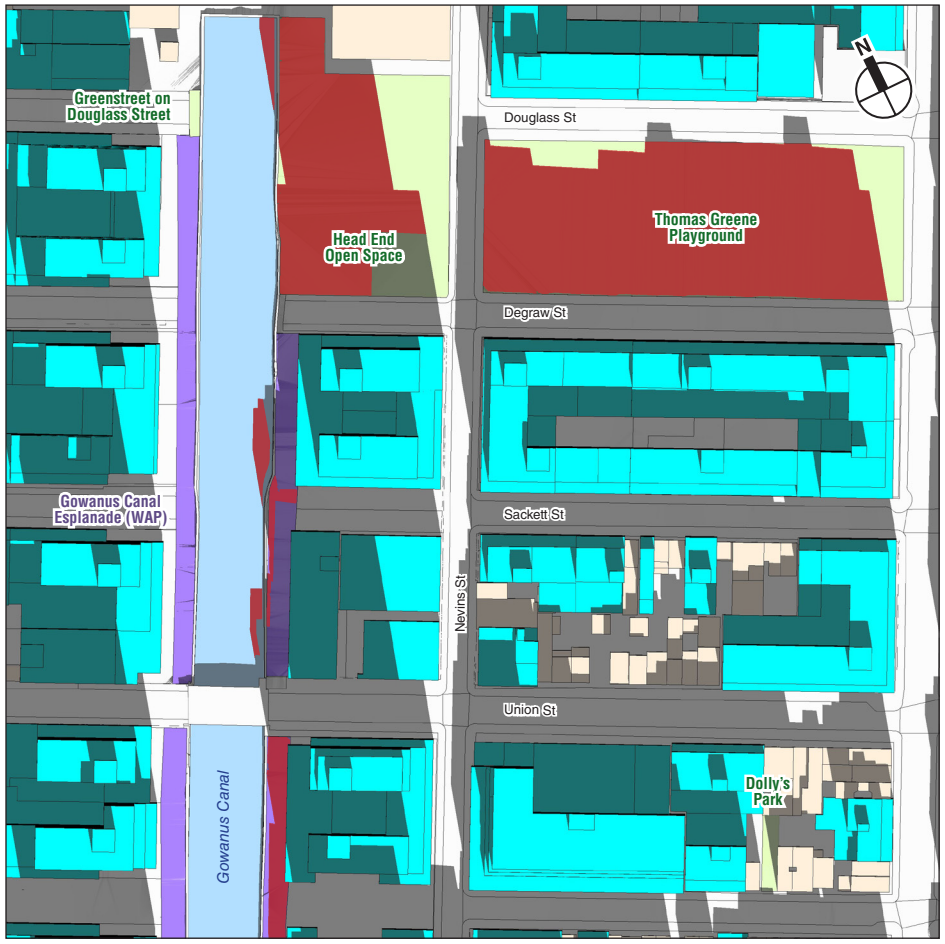
Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

December 21

1.14.21



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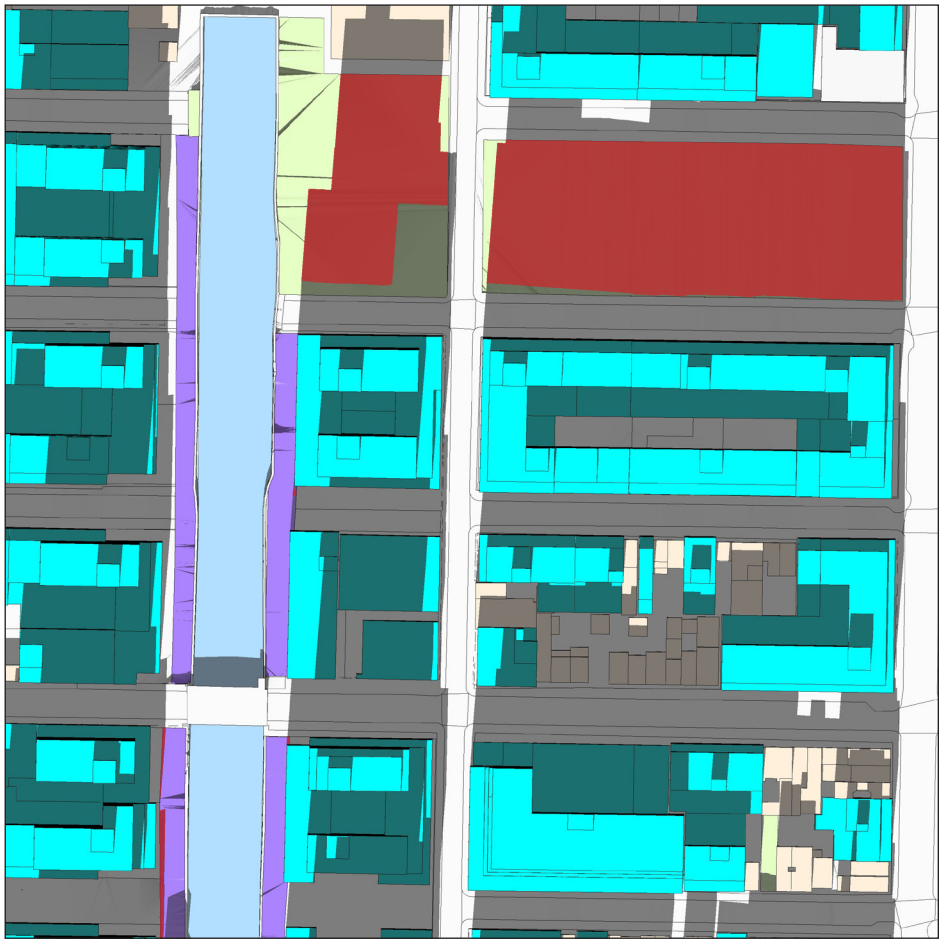

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Publicly Accessible Open Space

Project-Generated Open Space

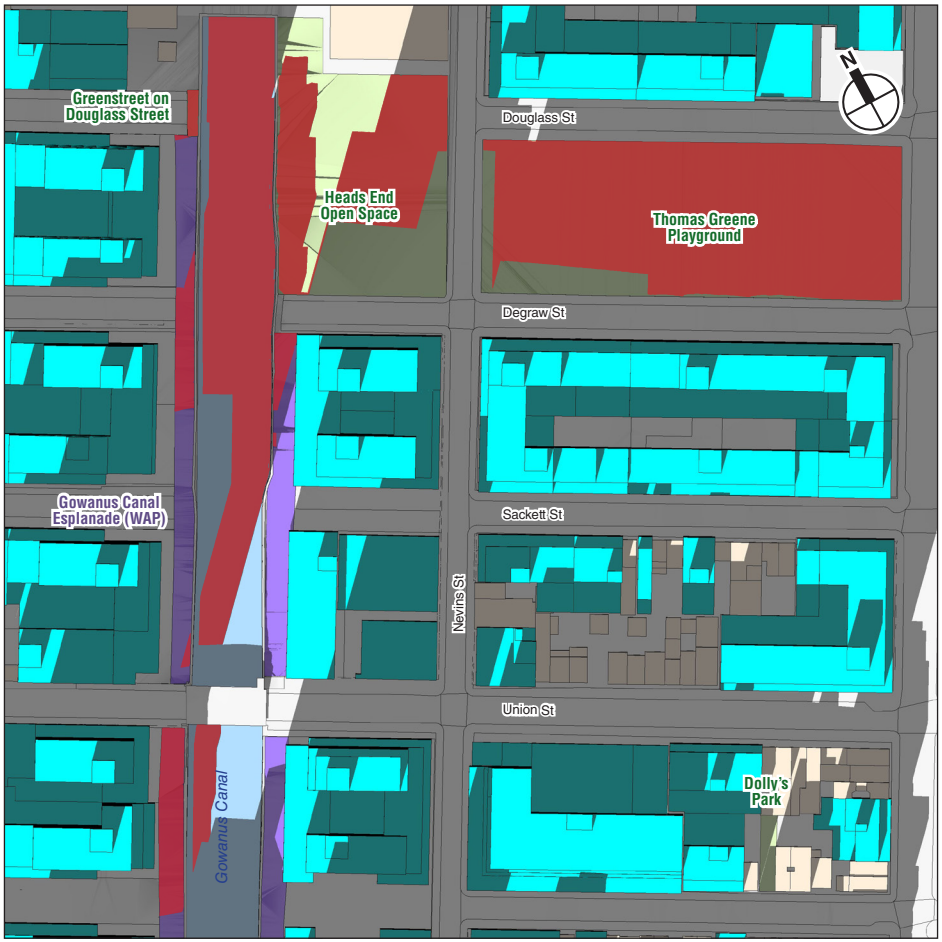
Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

December 21

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-24



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Publicly Accessible Open Space

Project Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

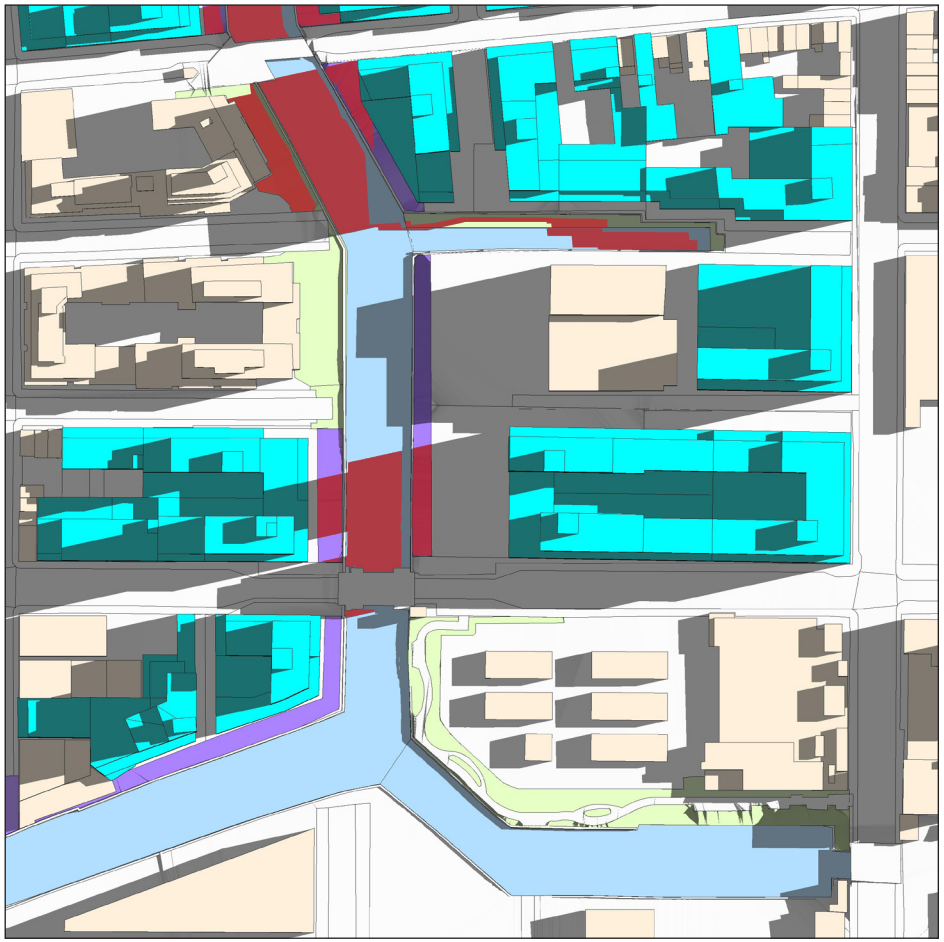
Projected and Potential Development Sites Requiring Shadow Analysis

December 21

1.14.21



7:36 AM



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Publicly Accessible Open Space

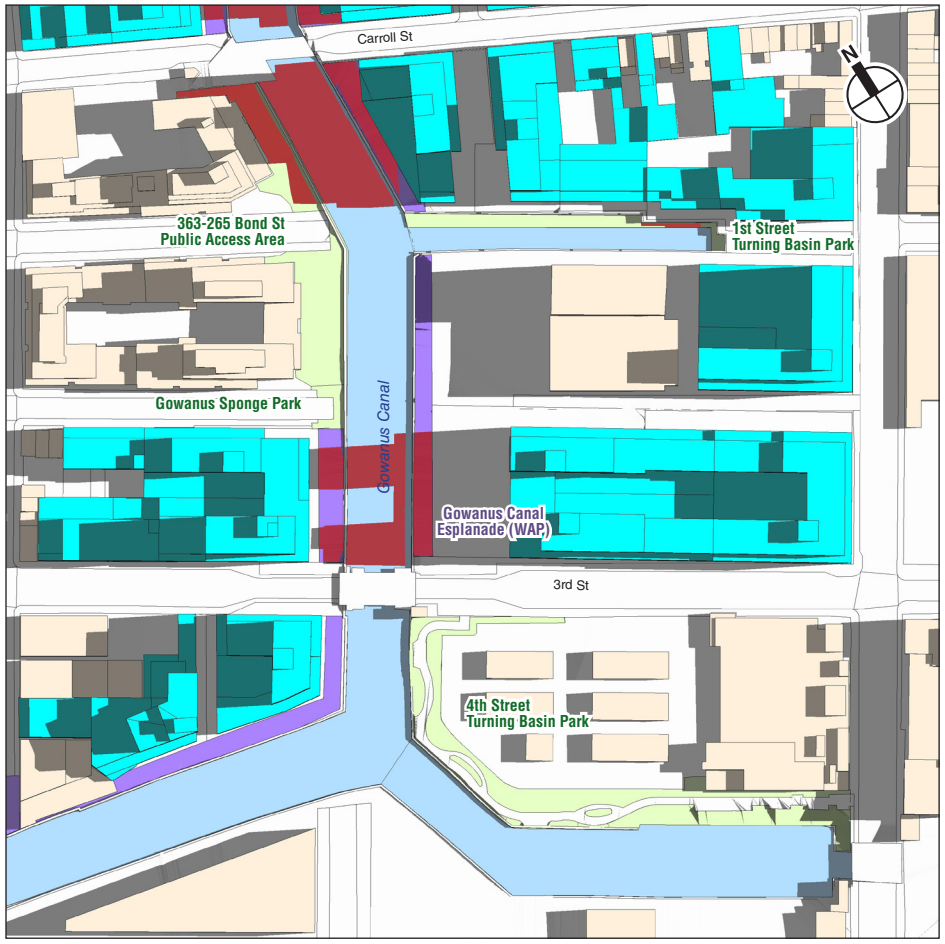
Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

March 21 / September 21

1.14.21



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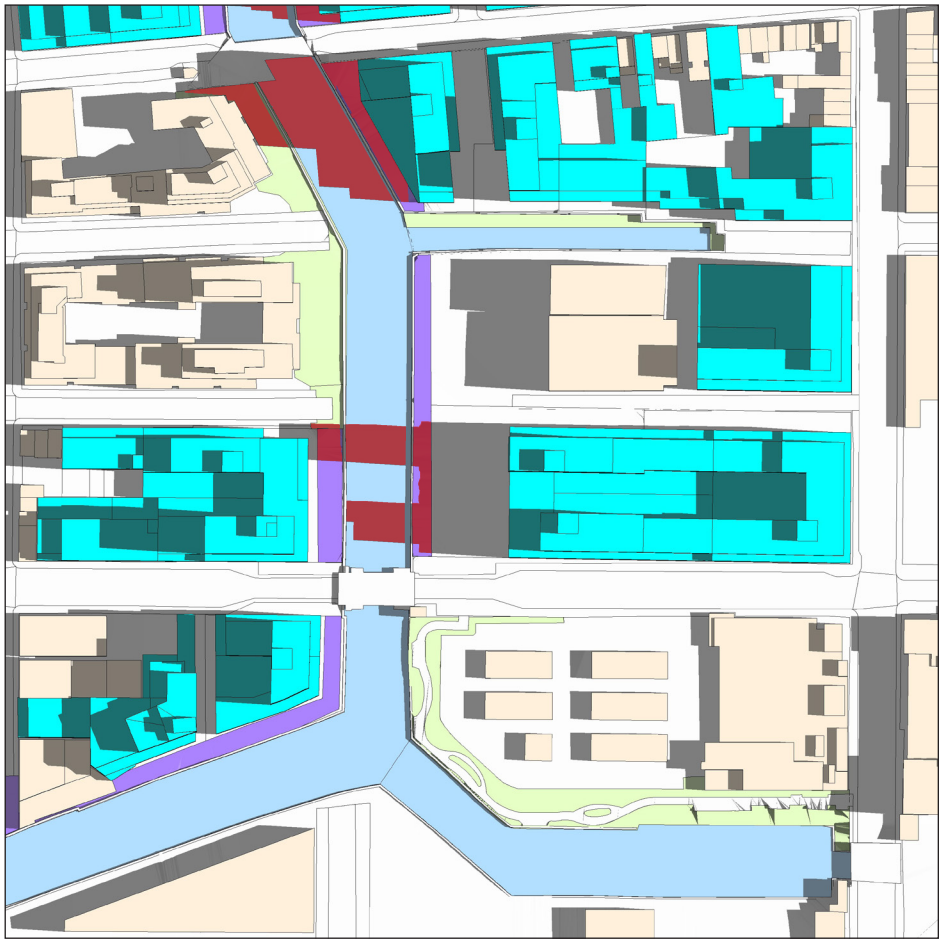

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

March 21 / September 21

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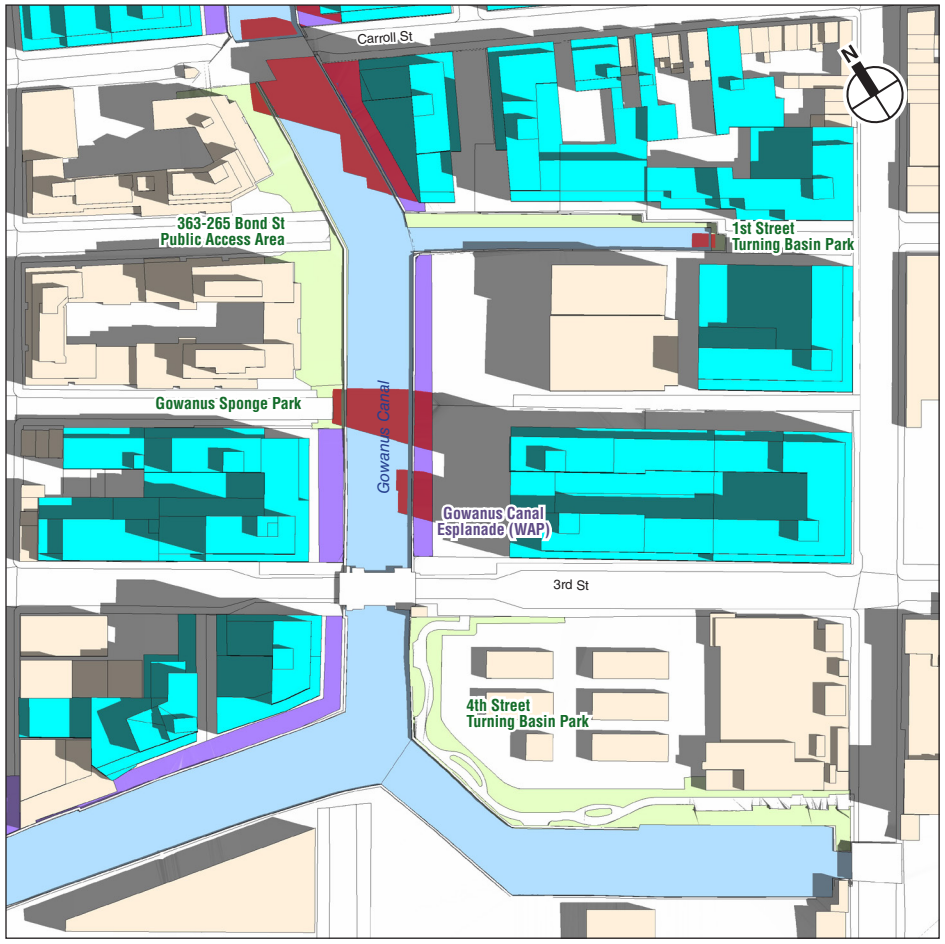

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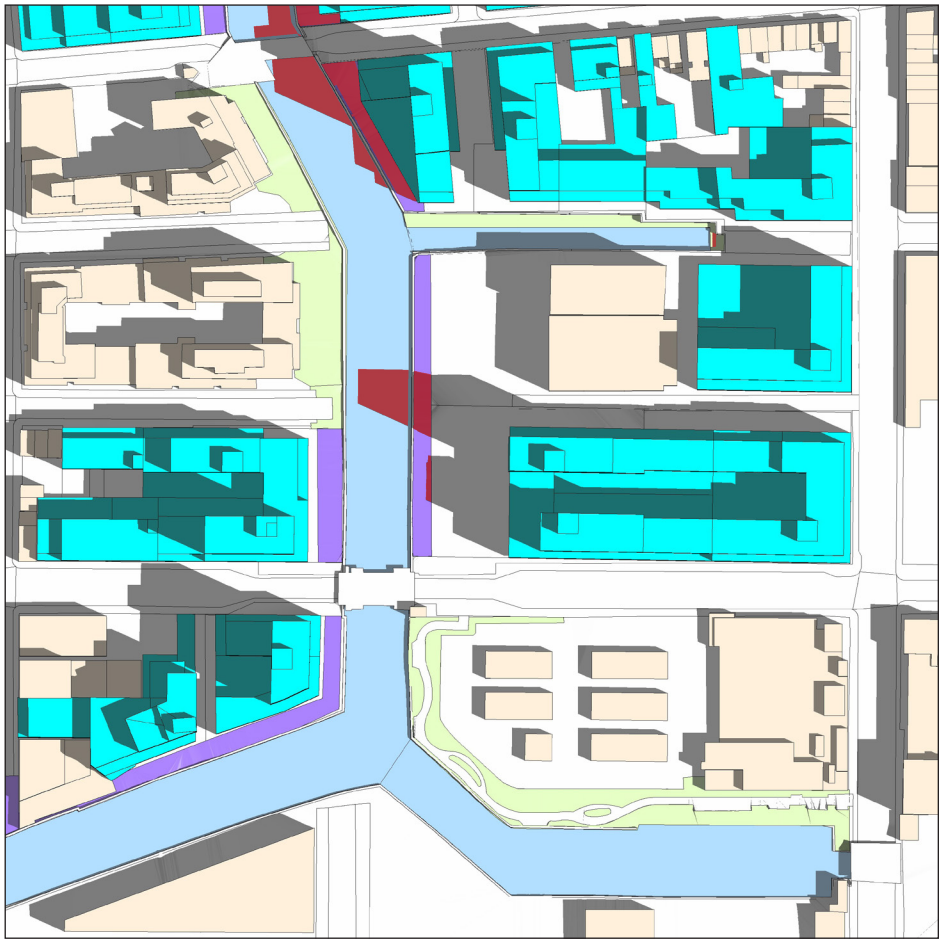

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

March 21 / September 21

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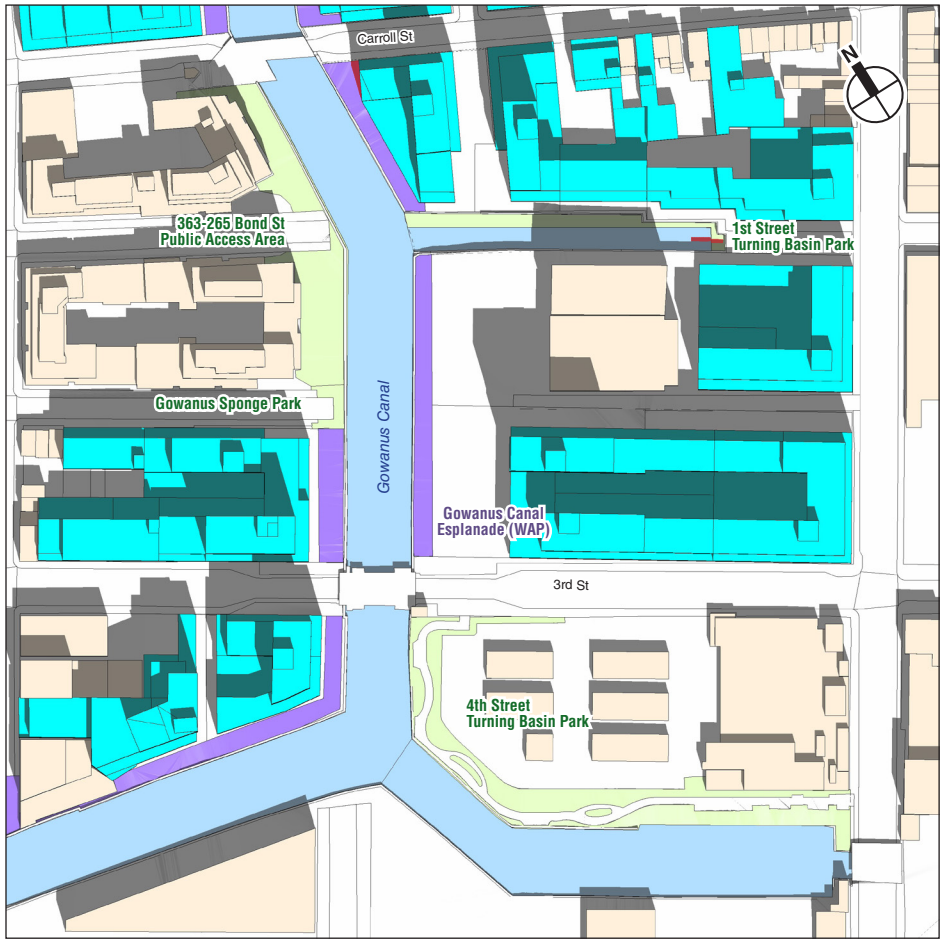

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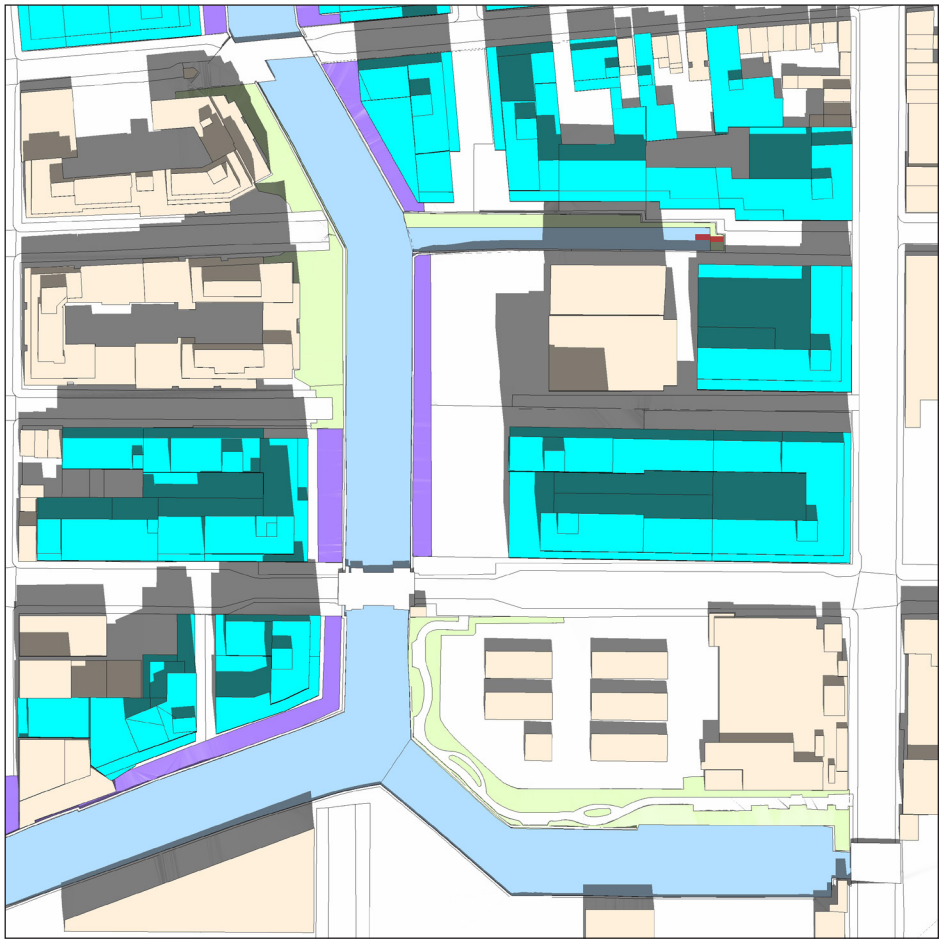

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Publicly Accessible Open Space

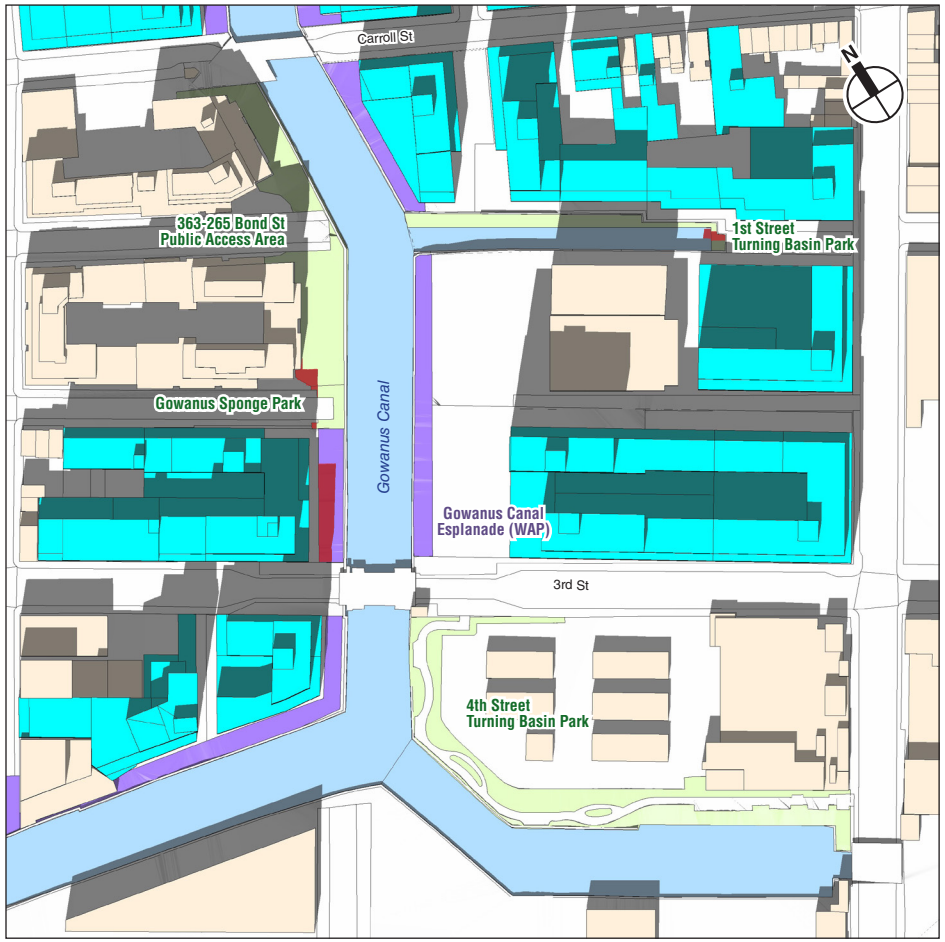
Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

March 21 / September 21

1.14.21



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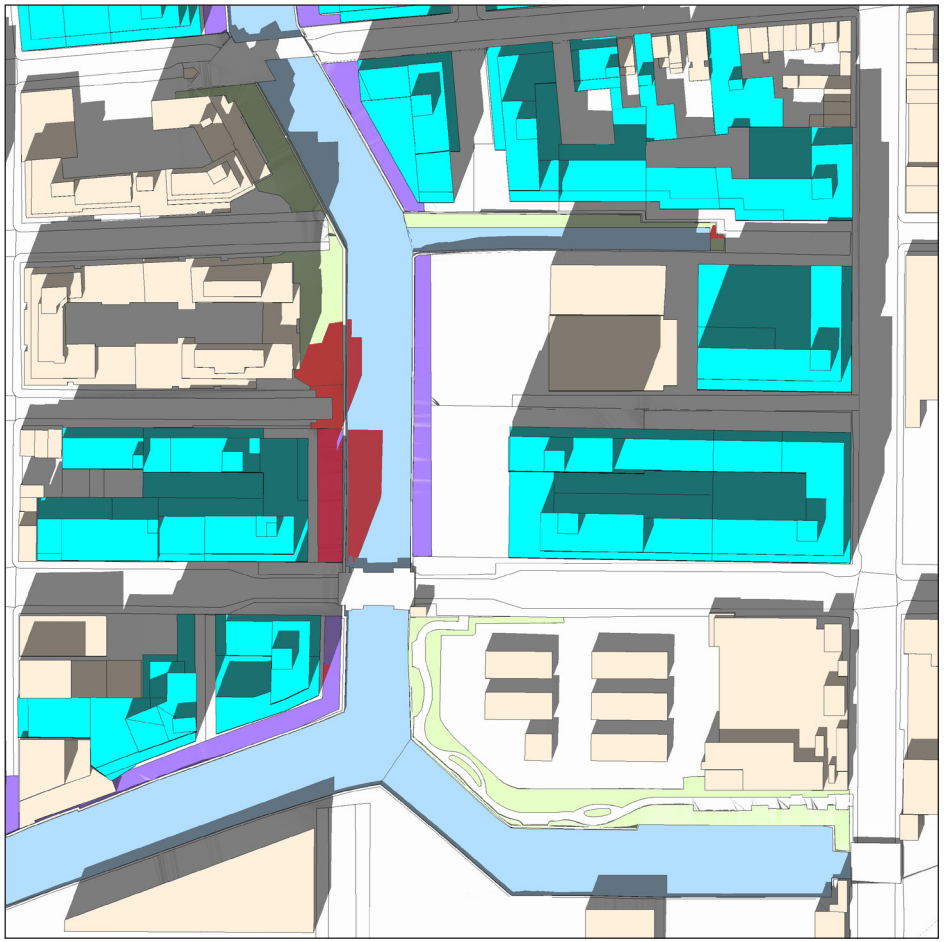

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

March 21 / September 21

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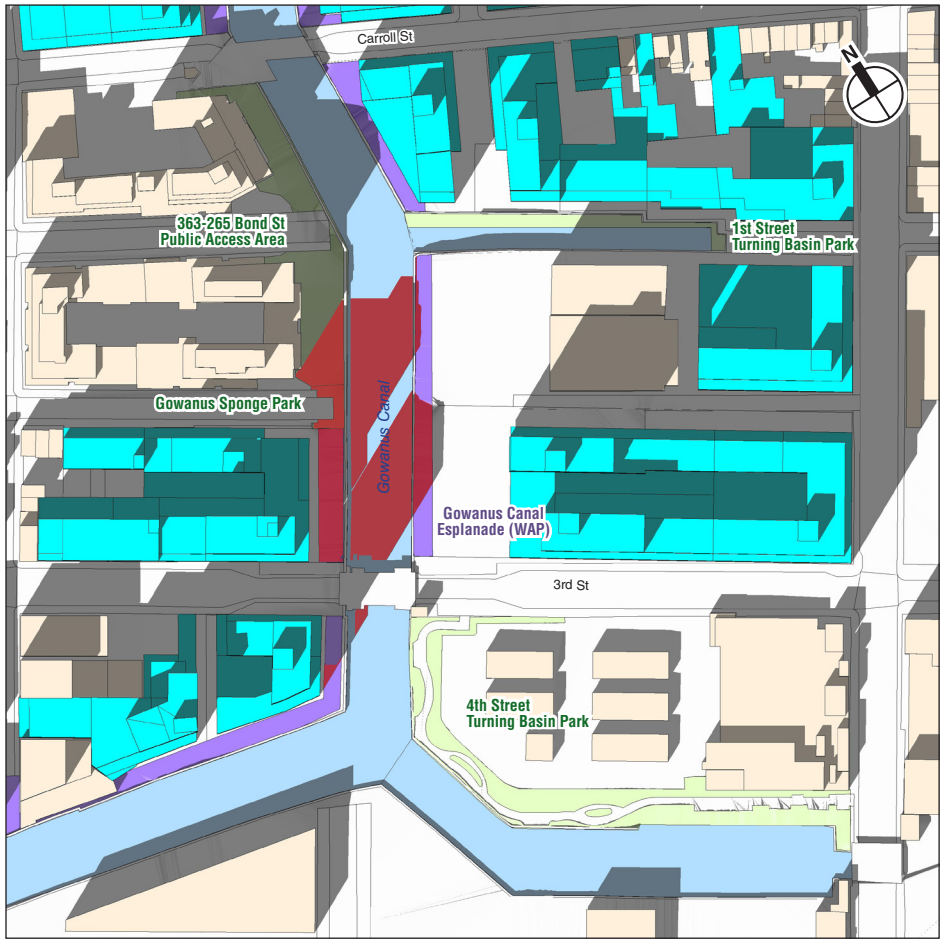

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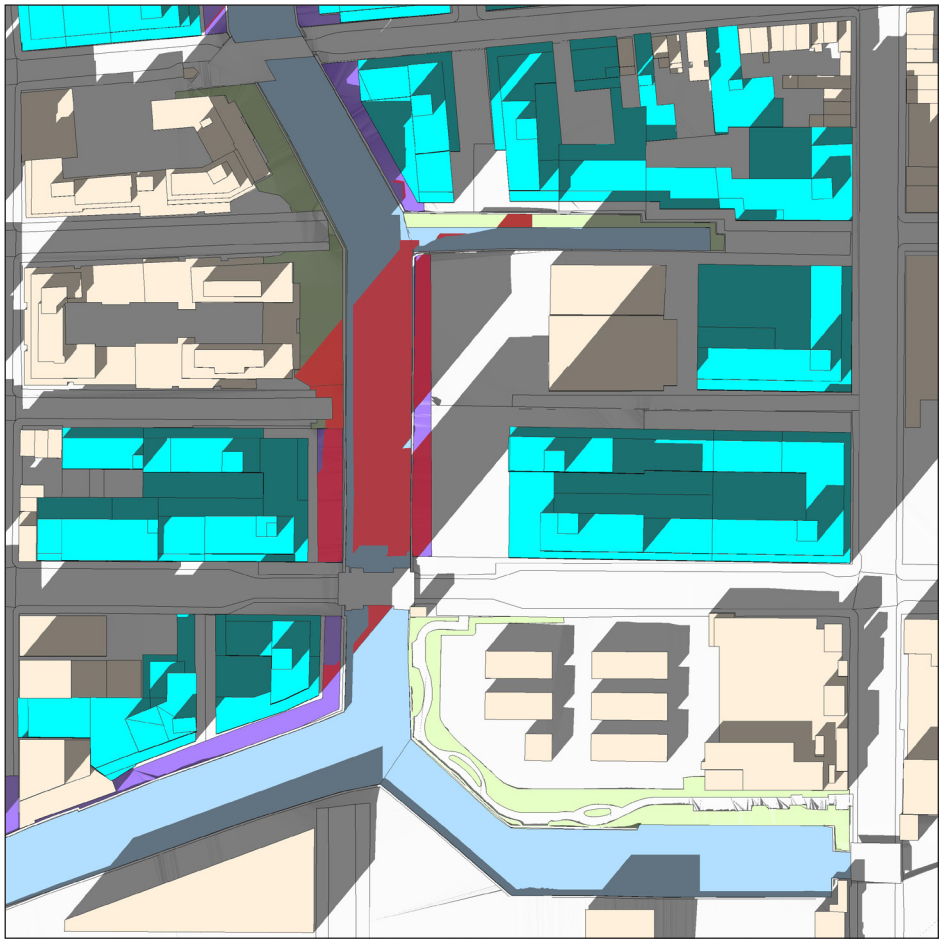

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Publicly Accessible Open Space

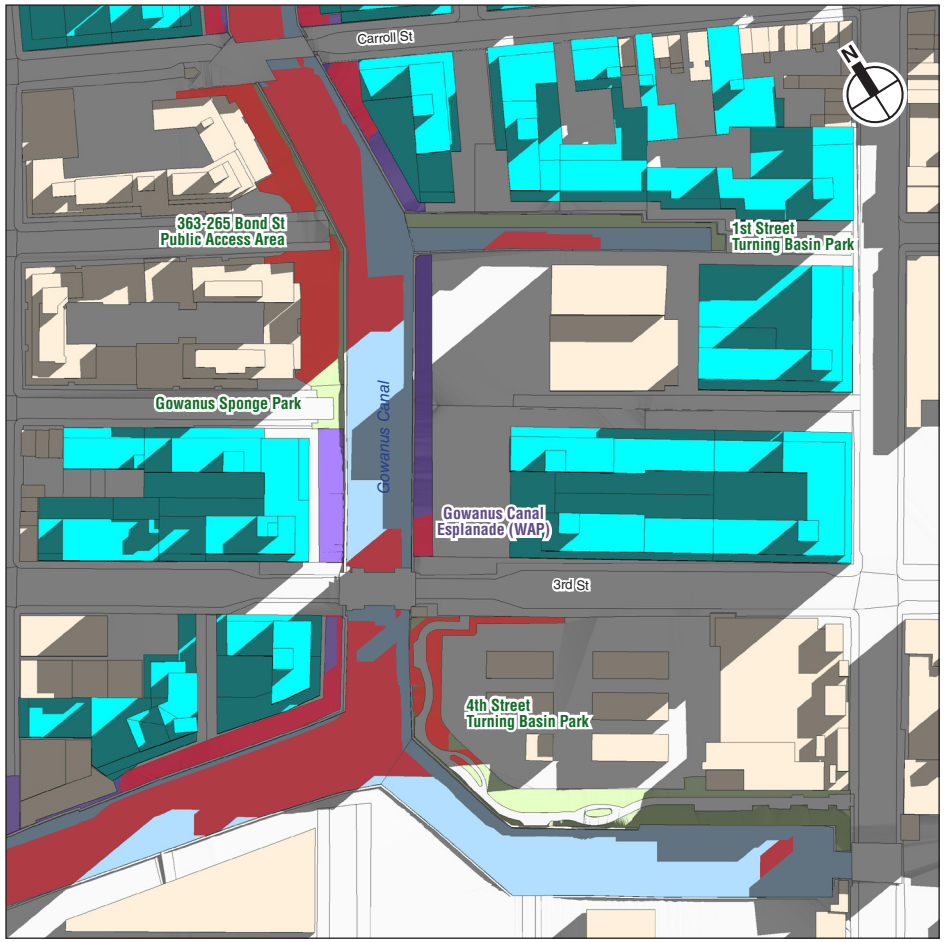
Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

March 21 / September 21

1.14.21



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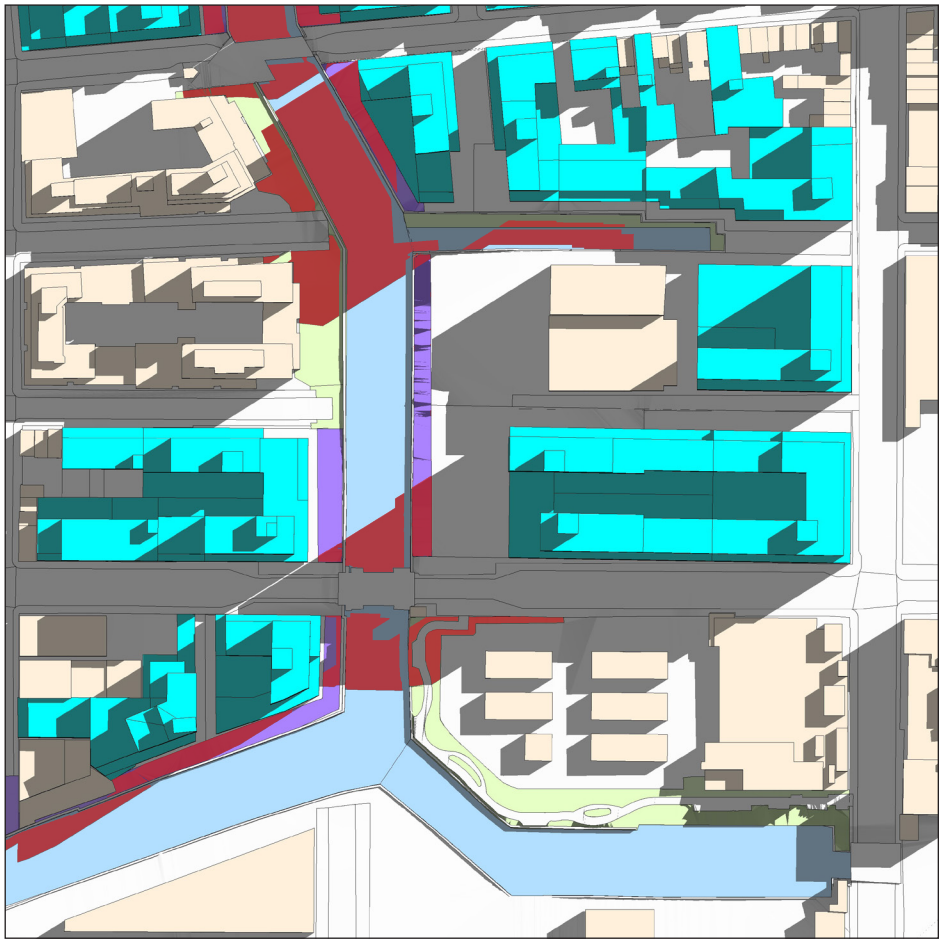

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

May 6 / August 6

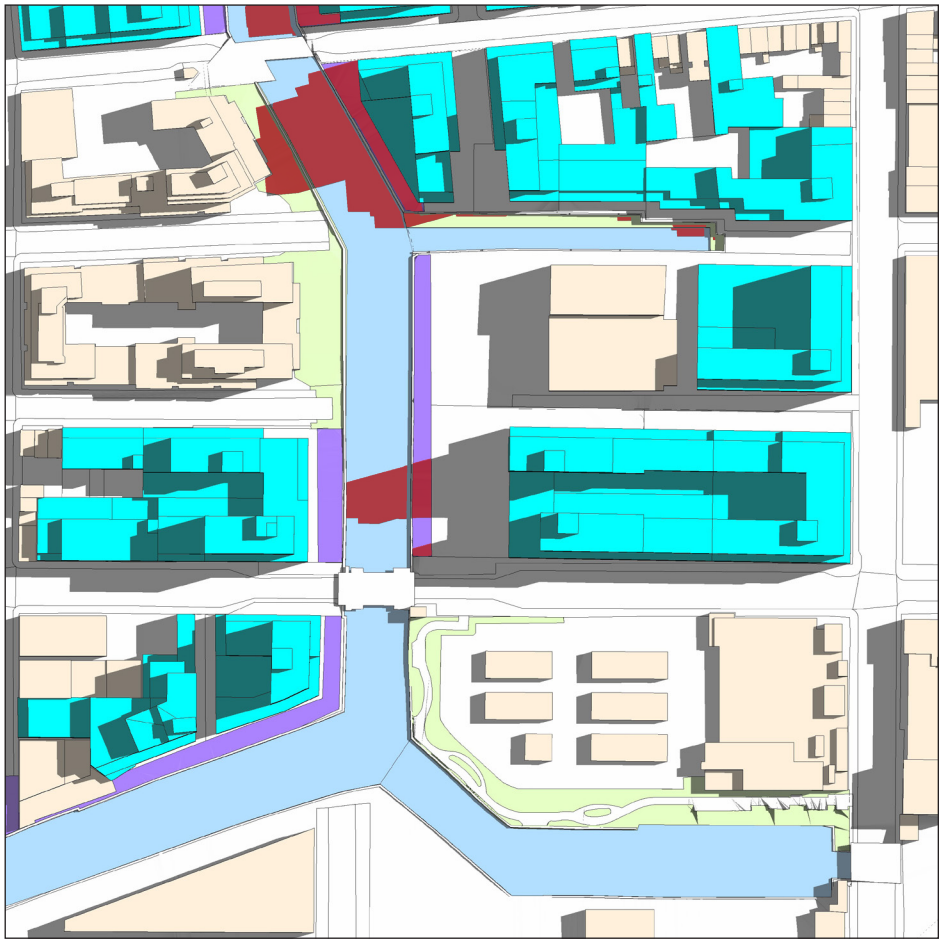
GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-32

1.14.21



8:00 AM



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Publicly Accessible Open Space

Project-Generated Open Space

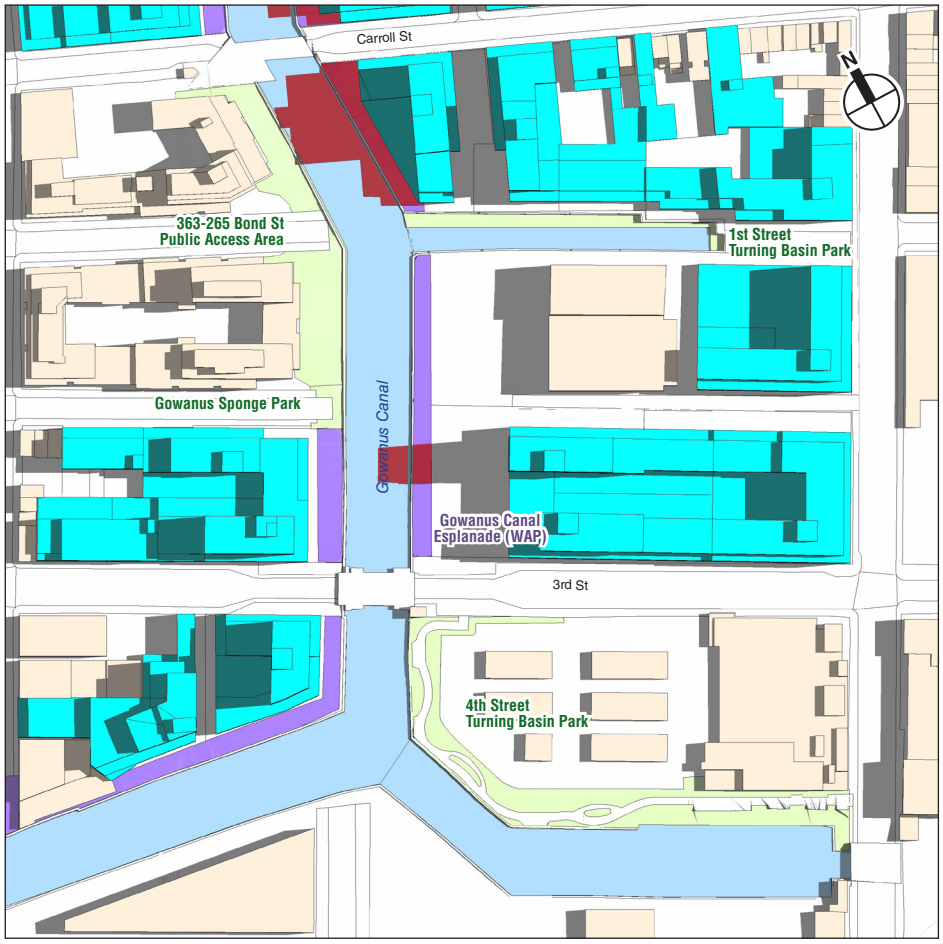
Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

May 6 / August 6

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-33



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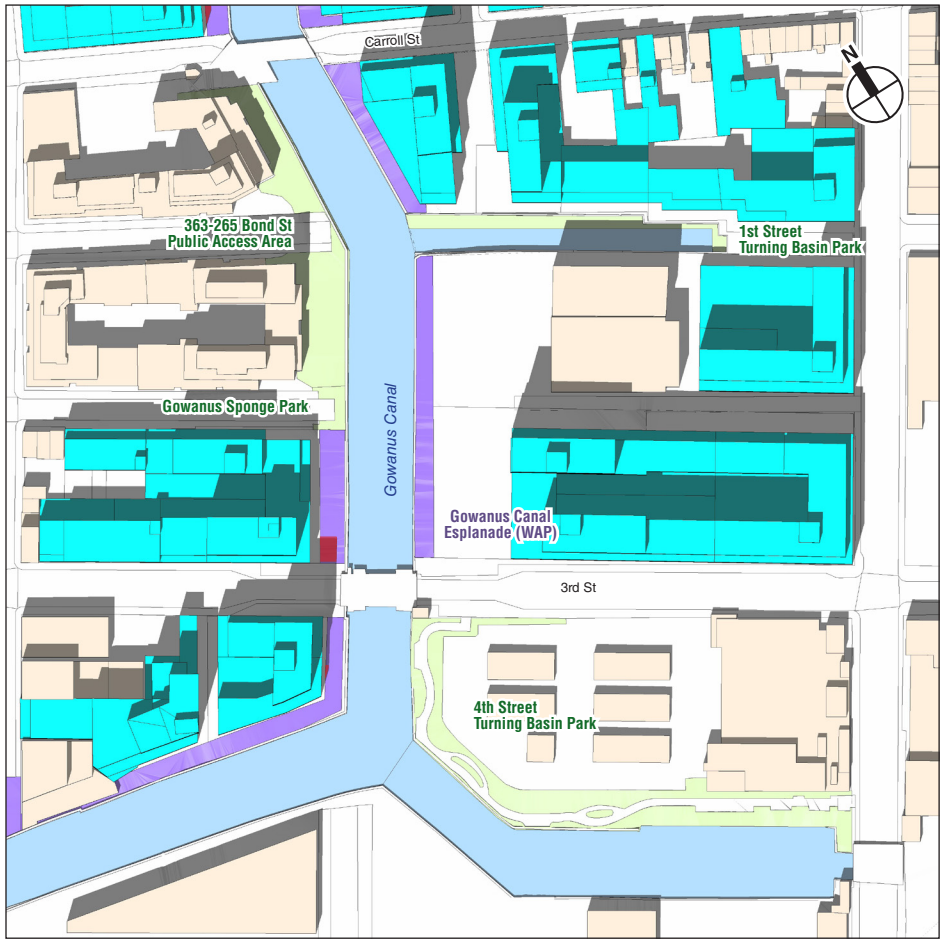
Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

1.14.21



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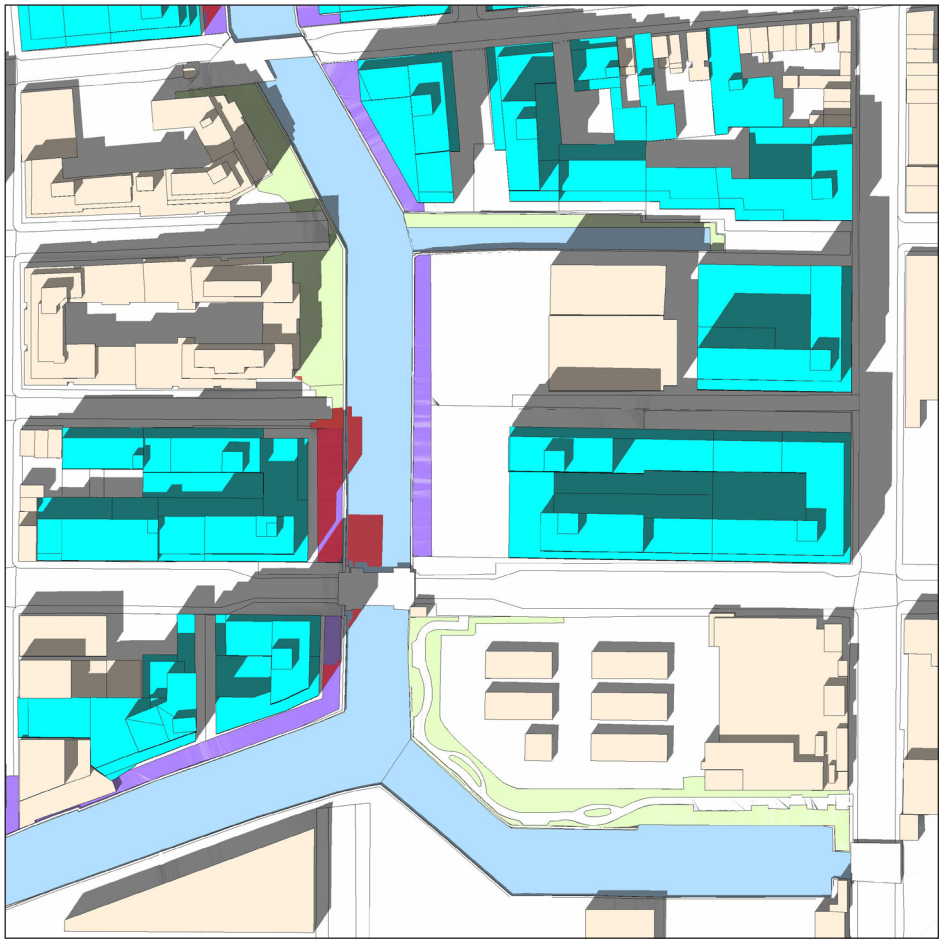

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Publicly Accessible Open Space

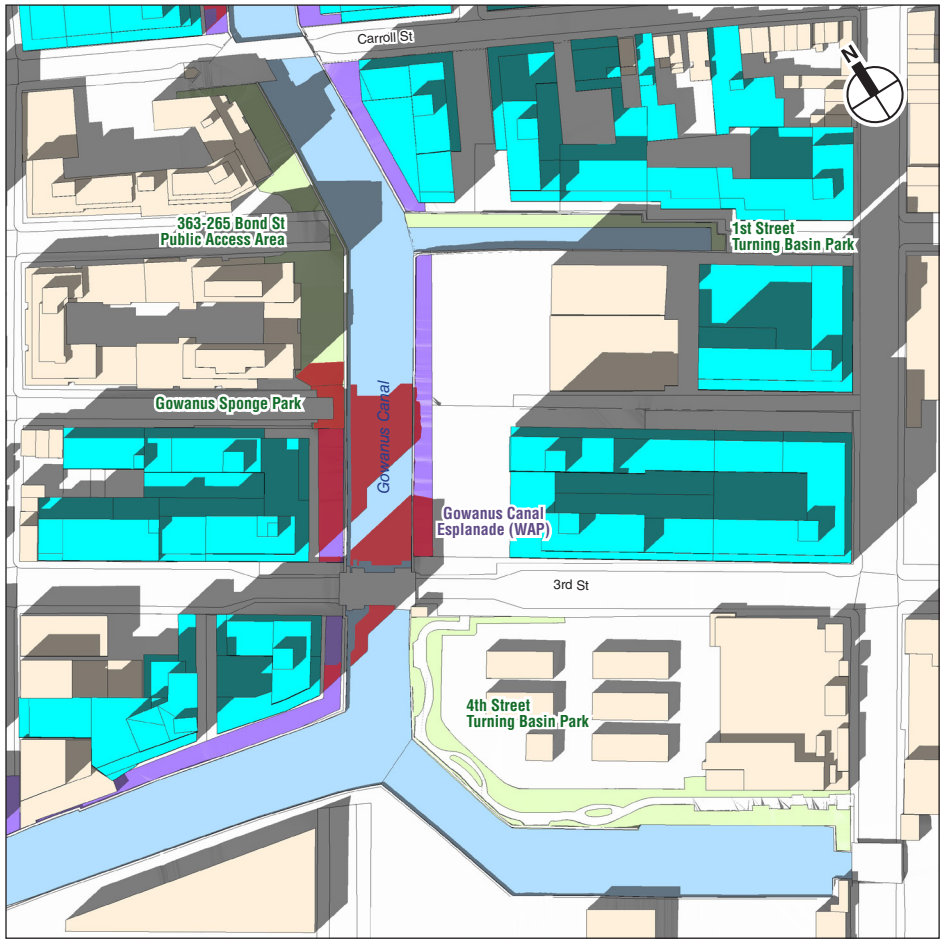
Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

May 6 / August 6

1.14.21



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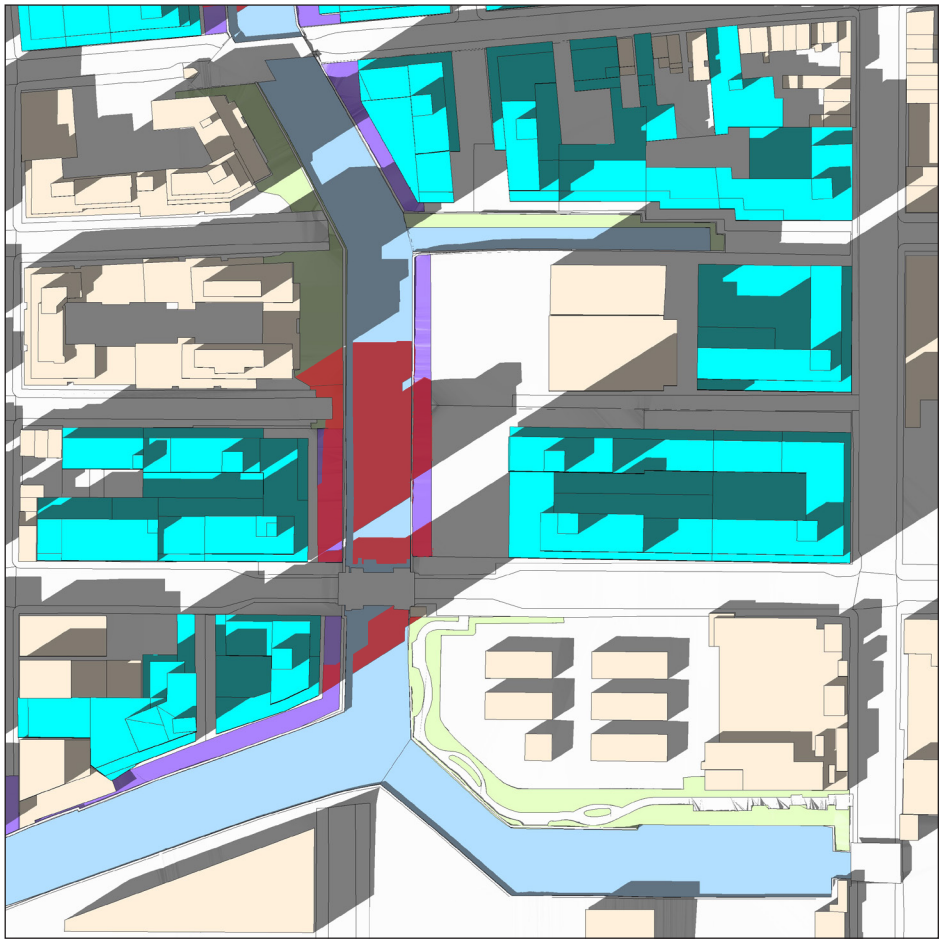

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

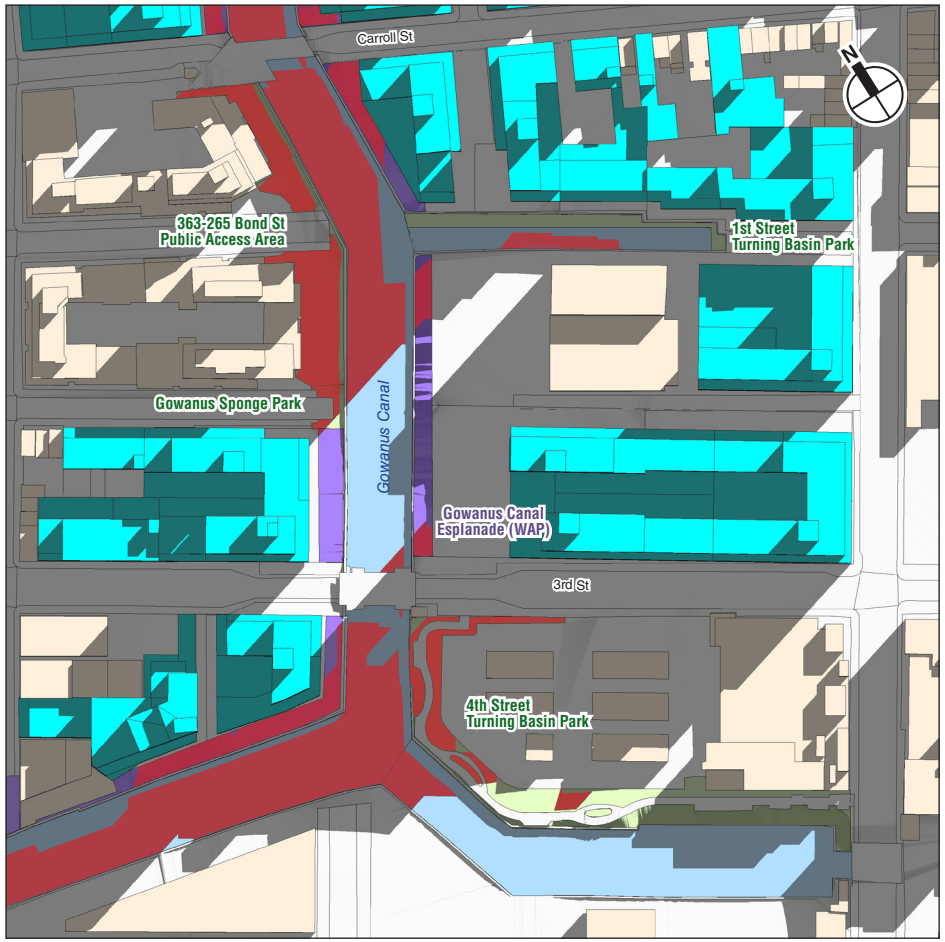
Projected and Potential Development Sites Requiring Shadow Analysis

May 6 / August 6

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-36

1.14.21



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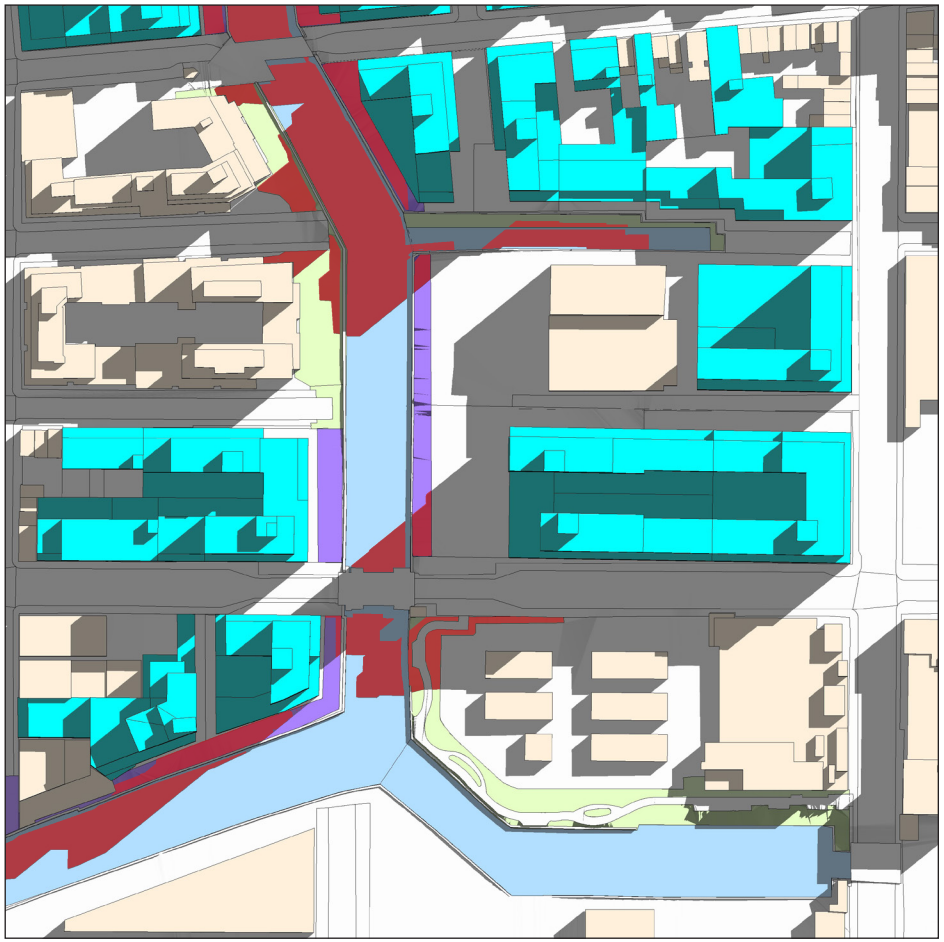

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

June 21

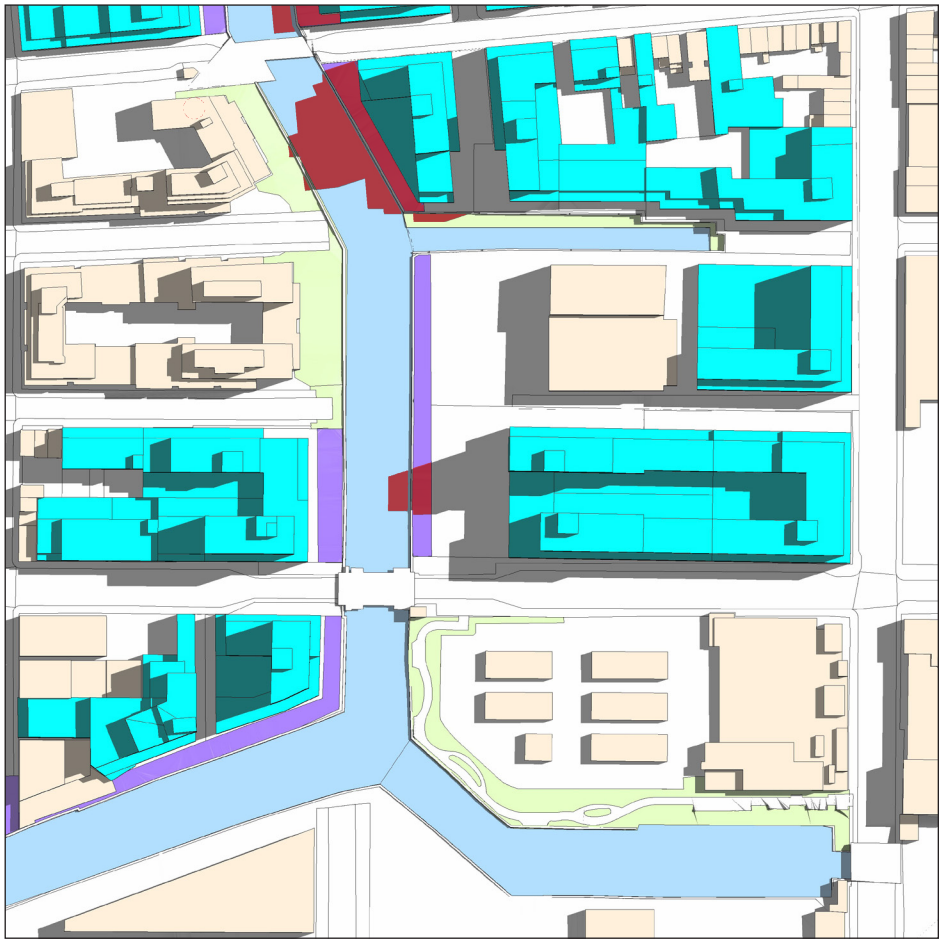
GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-37

1.14.21



8:15 AM



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Publicly Accessible Open Space

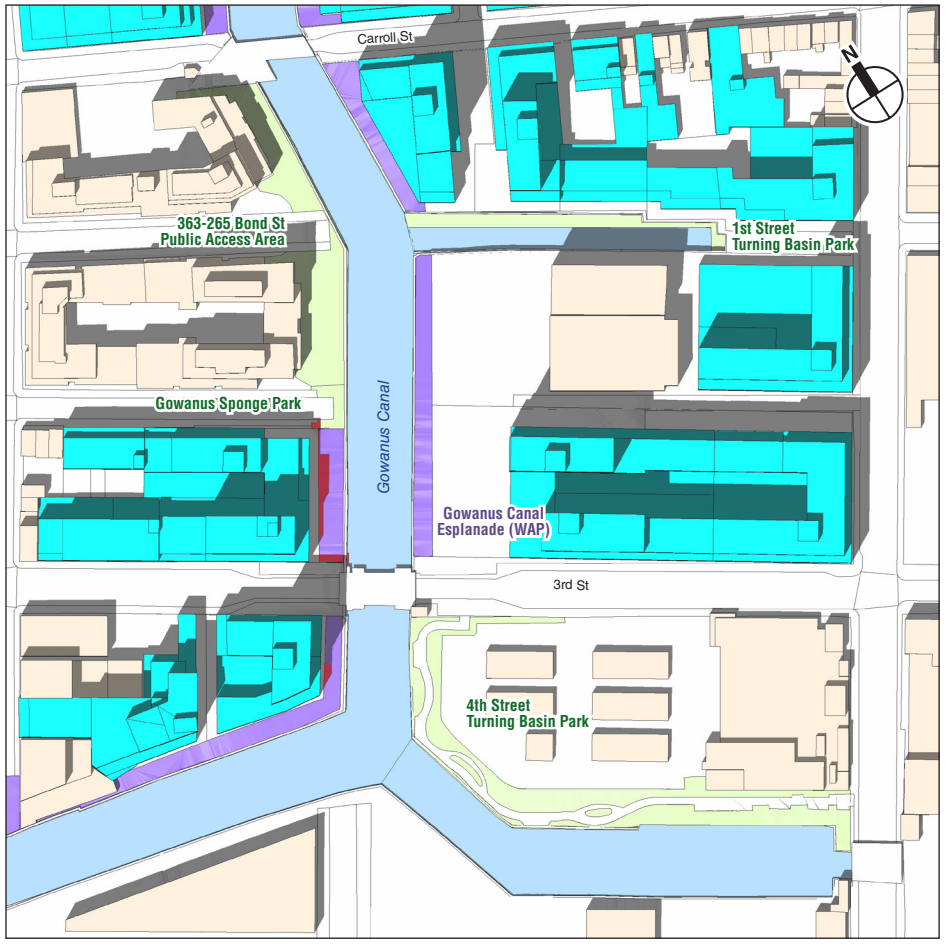
Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

June 21

1.14.21



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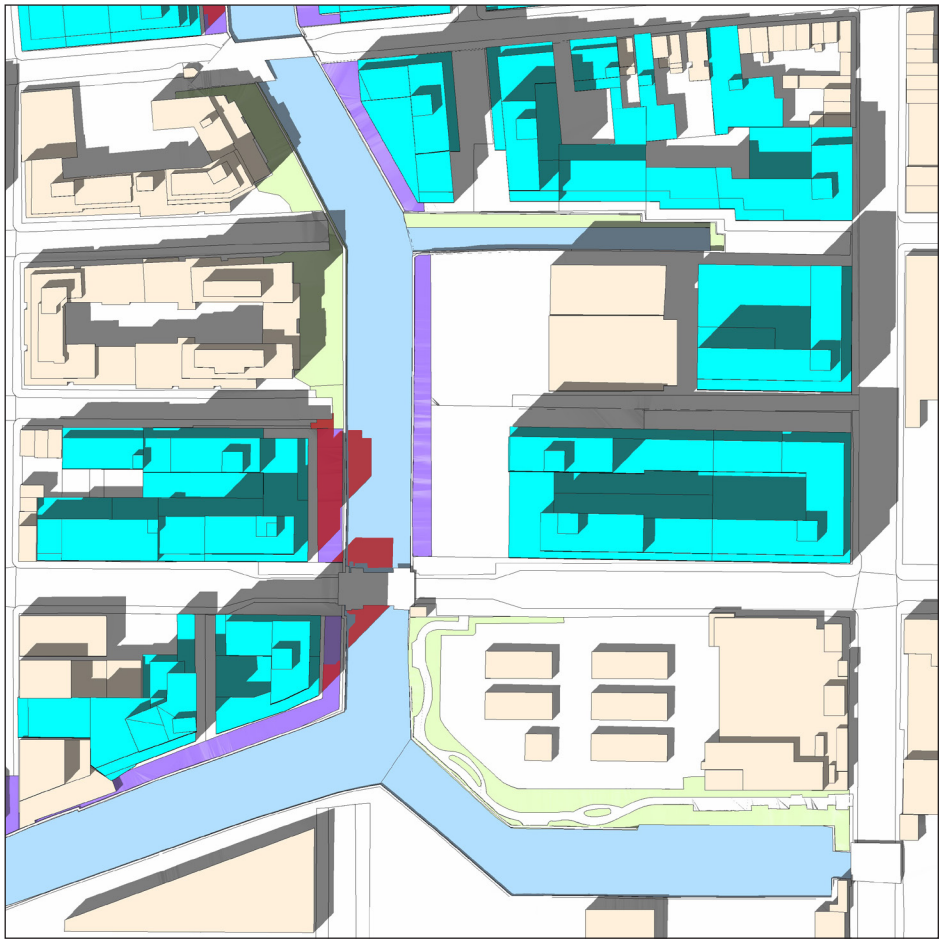

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Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

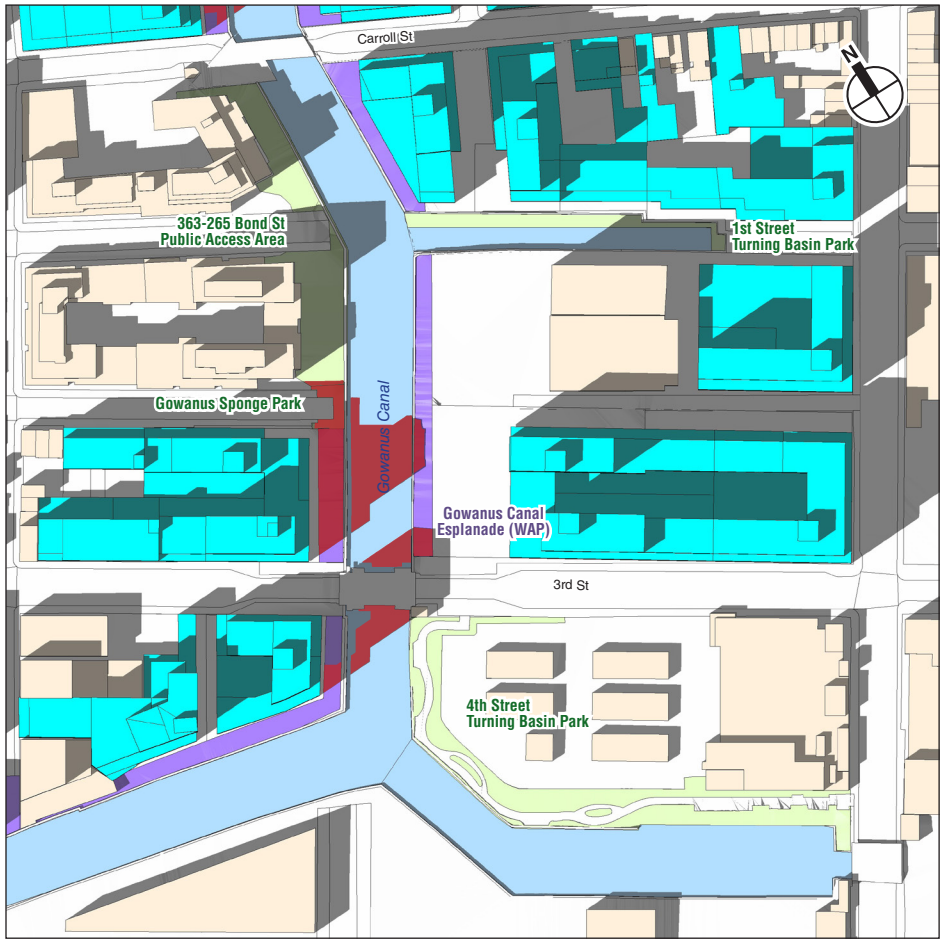
Projected and Potential Development Sites Requiring Shadow Analysis

June 21

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-39

1.14.21



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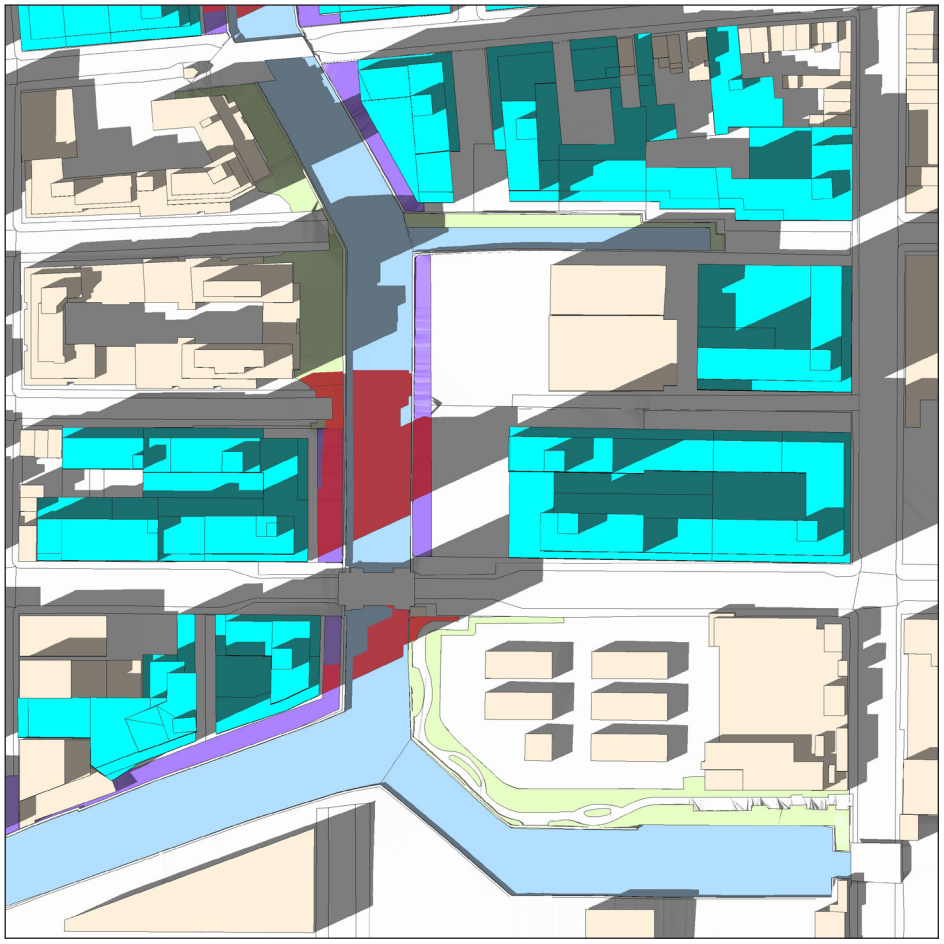

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Publicly Accessible Open Space

Project-Generated Open Space

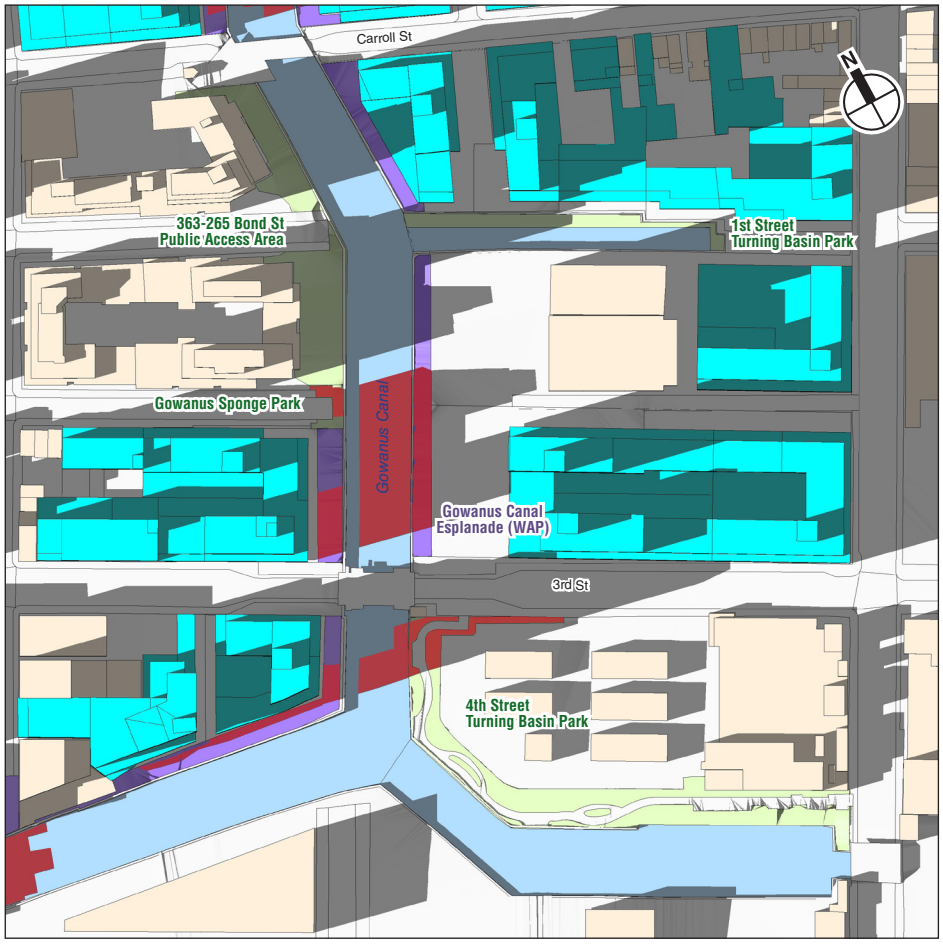
Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

June 21

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-40



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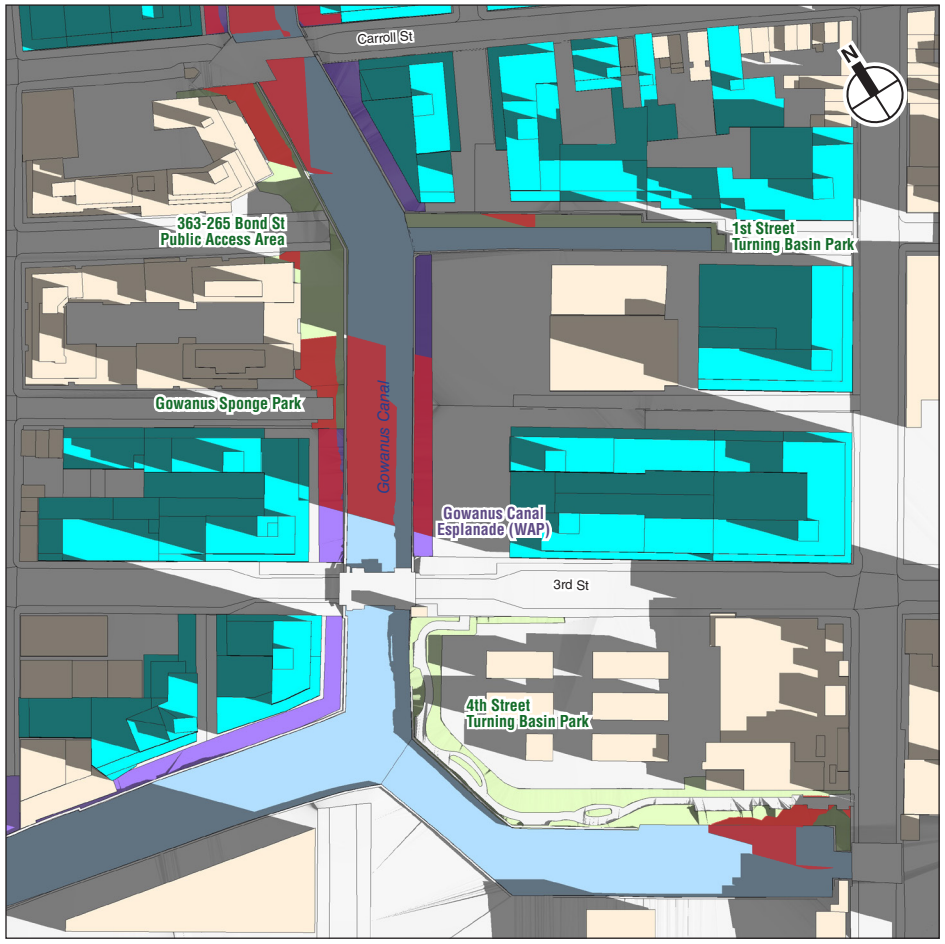
Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

1.14.21



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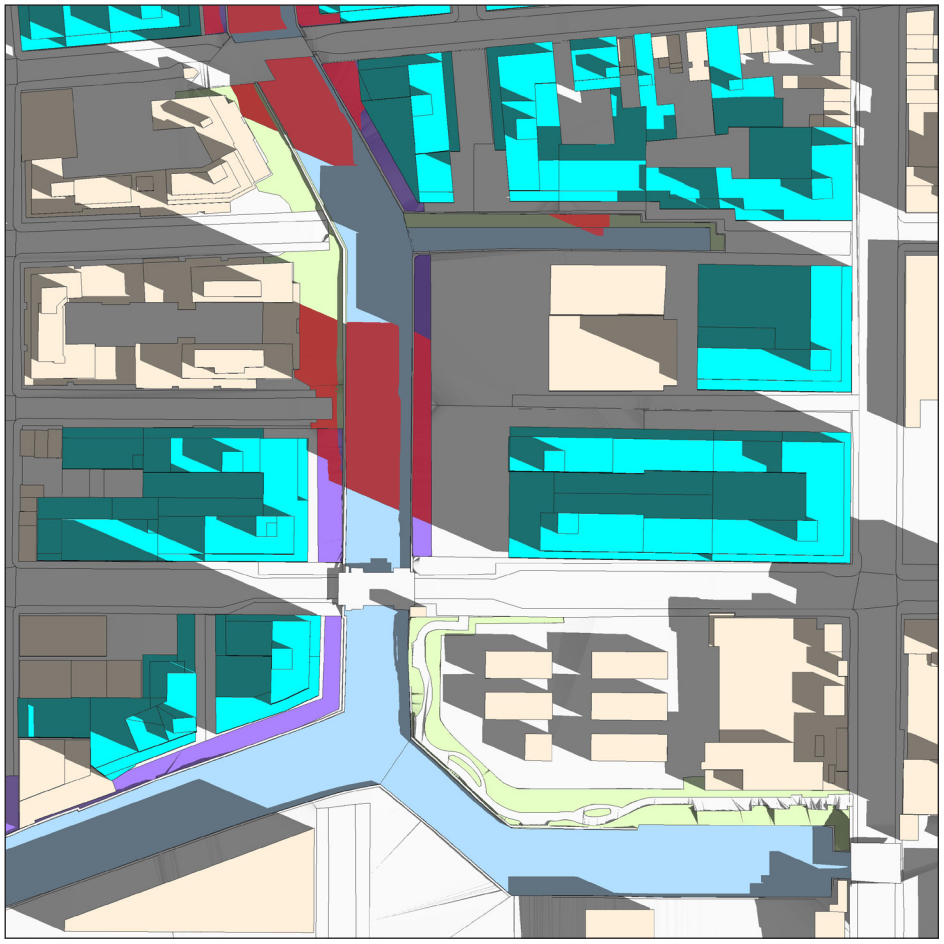


9:30 AM

Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

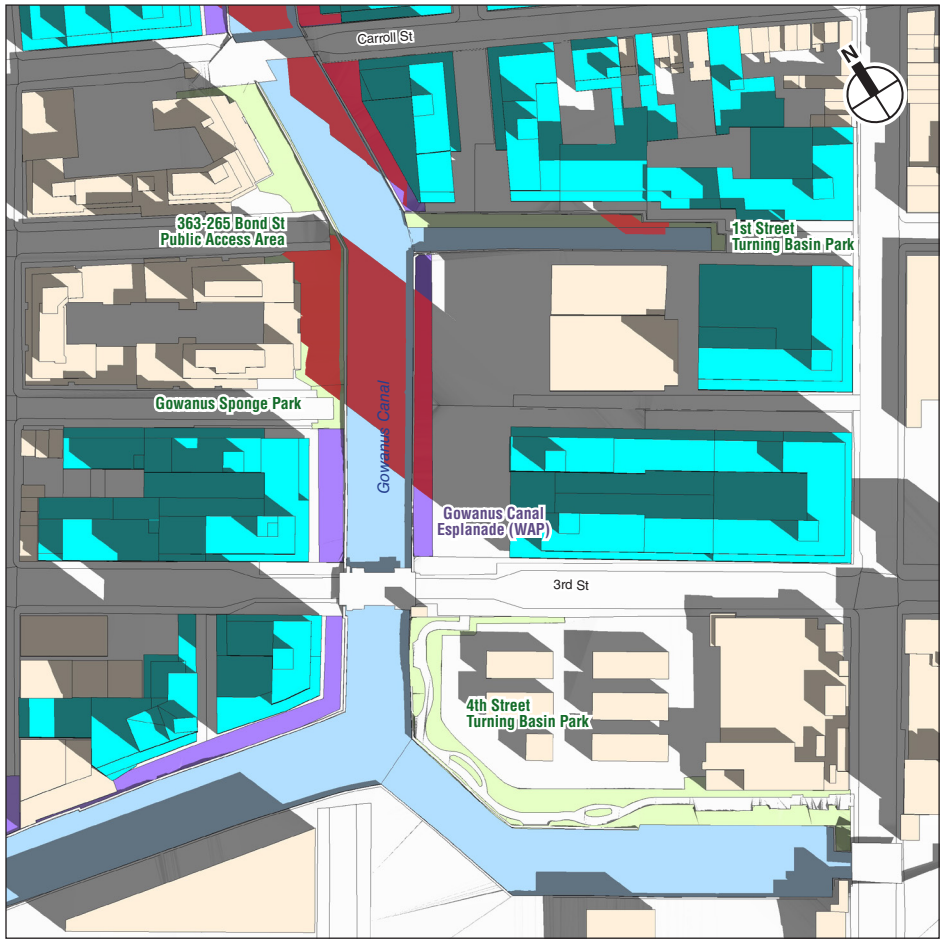
Projected and Potential Development Sites Requiring Shadow Analysis

December 21

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-42

1.14.21



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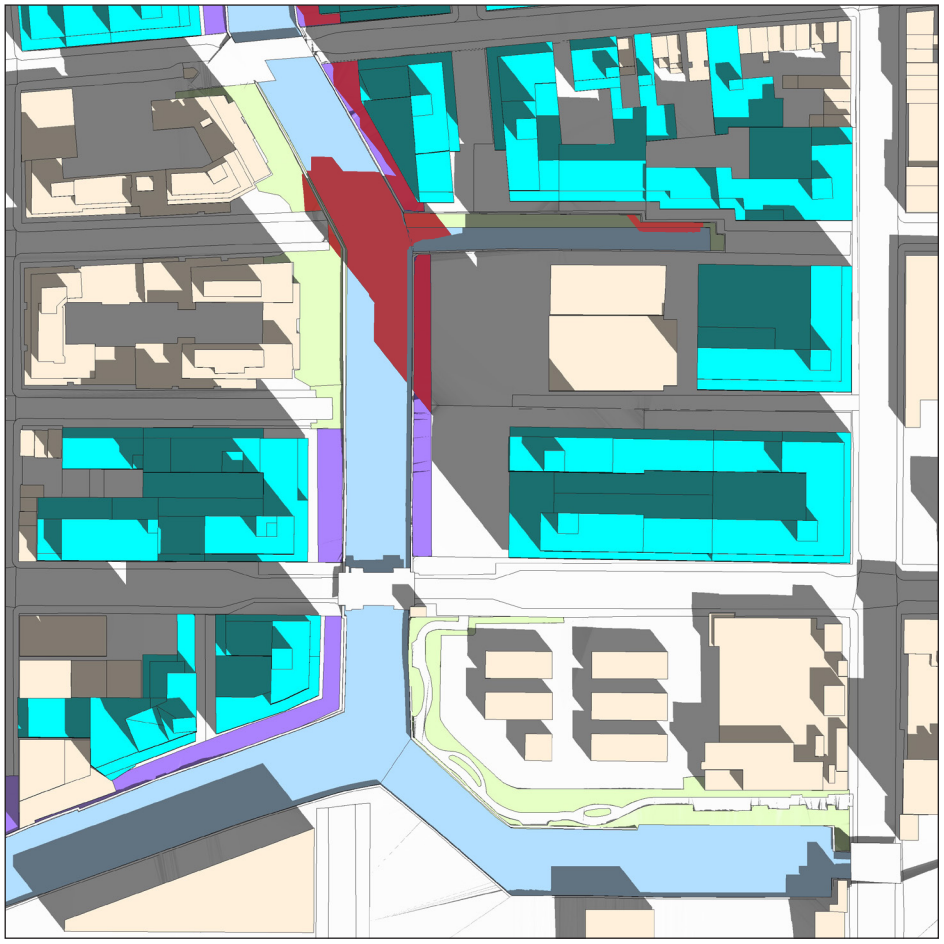


11:30 AM

Publicly Accessible Open Space

Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

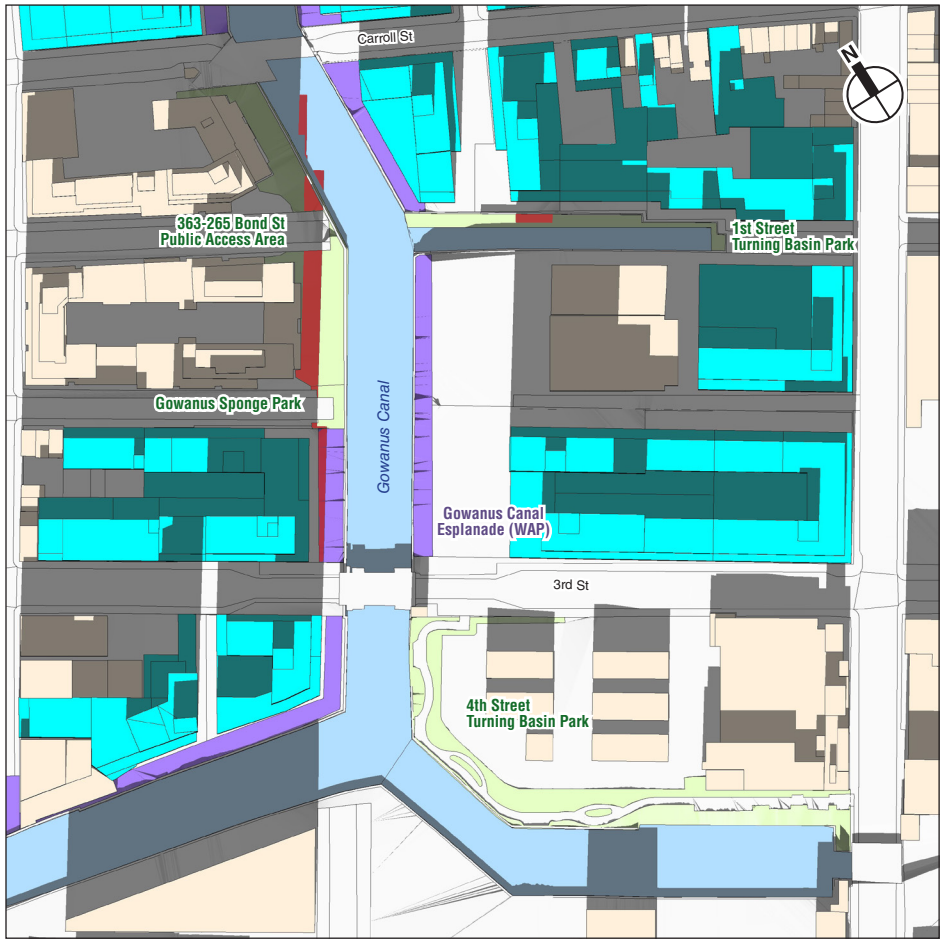
Projected and Potential Development Sites Requiring Shadow Analysis

December 21

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-43

1.14.21



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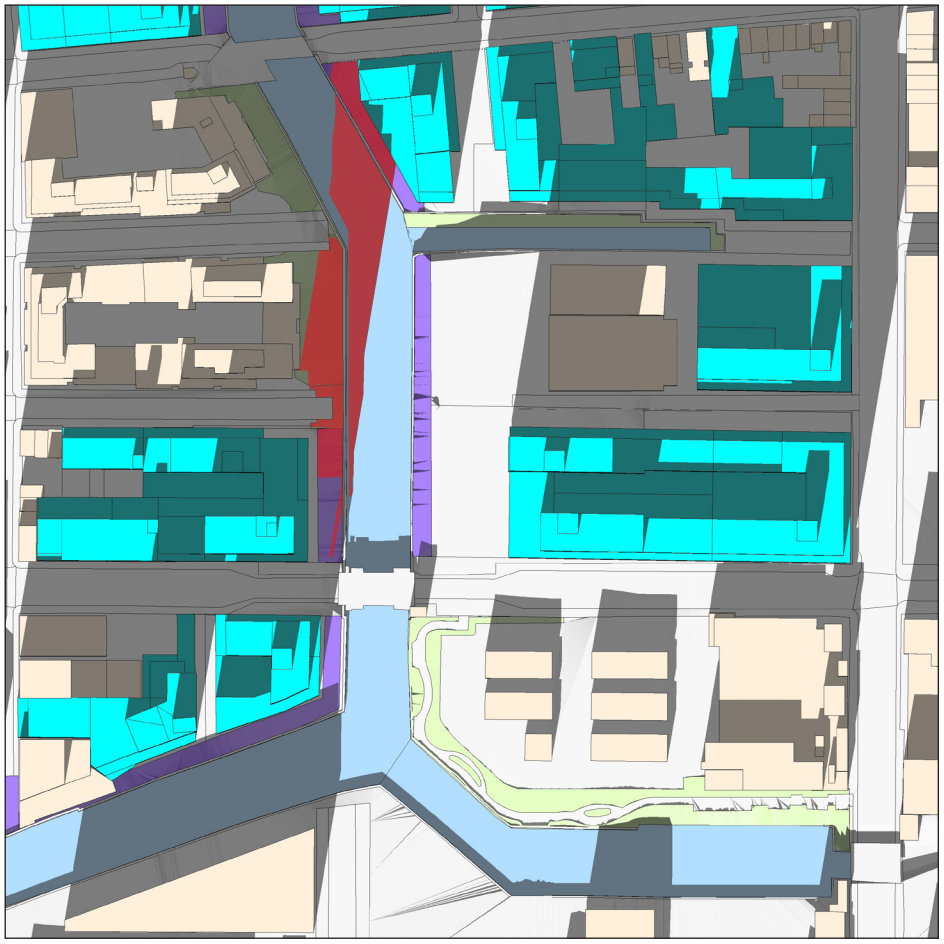

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Publicly Accessible Open Space

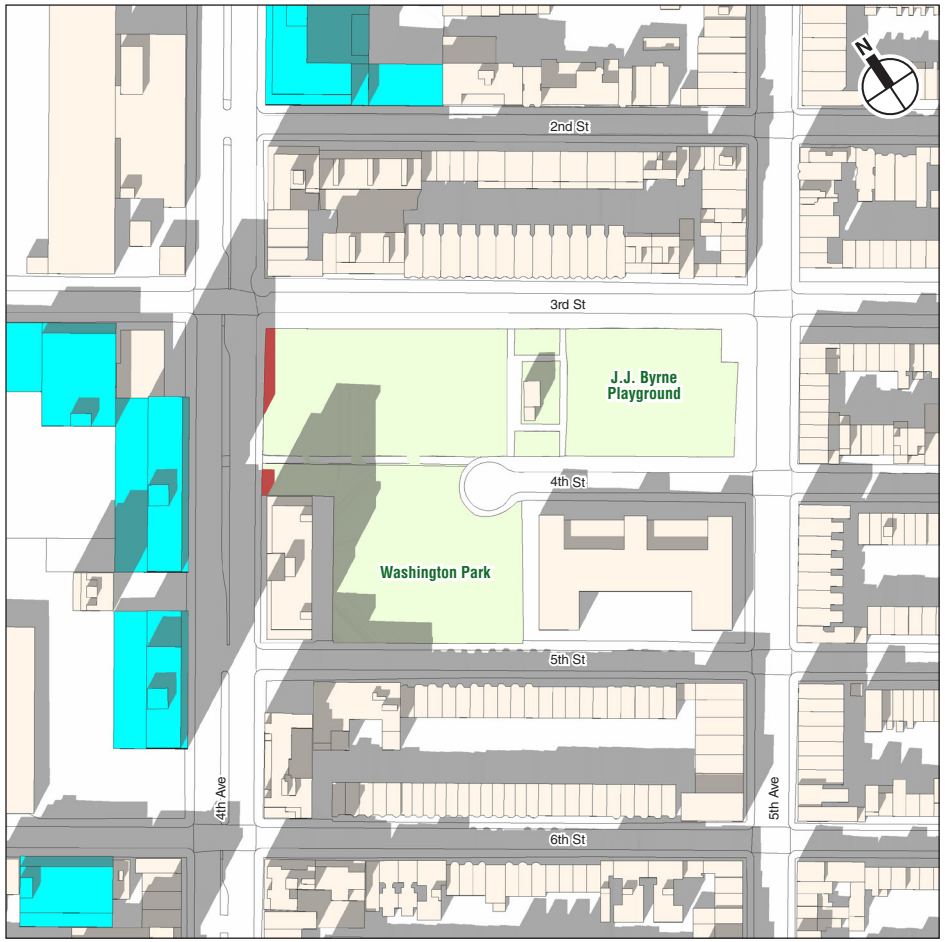
Project-Generated Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

December 21

1.14.21



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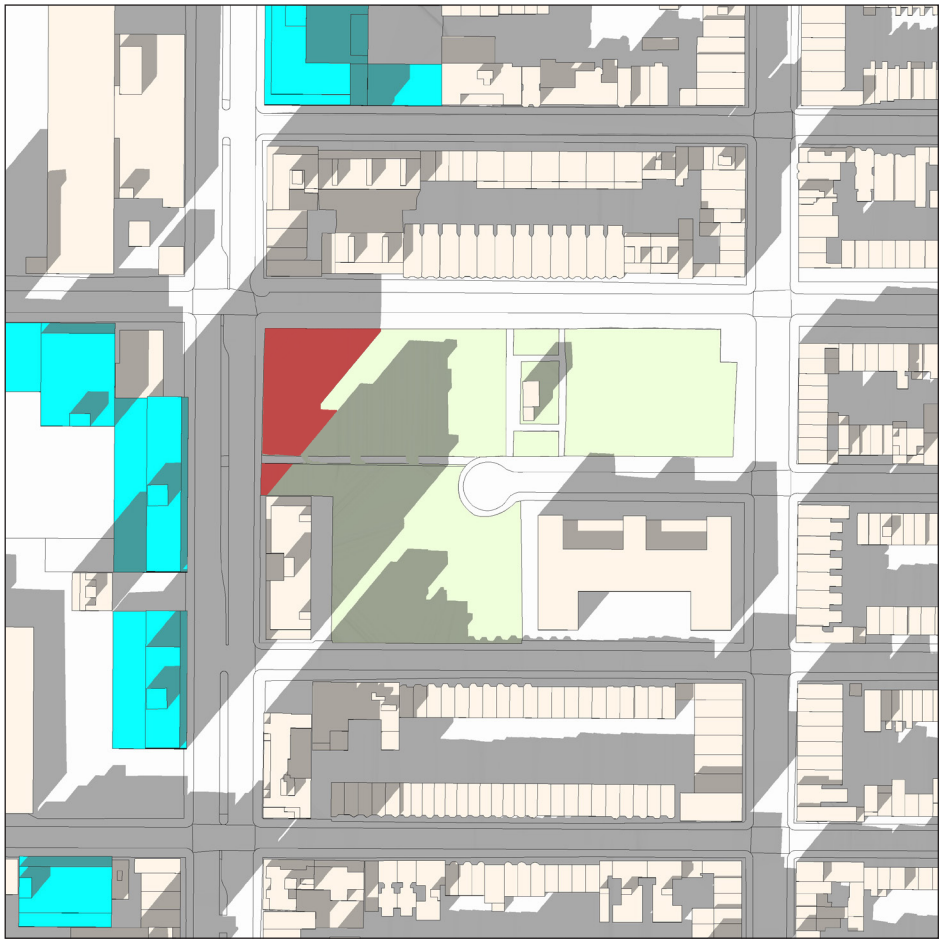

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

March 21 / September 21

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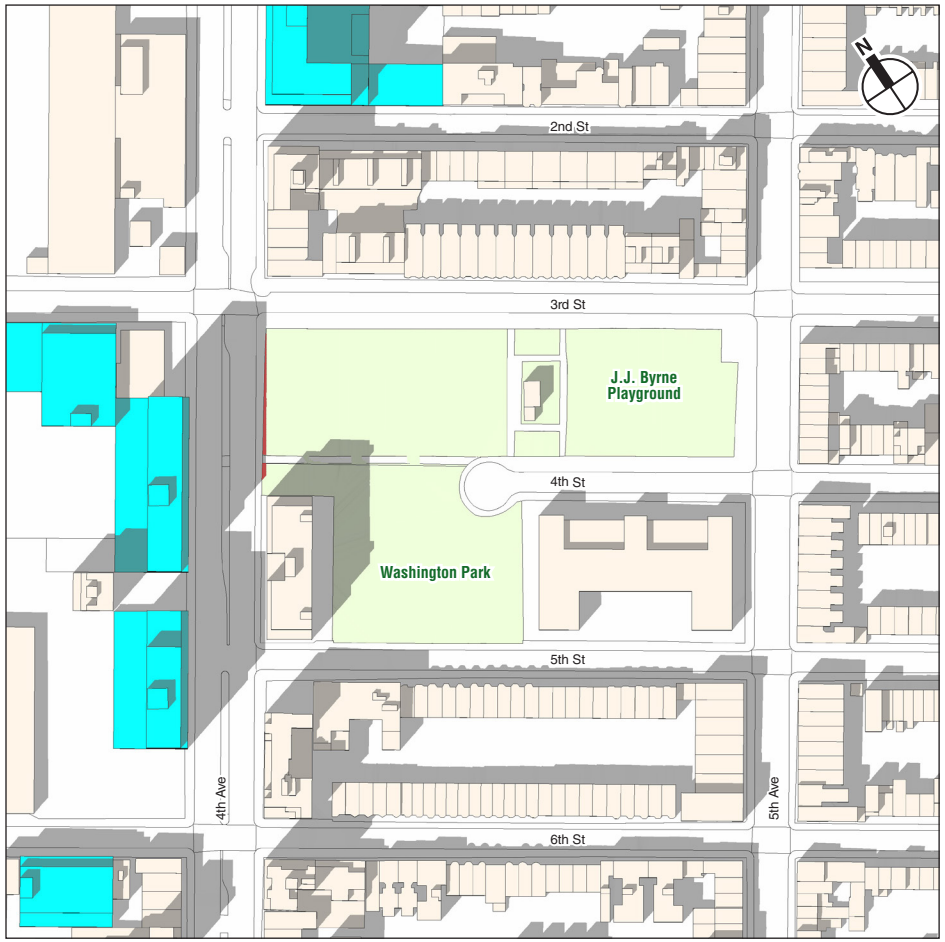

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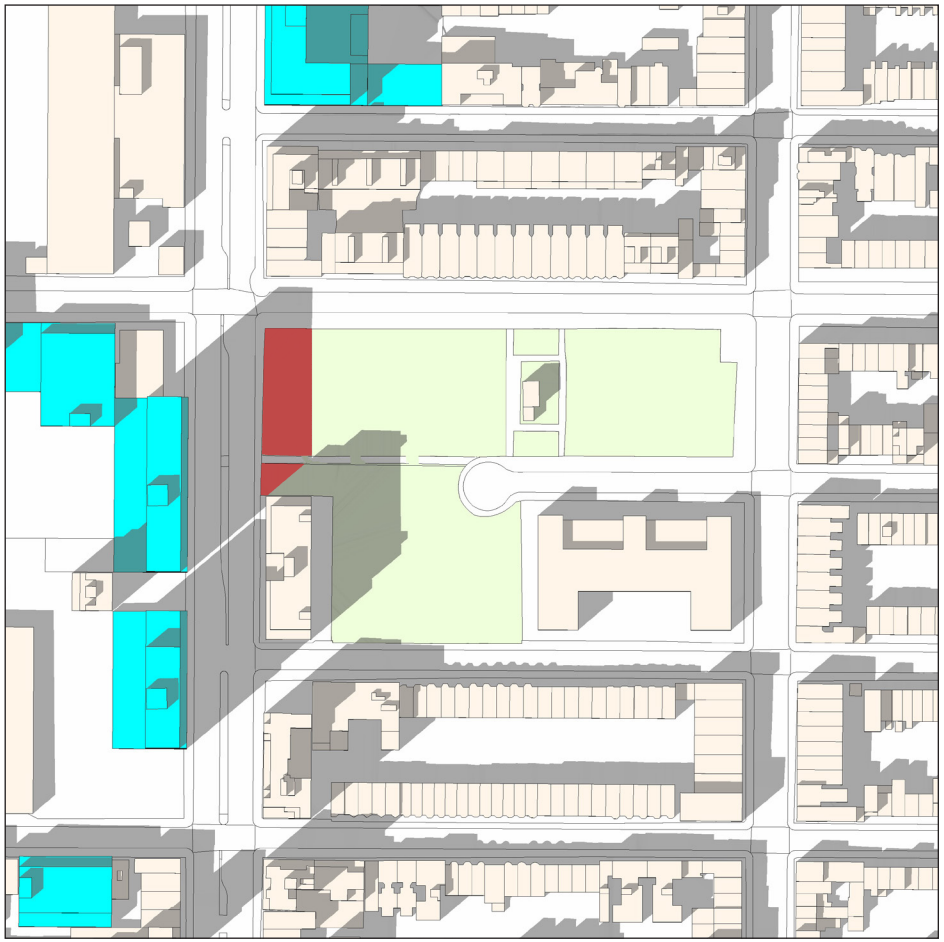

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Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

May 6 / August 6

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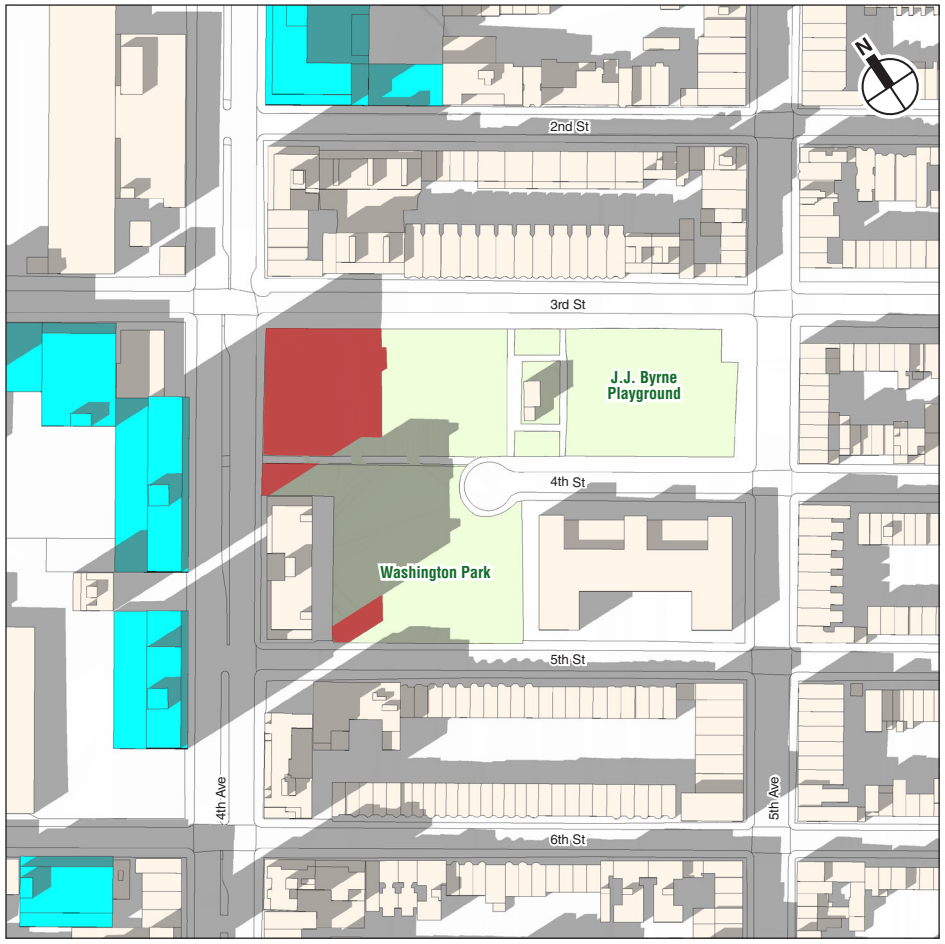

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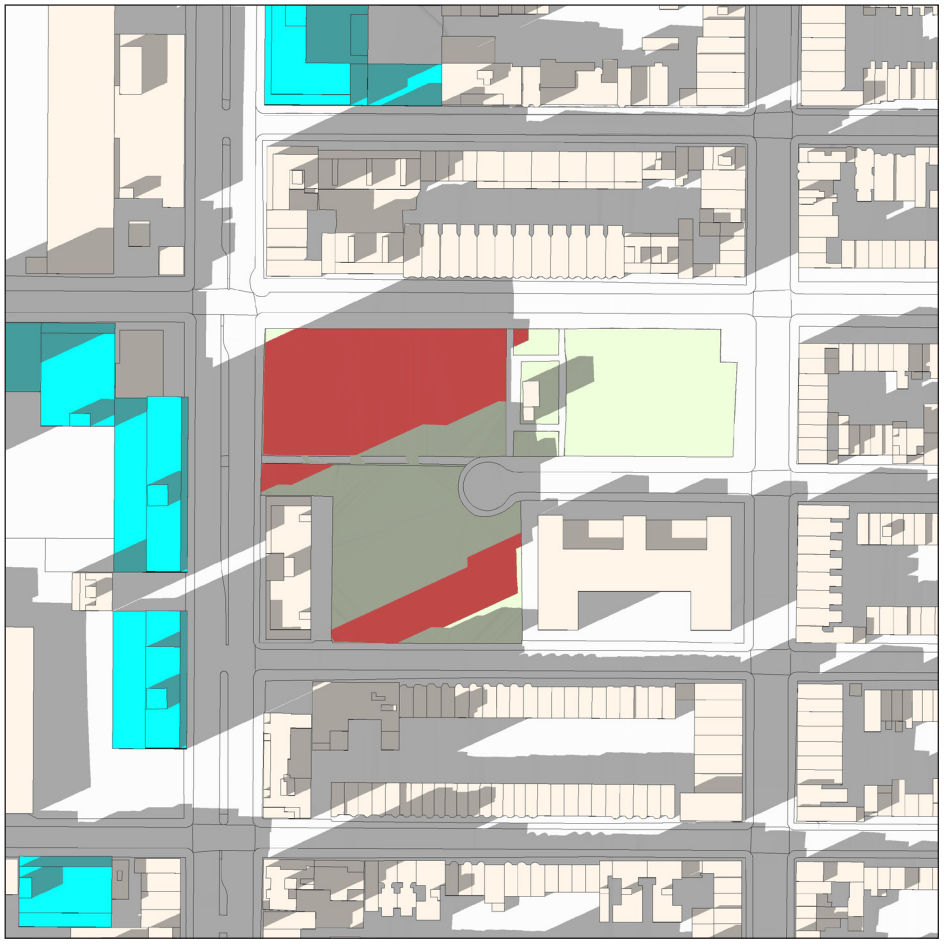

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Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

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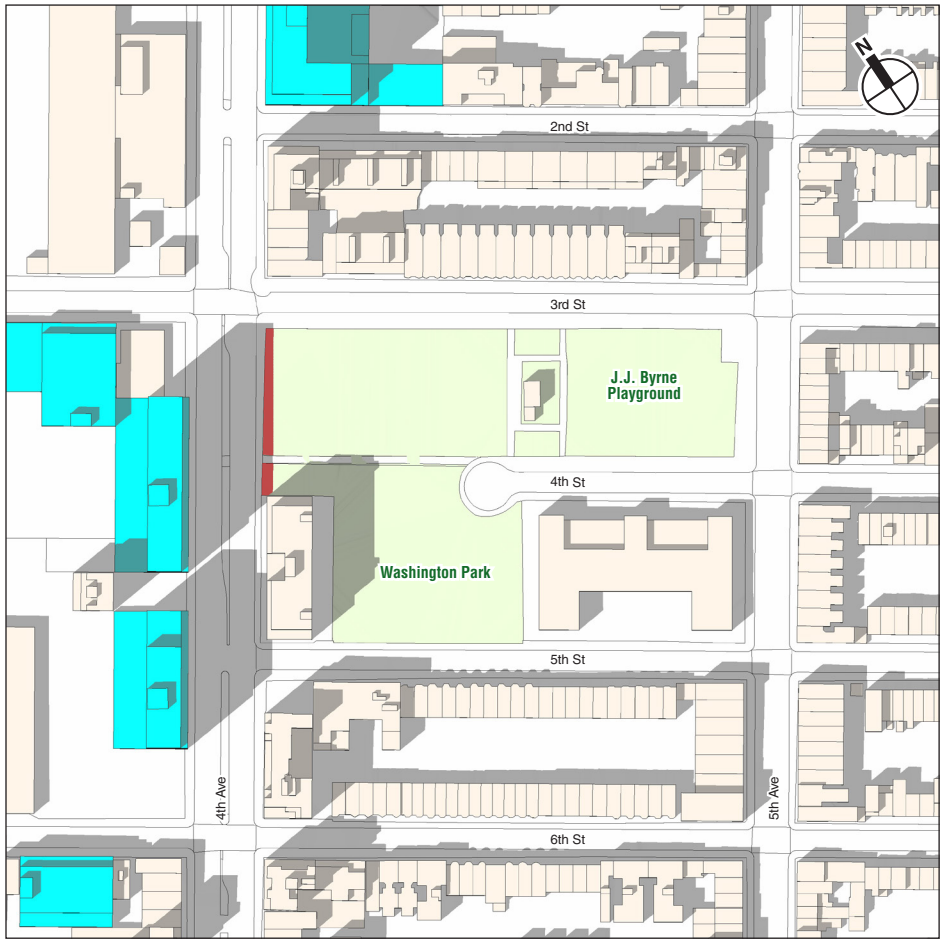

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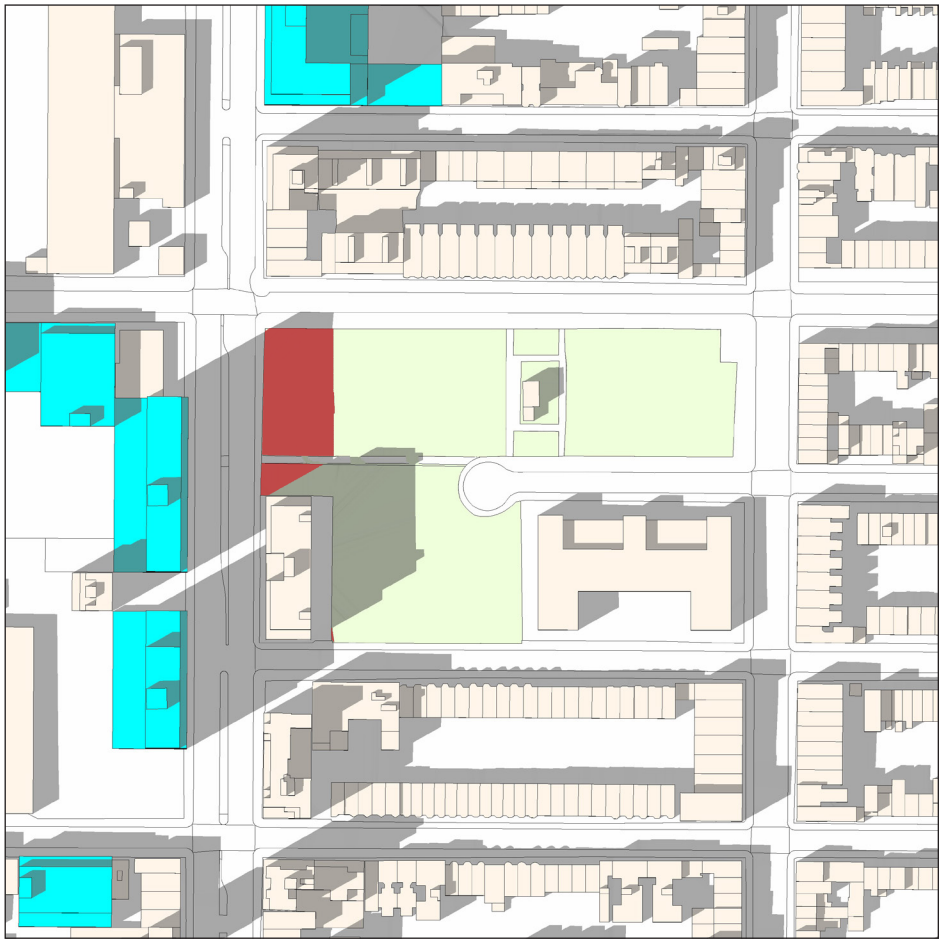

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Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

June 21

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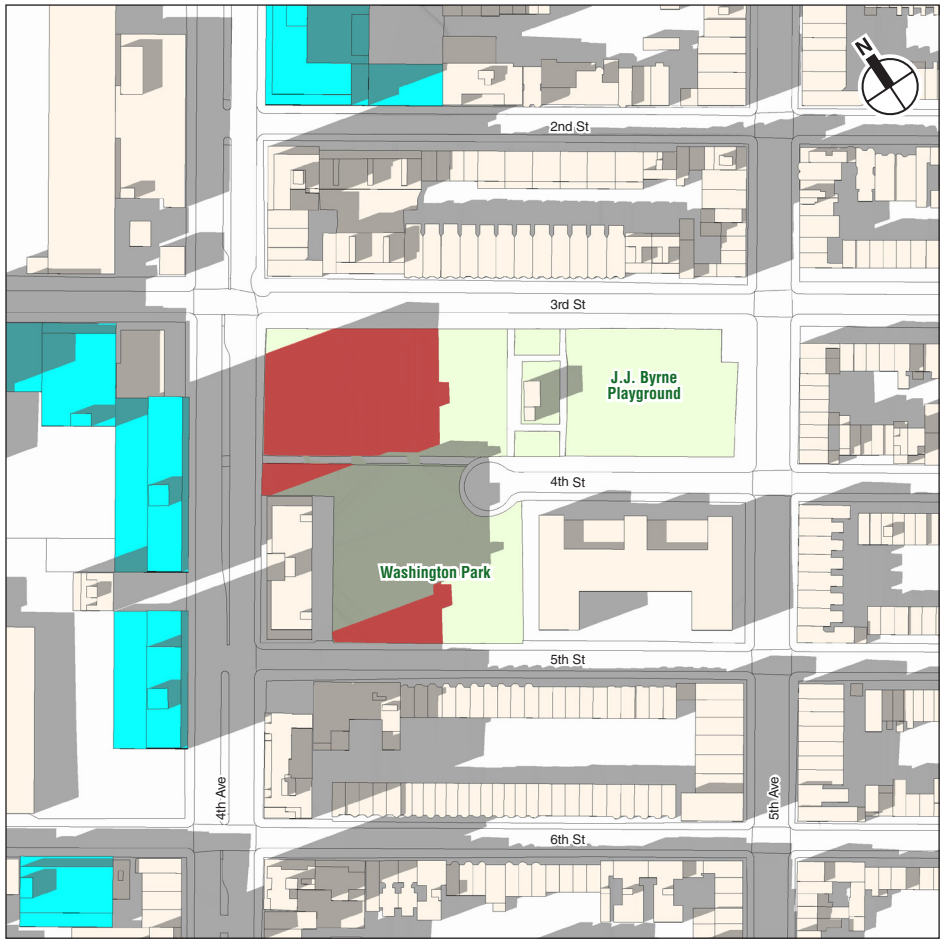

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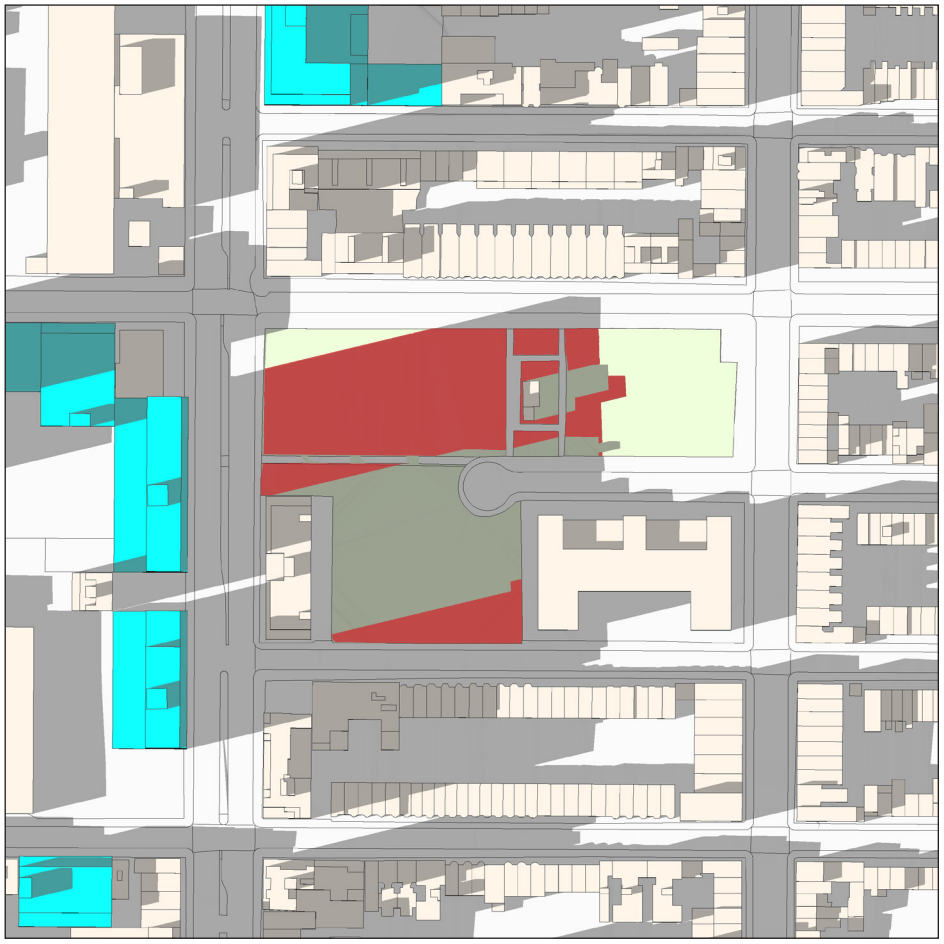

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Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

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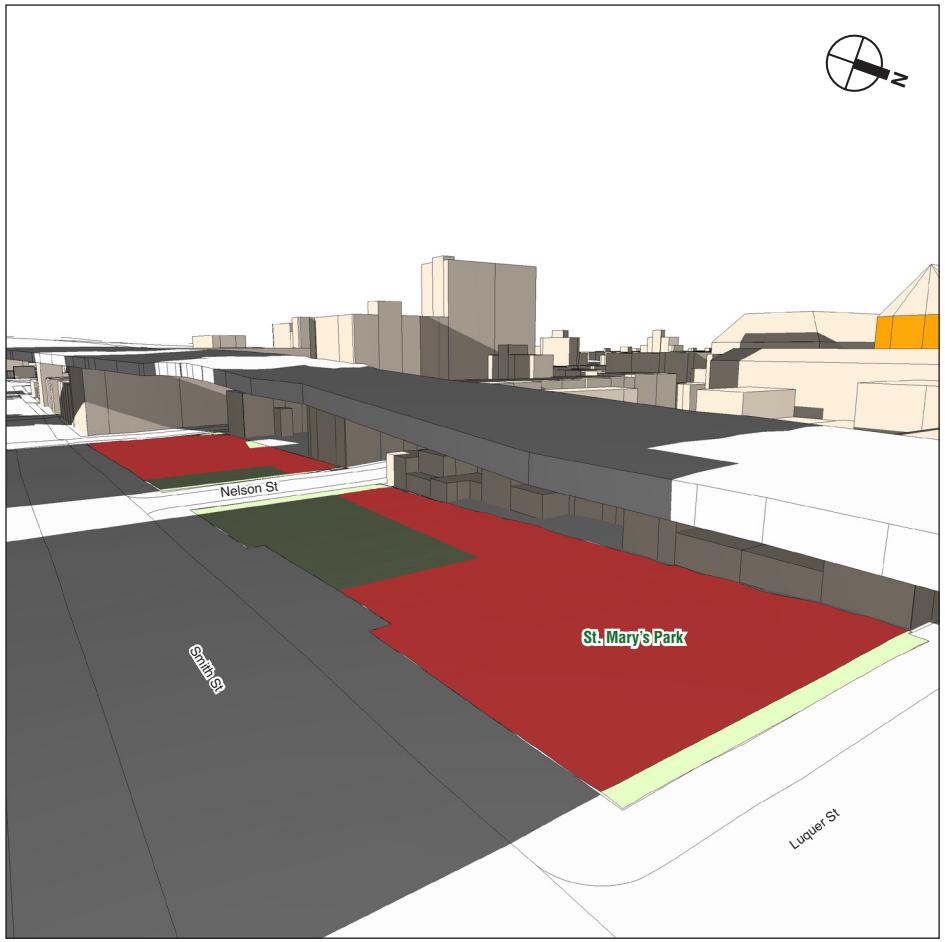

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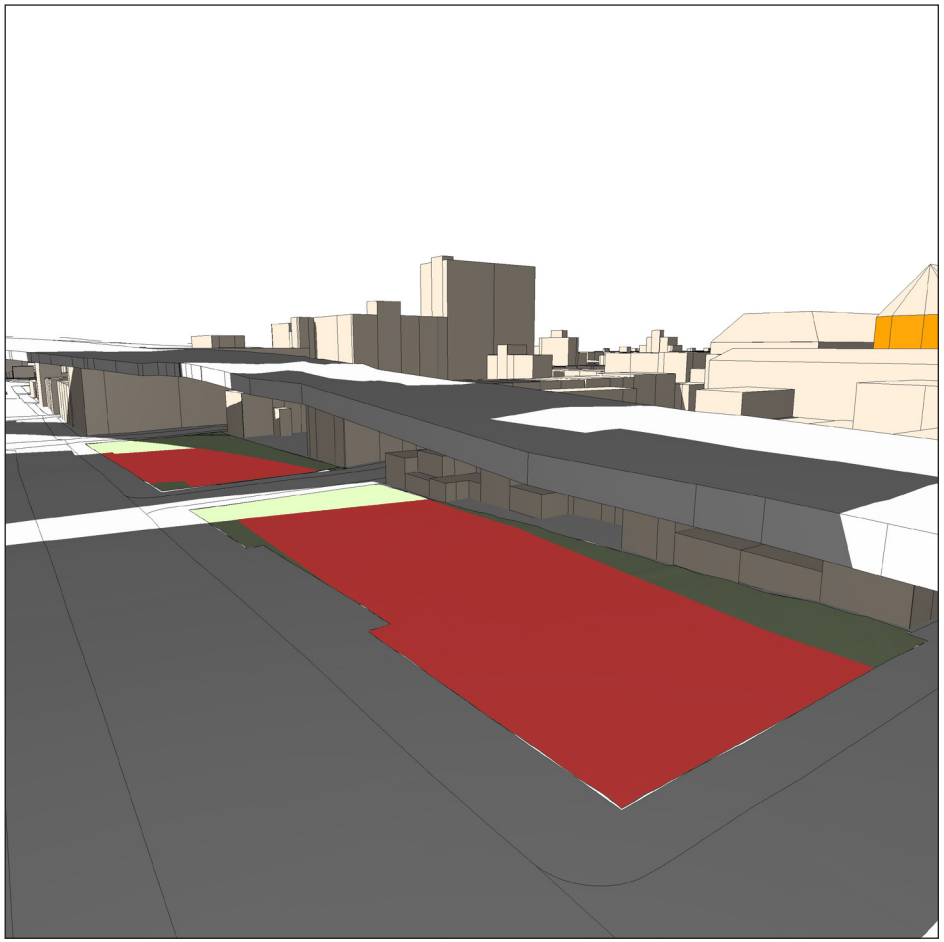

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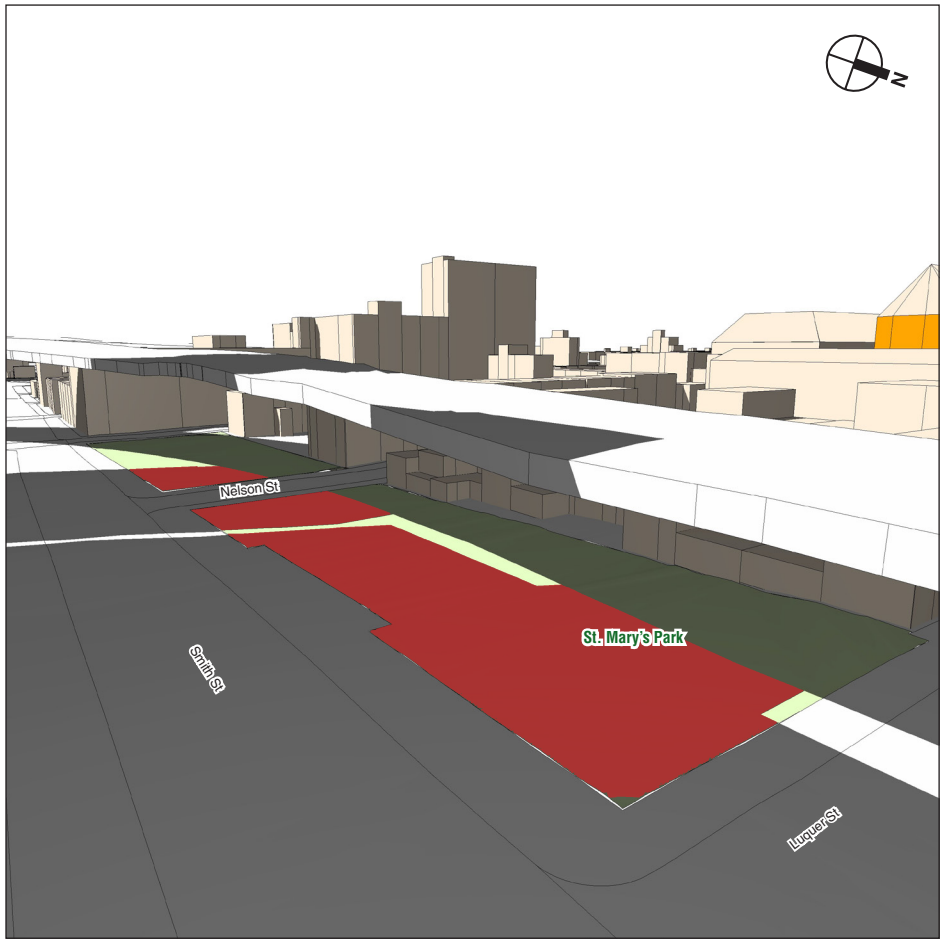
Incremental Shadow on Sunlight-Sensitive Resource

Historic Resources with Sunlight-Sensitive Features

March 21 / September 21

1.14.21



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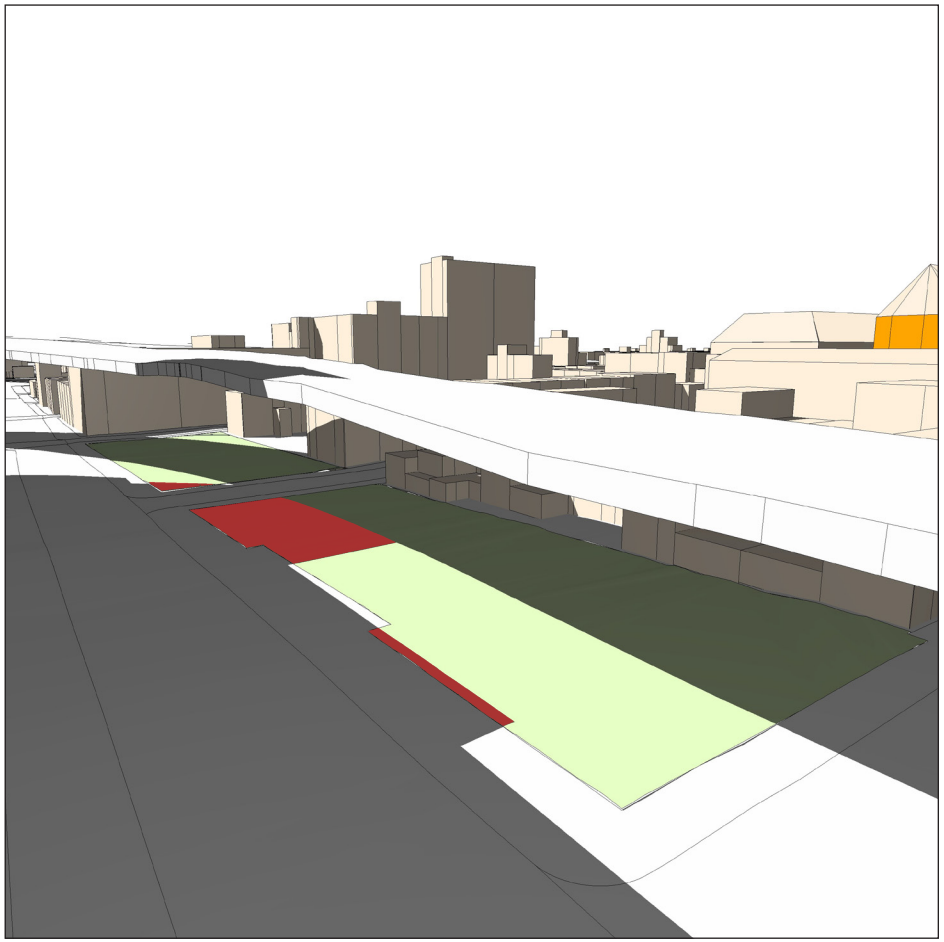

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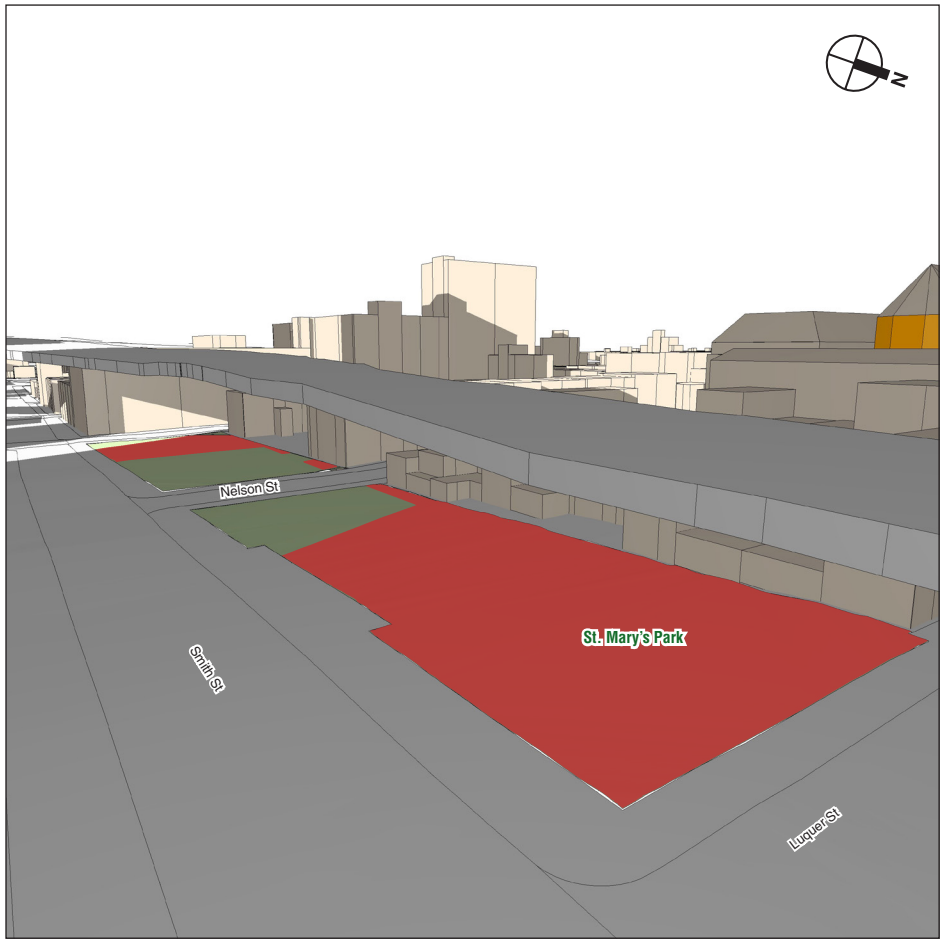
Incremental Shadow on Sunlight-Sensitive Resource

Historic Resources with Sunlight-Sensitive Features

March 21 / September 21

1.14.21



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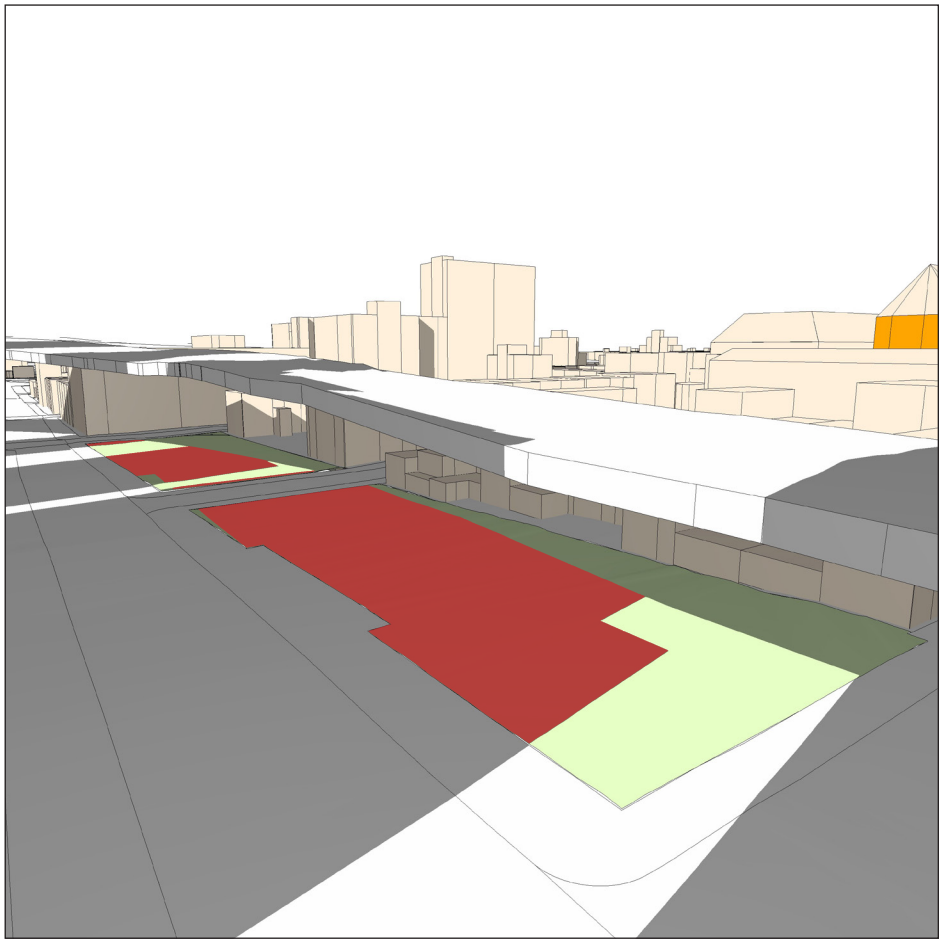

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Incremental Shadow on Sunlight-Sensitive Resource

Historic Resources with Sunlight-Sensitive Features

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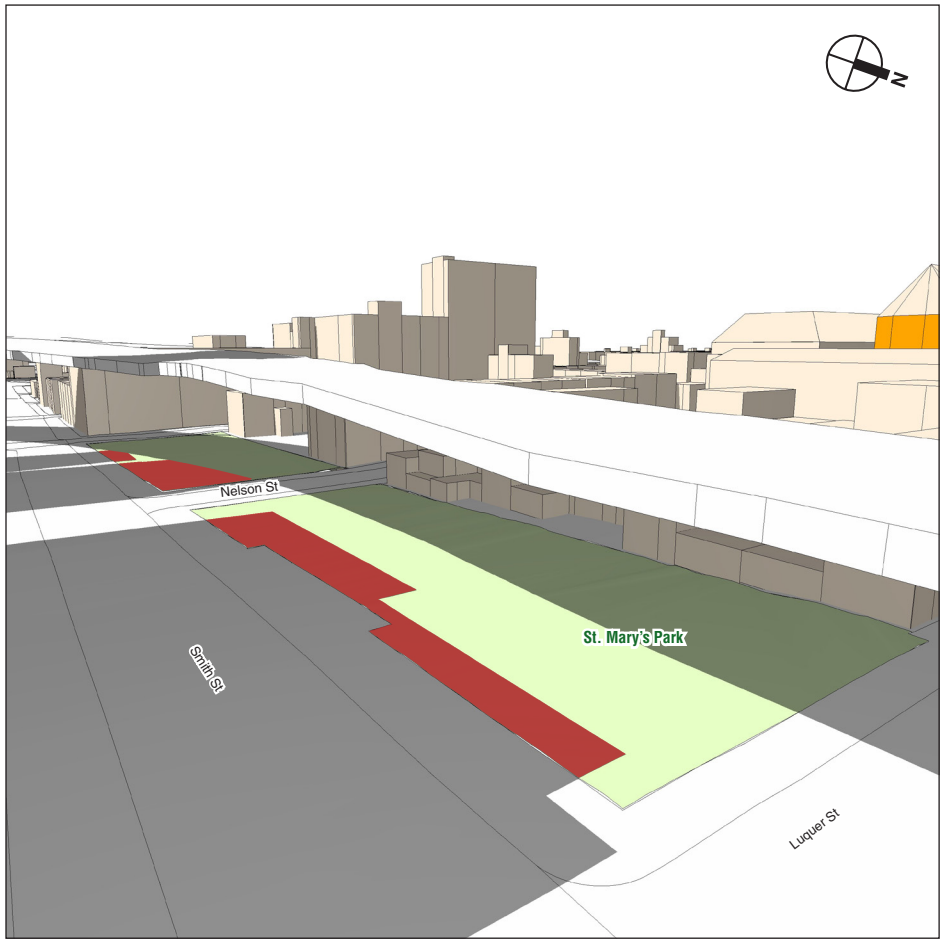

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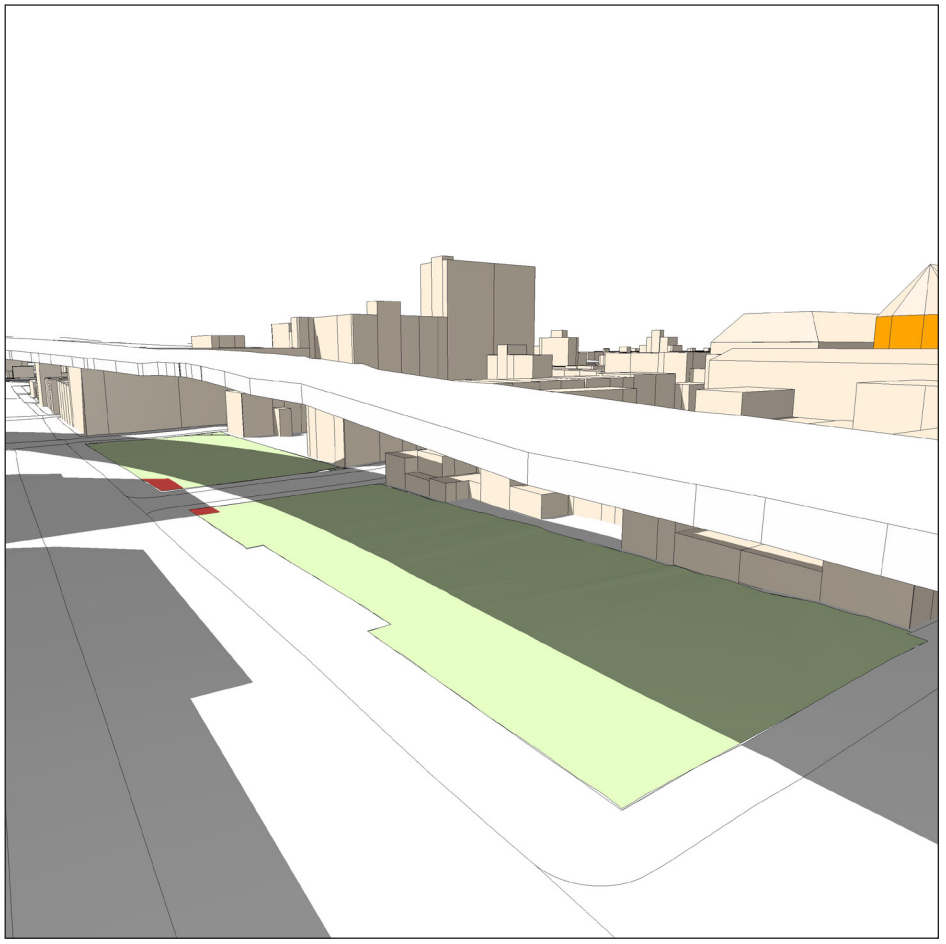

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Historic Resources with Sunlight-Sensitive Features

May 6 / August 6

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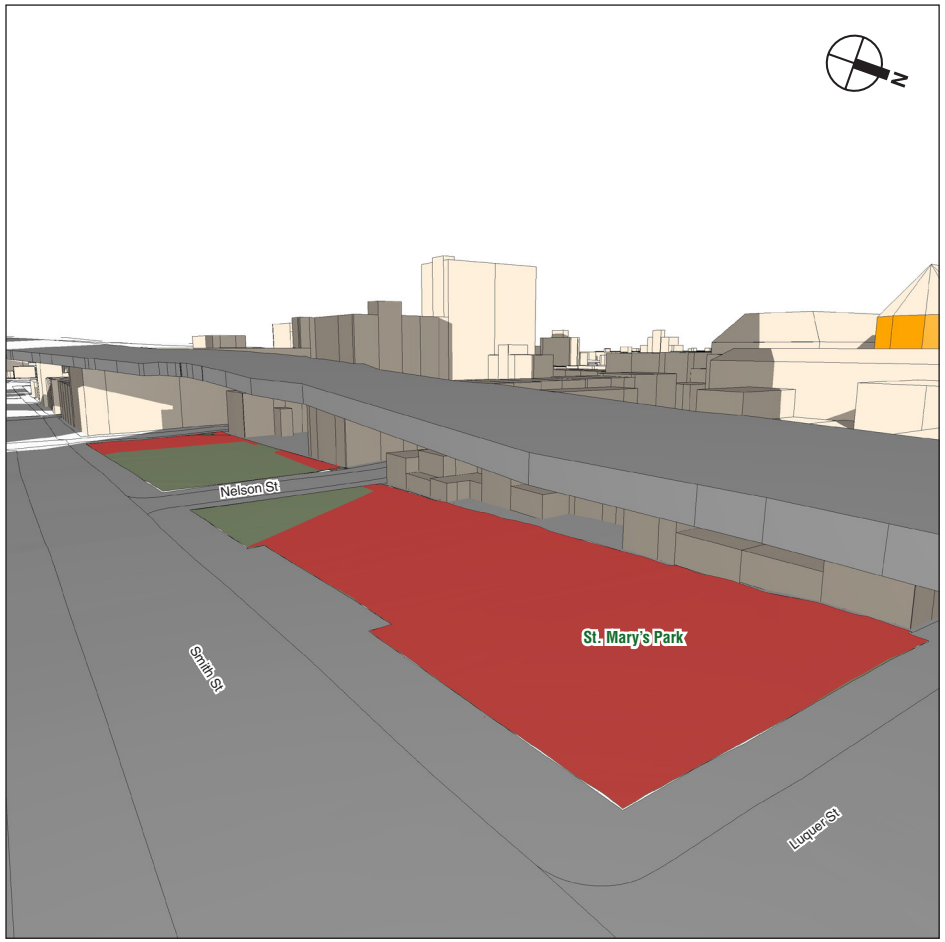

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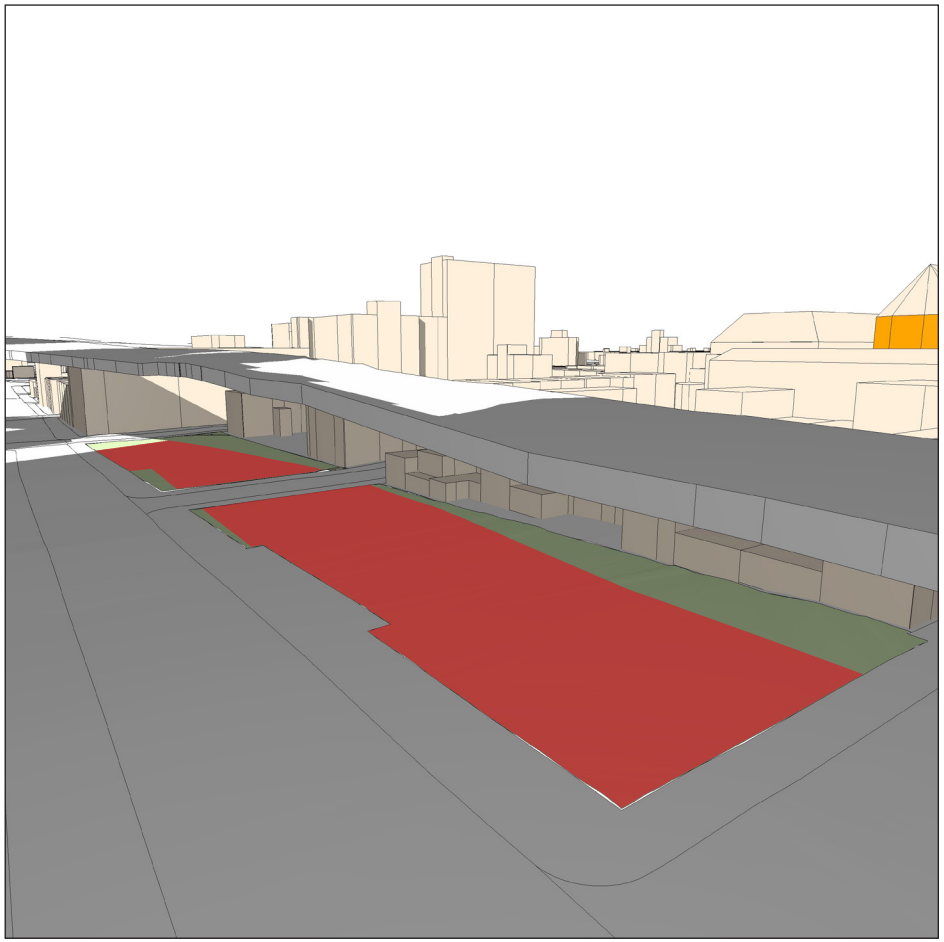

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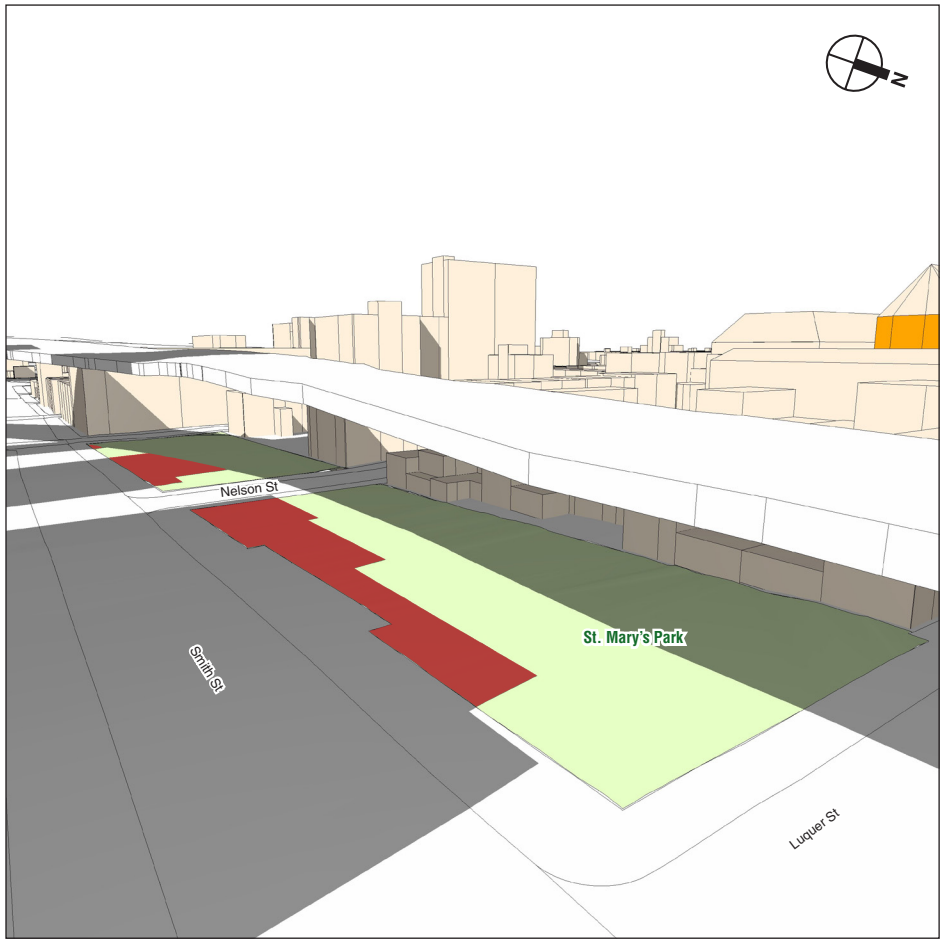
Incremental Shadow on Sunlight-Sensitive Resource

Historic Resources with Sunlight-Sensitive Features

1.14.21



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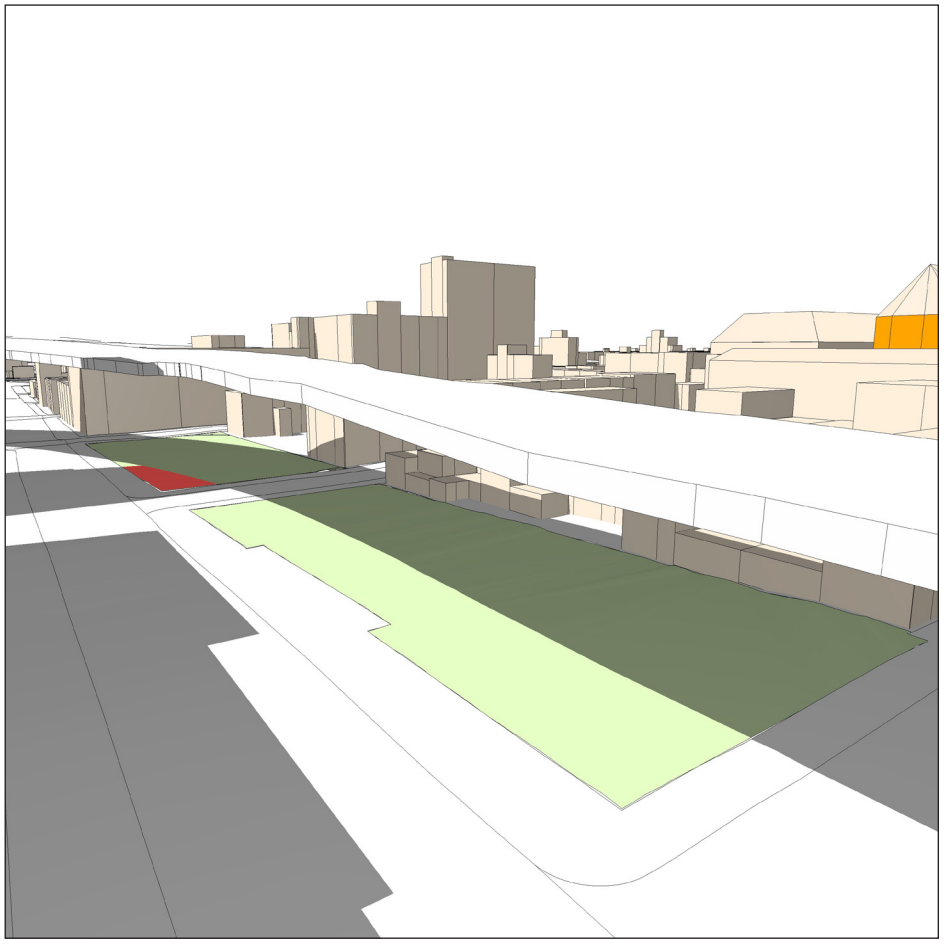

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Incremental Shadow on Sunlight-Sensitive Resource

Historic Resources with Sunlight-Sensitive Features

June 21

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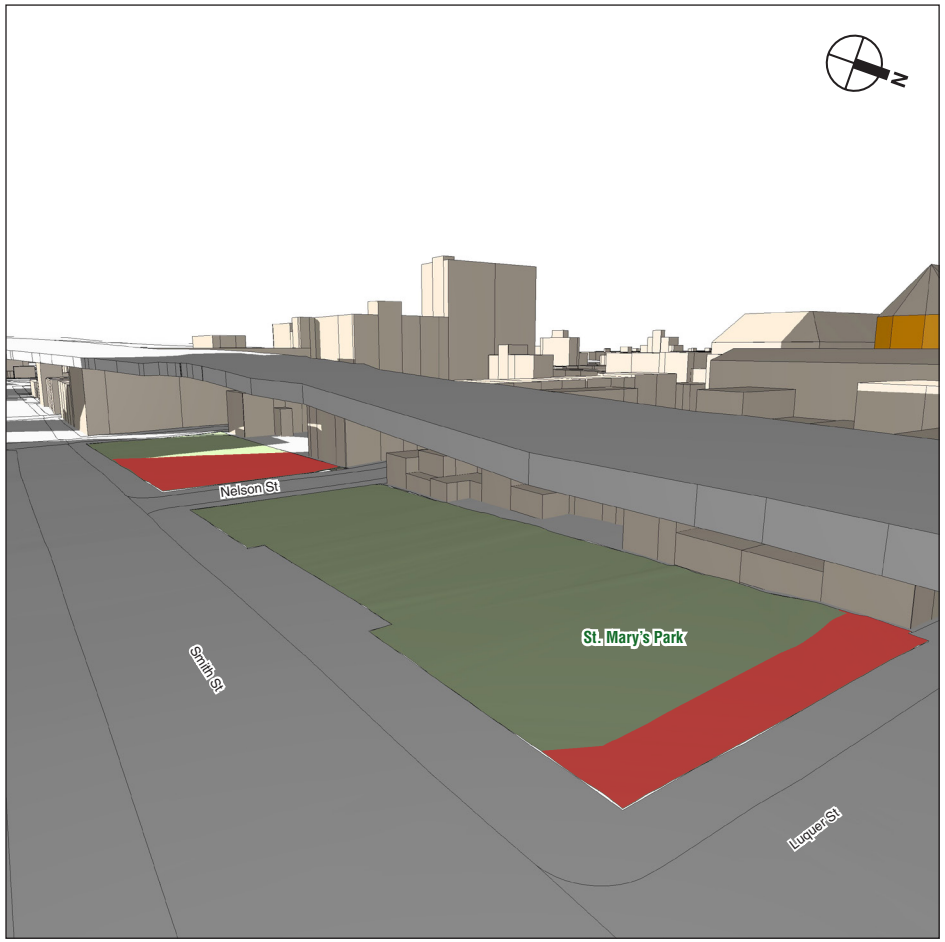

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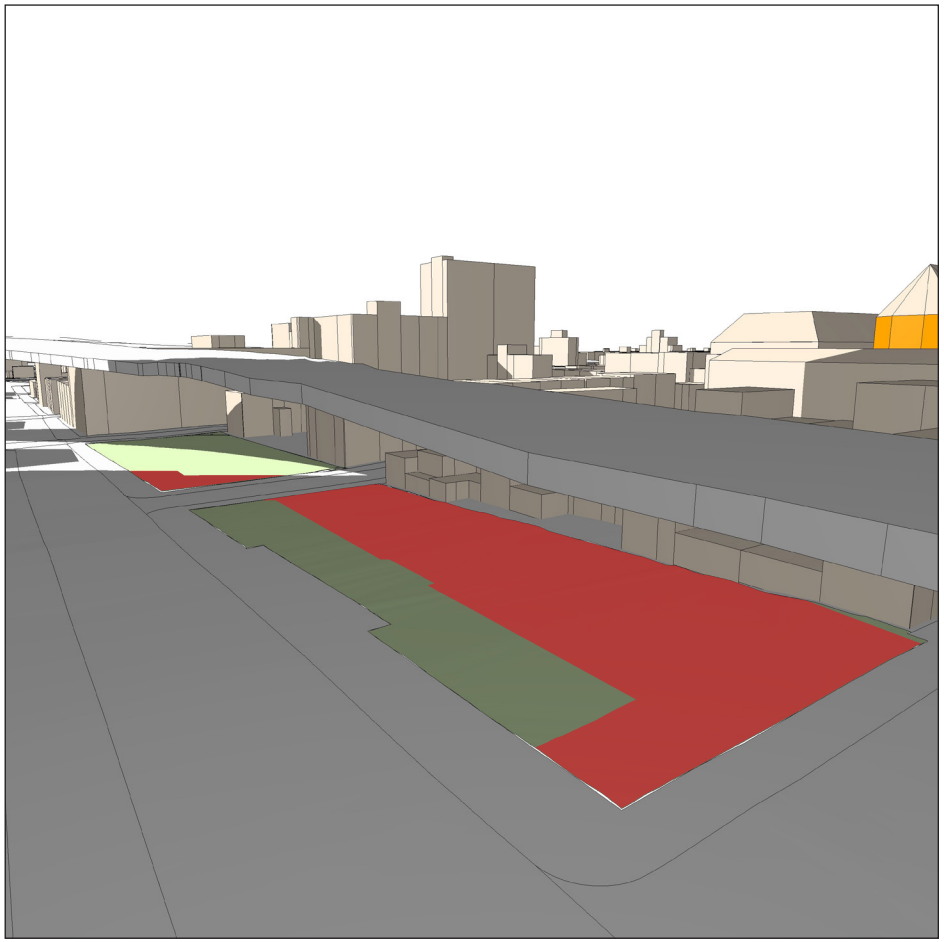

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Historic Resources with Sunlight-Sensitive Features

December 21

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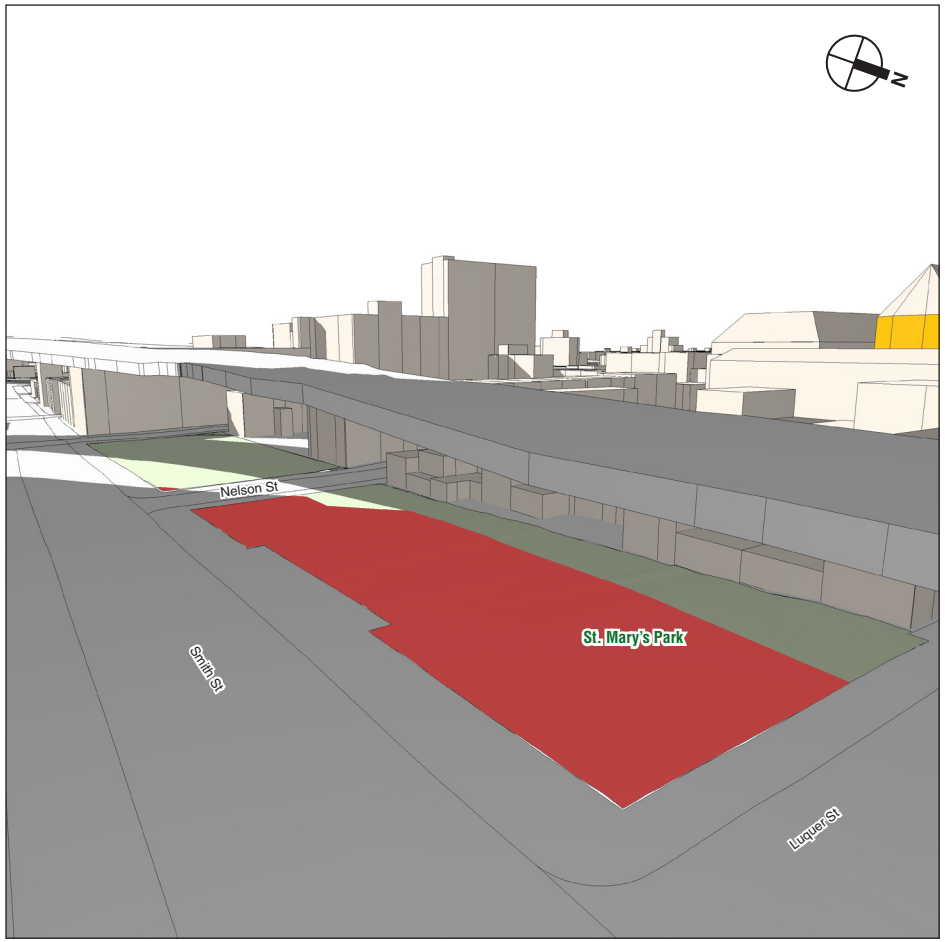

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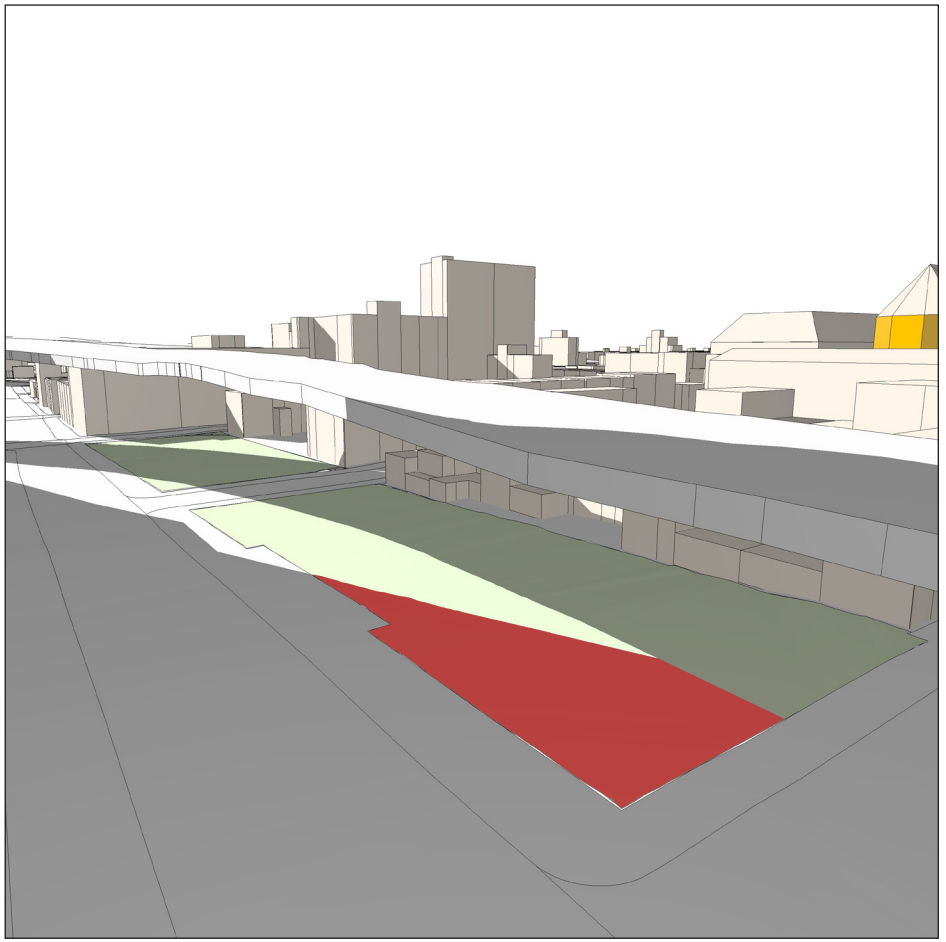

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Incremental Shadow on Sunlight-Sensitive Resource

Historic Resources with Sunlight-Sensitive Features

December 21

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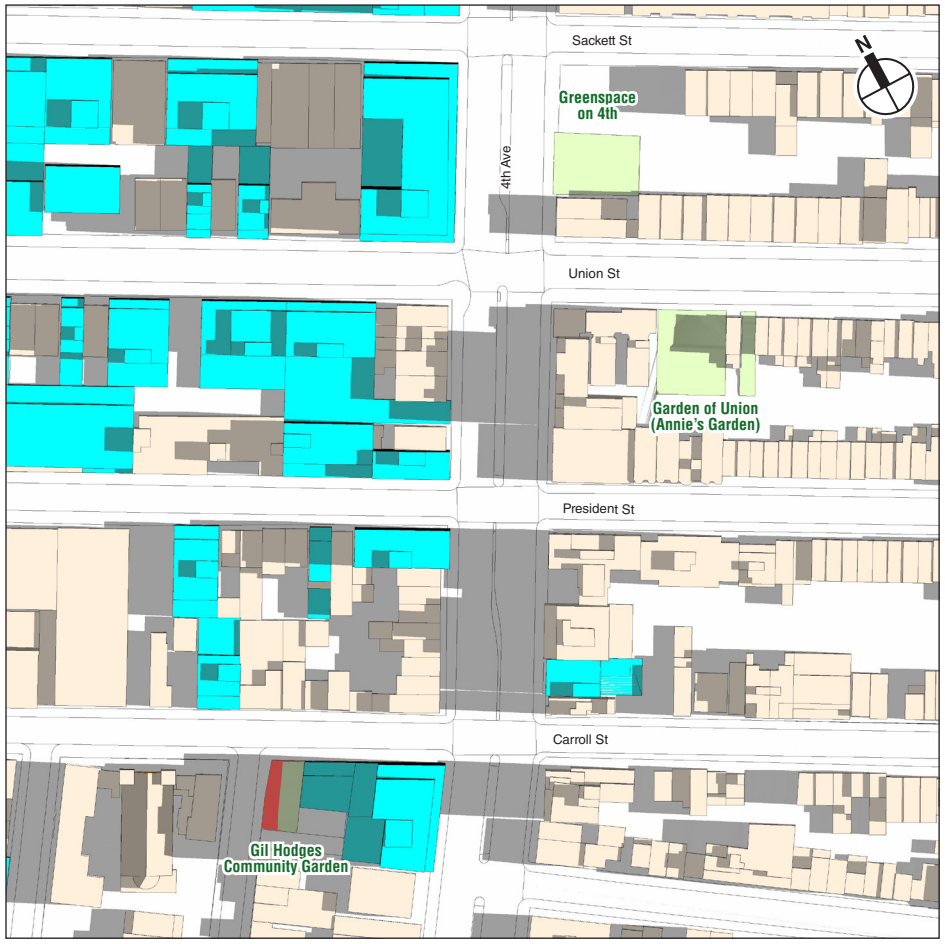

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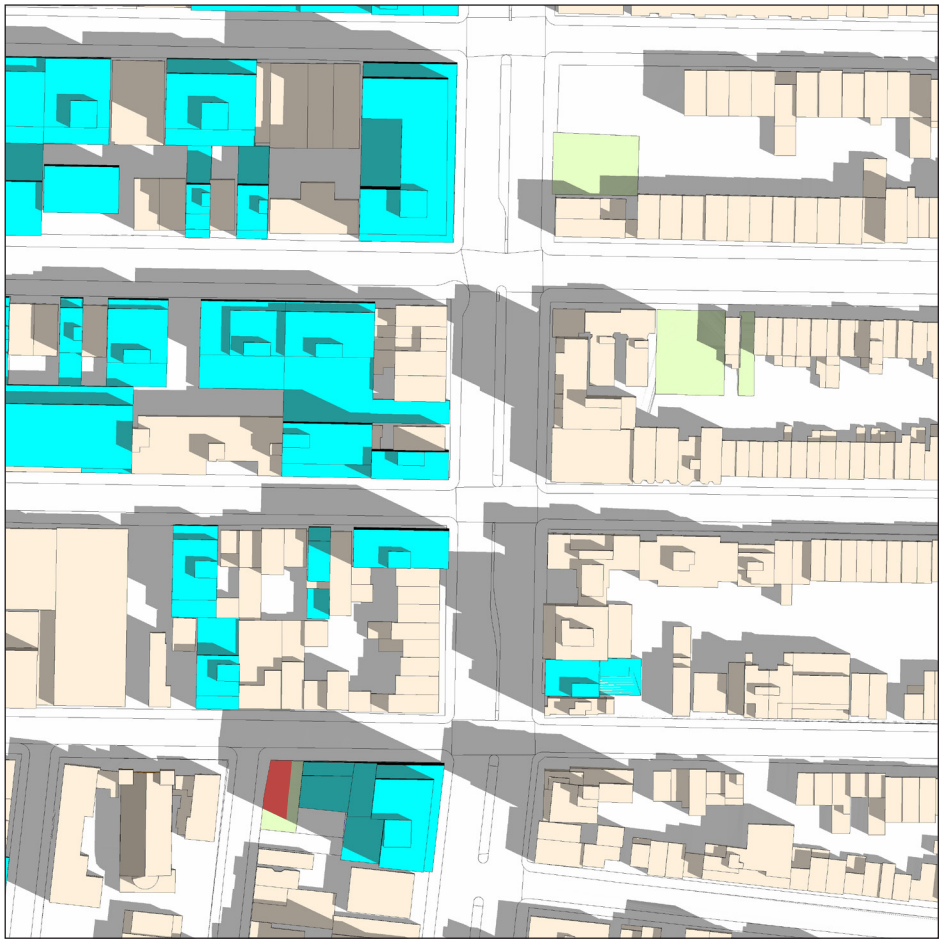

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

March 21 / September 21

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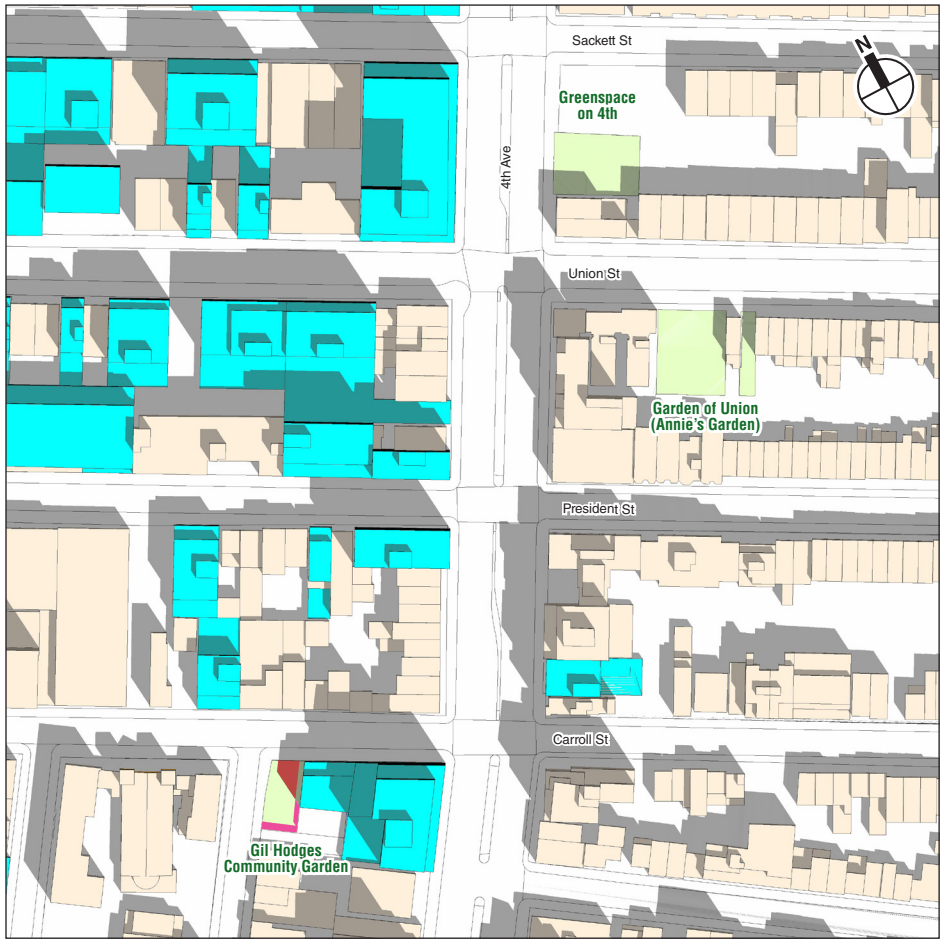

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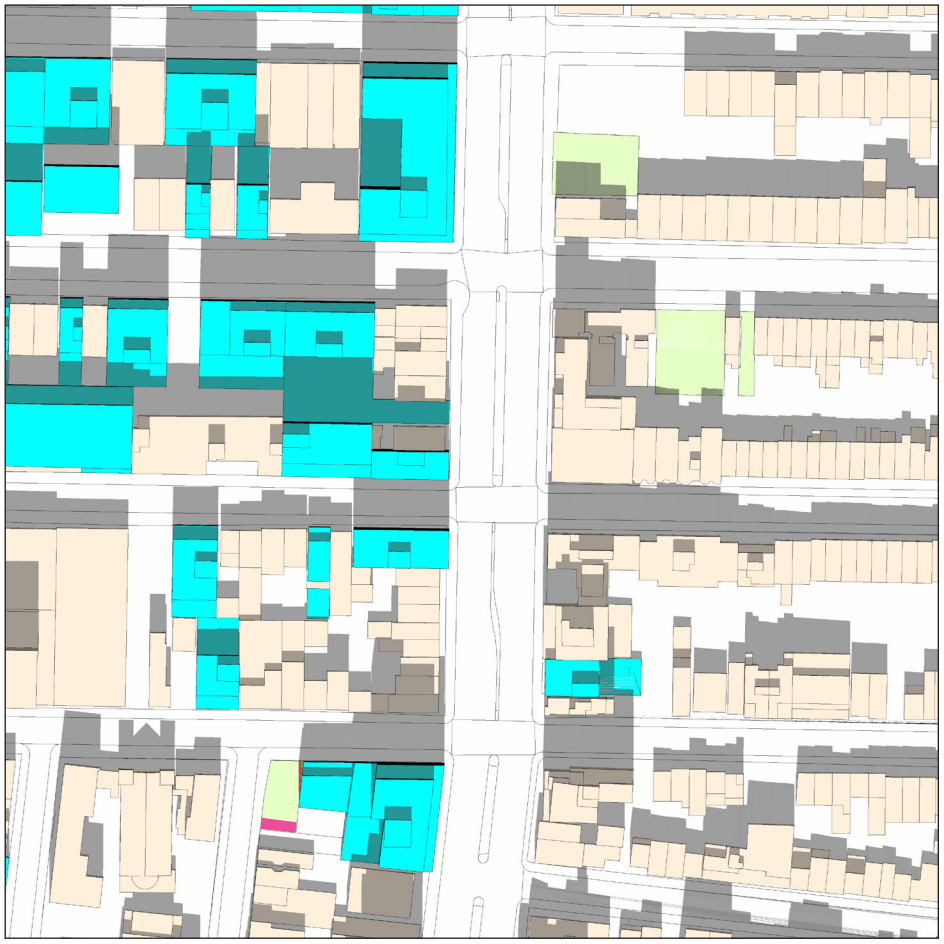

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Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

Reduced Shadow

March 21 / September 21

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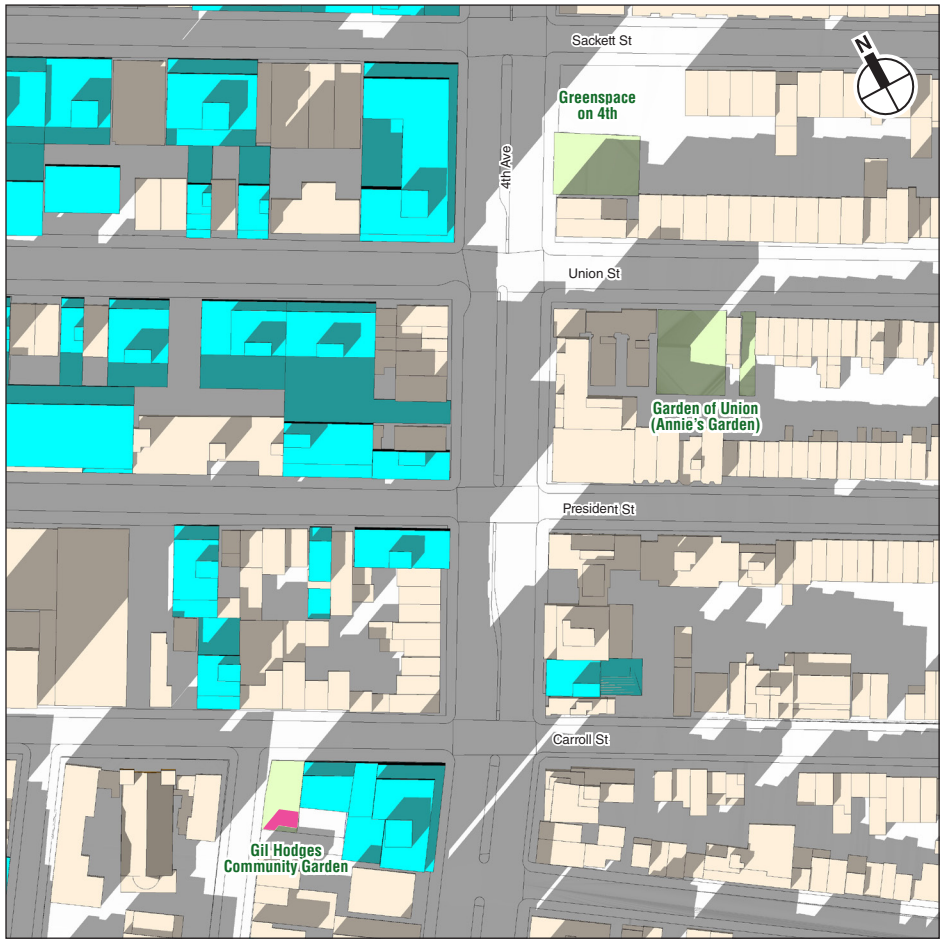

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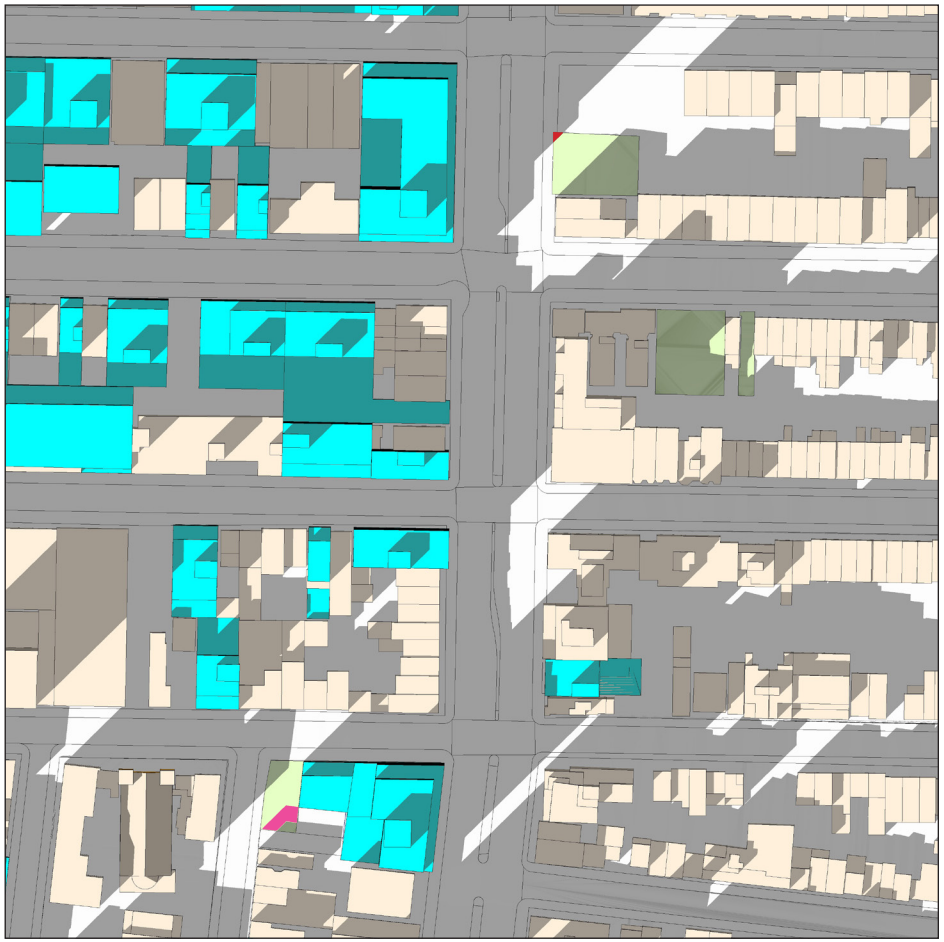

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Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

Reduced Shadow

March 21 / September 21

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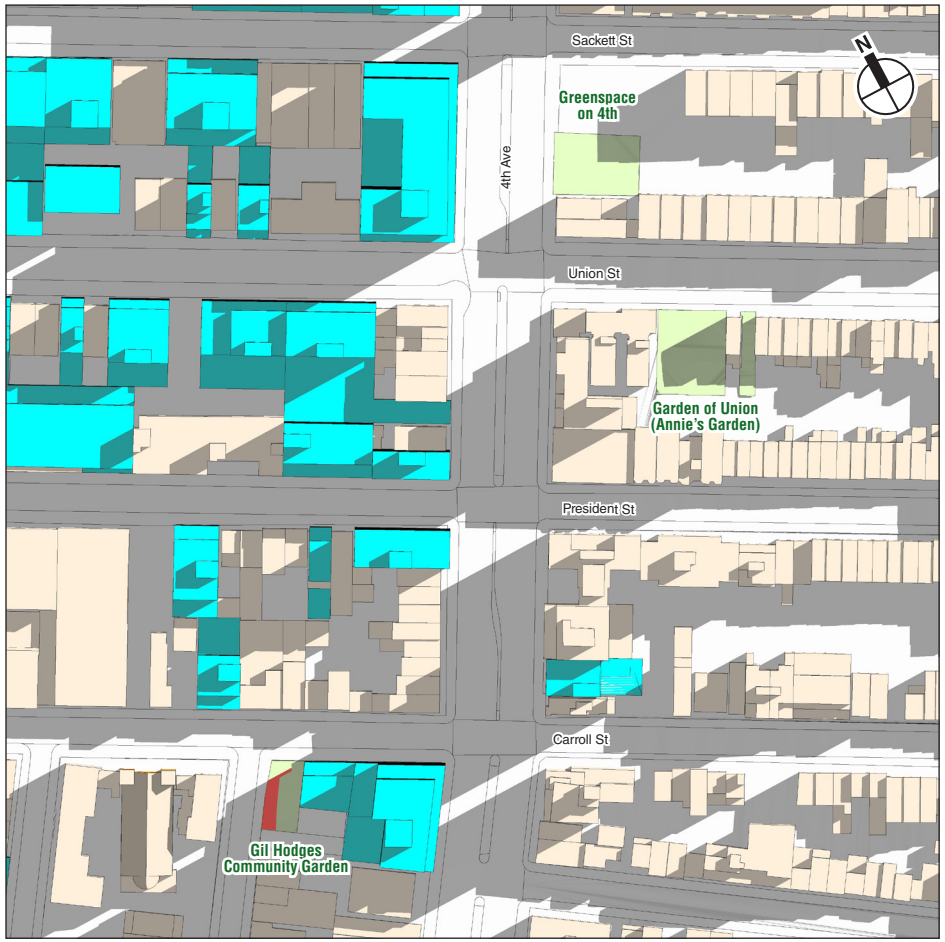

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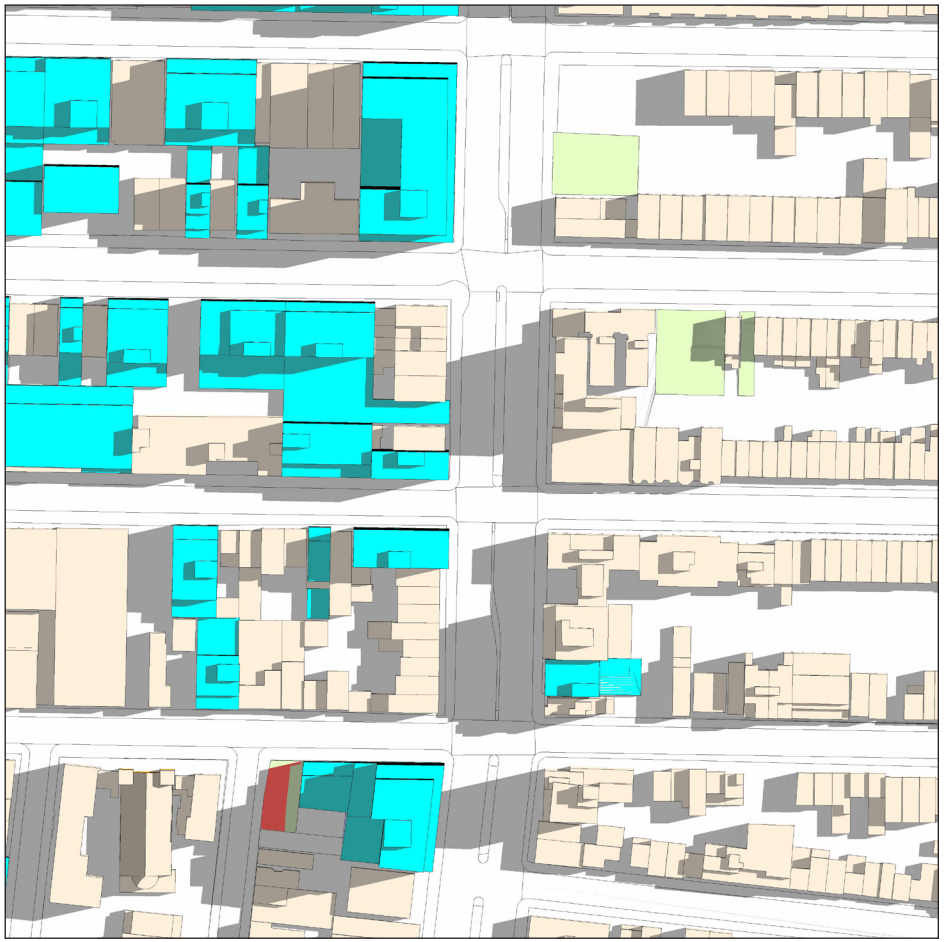

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

May 6 / August 6

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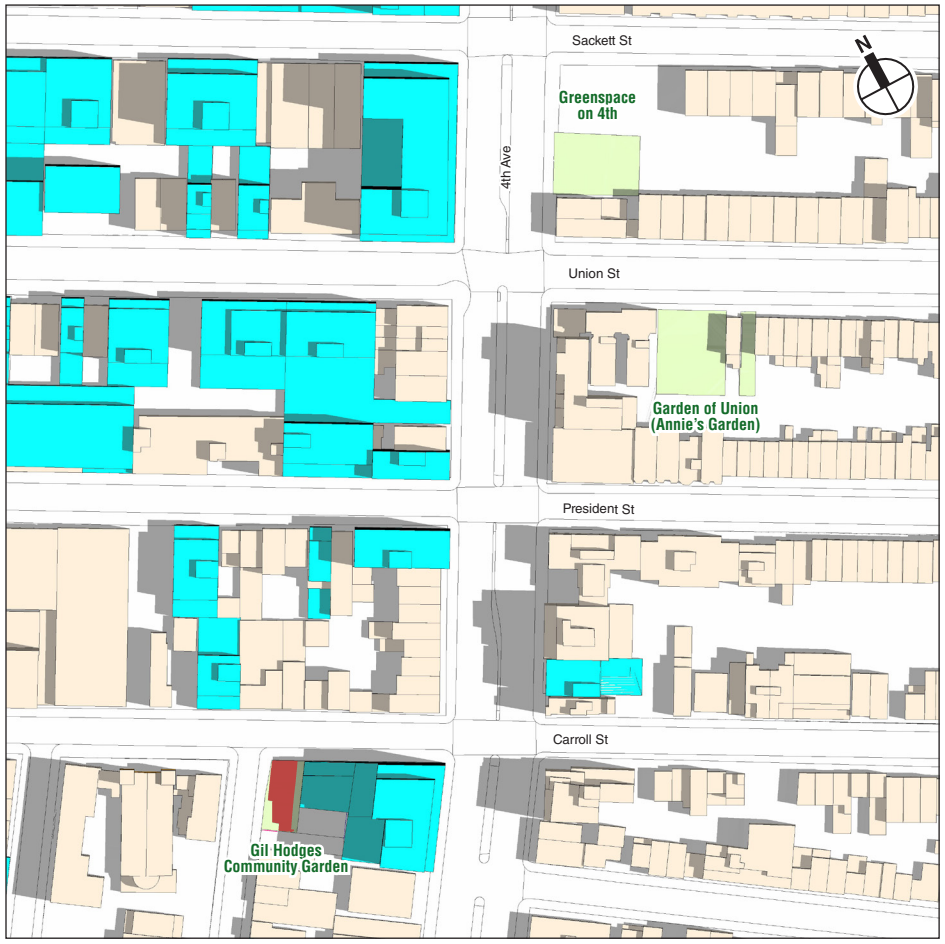

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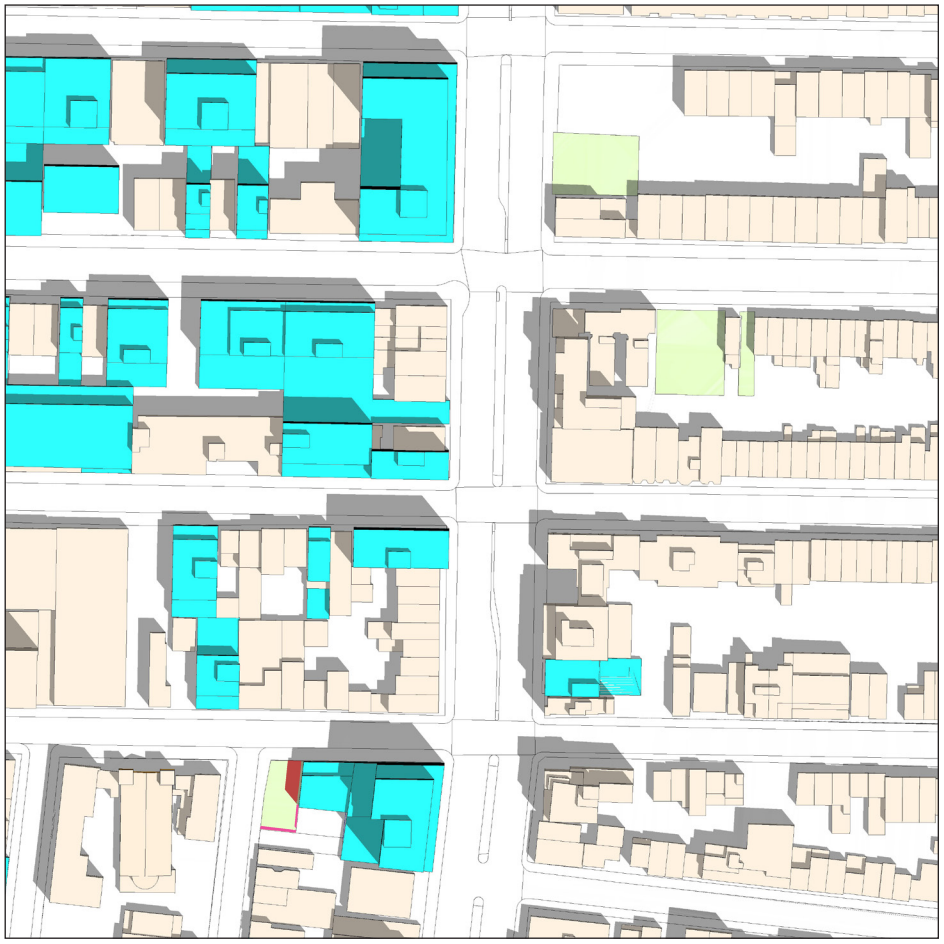

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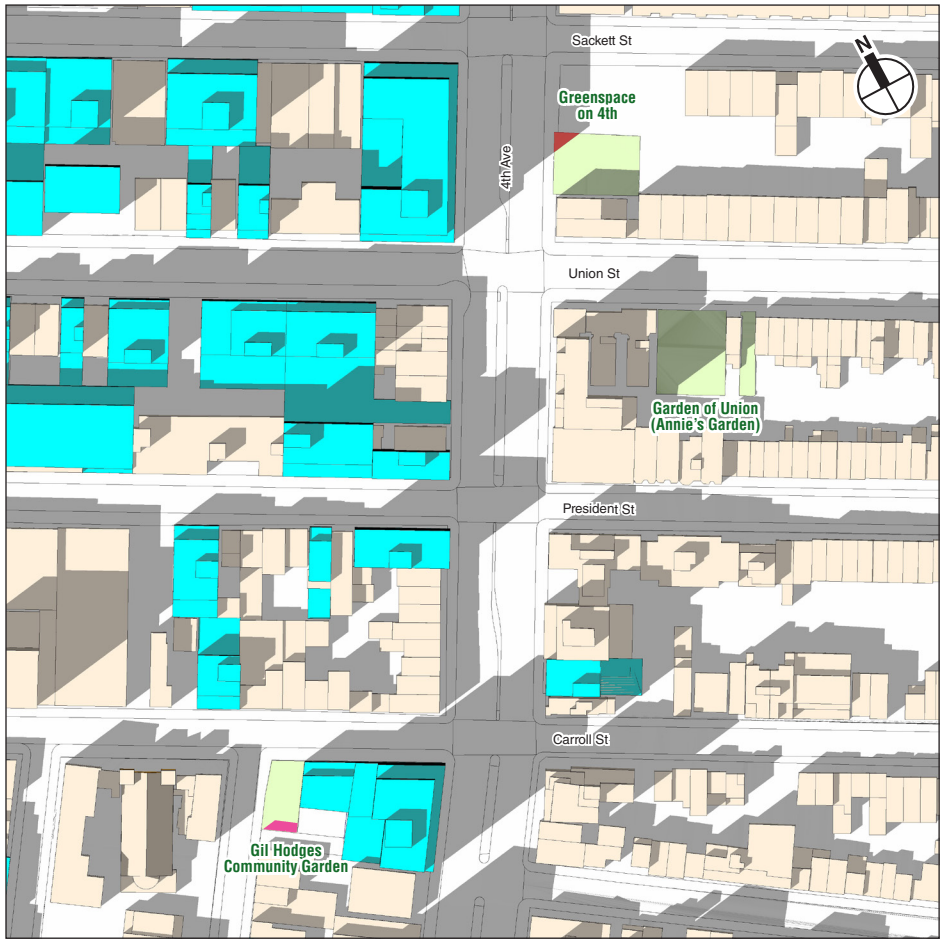
Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

Reduced Shadow

1.14.21



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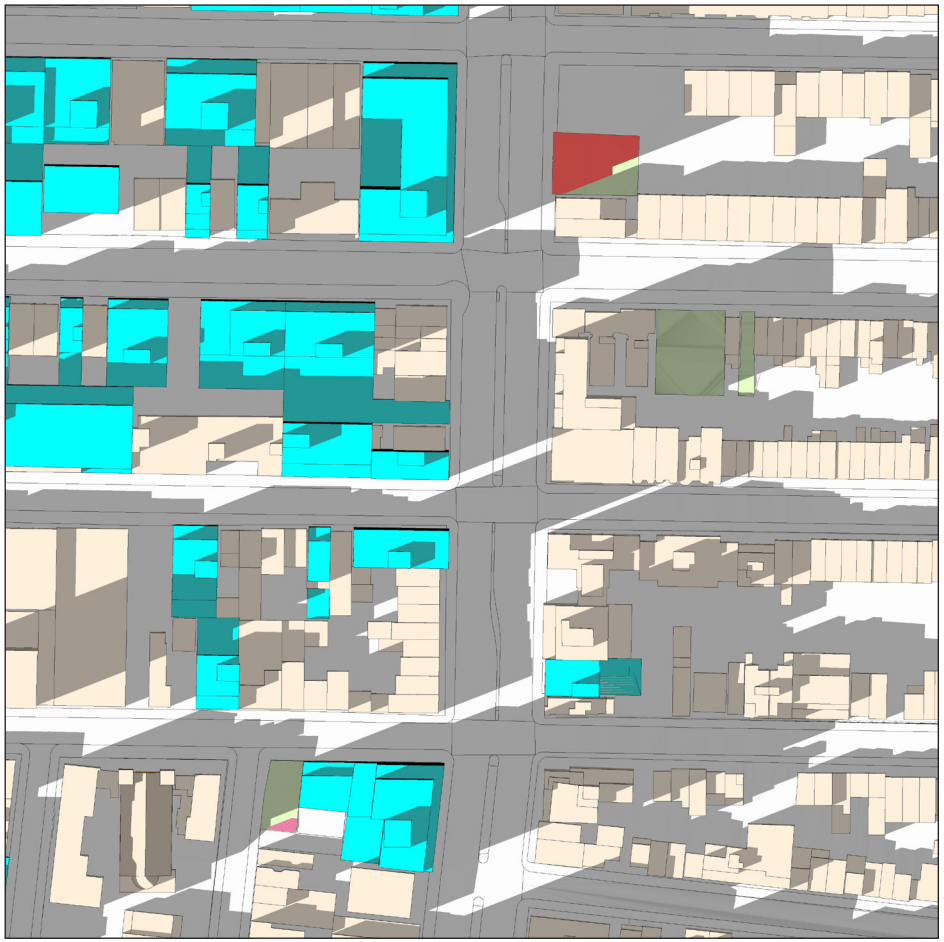

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

Reduced Shadow

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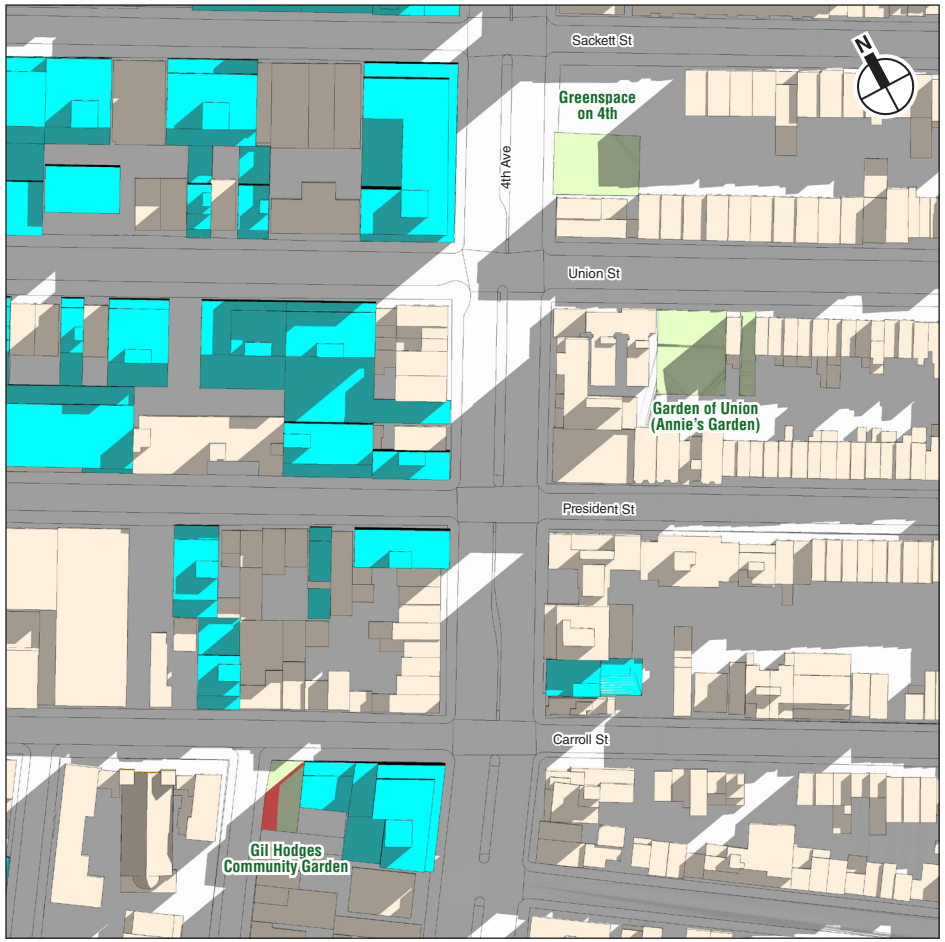

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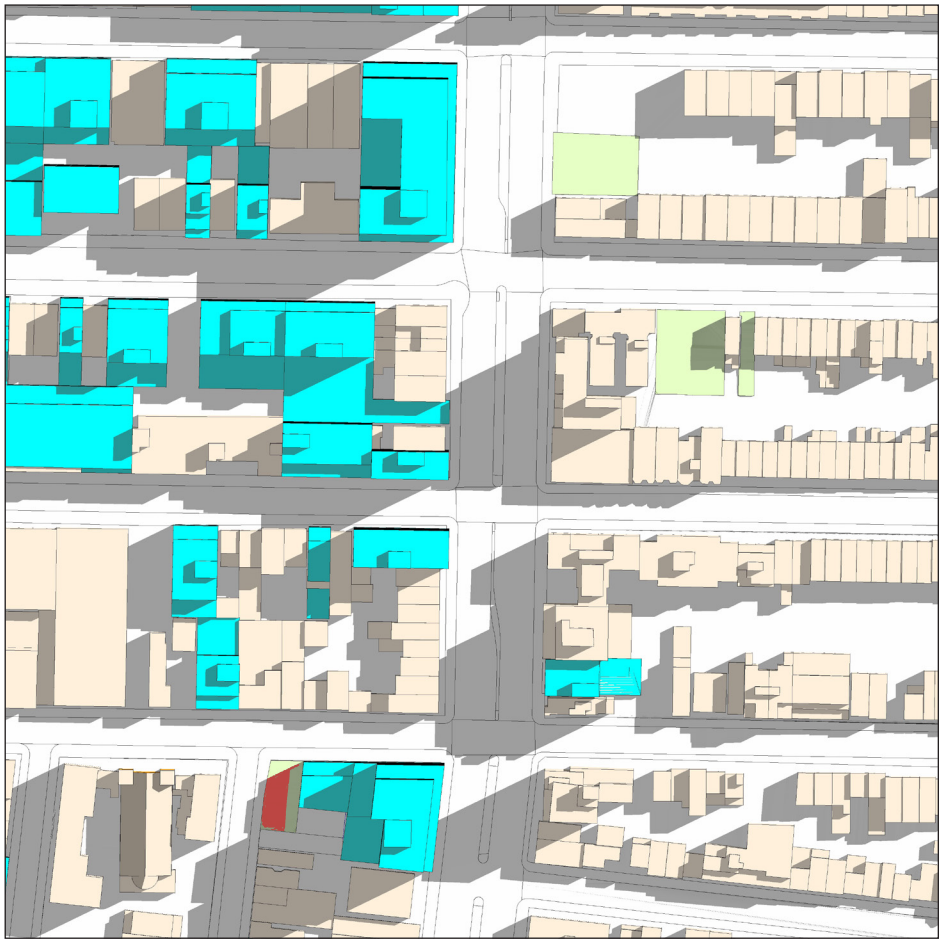

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

June 21

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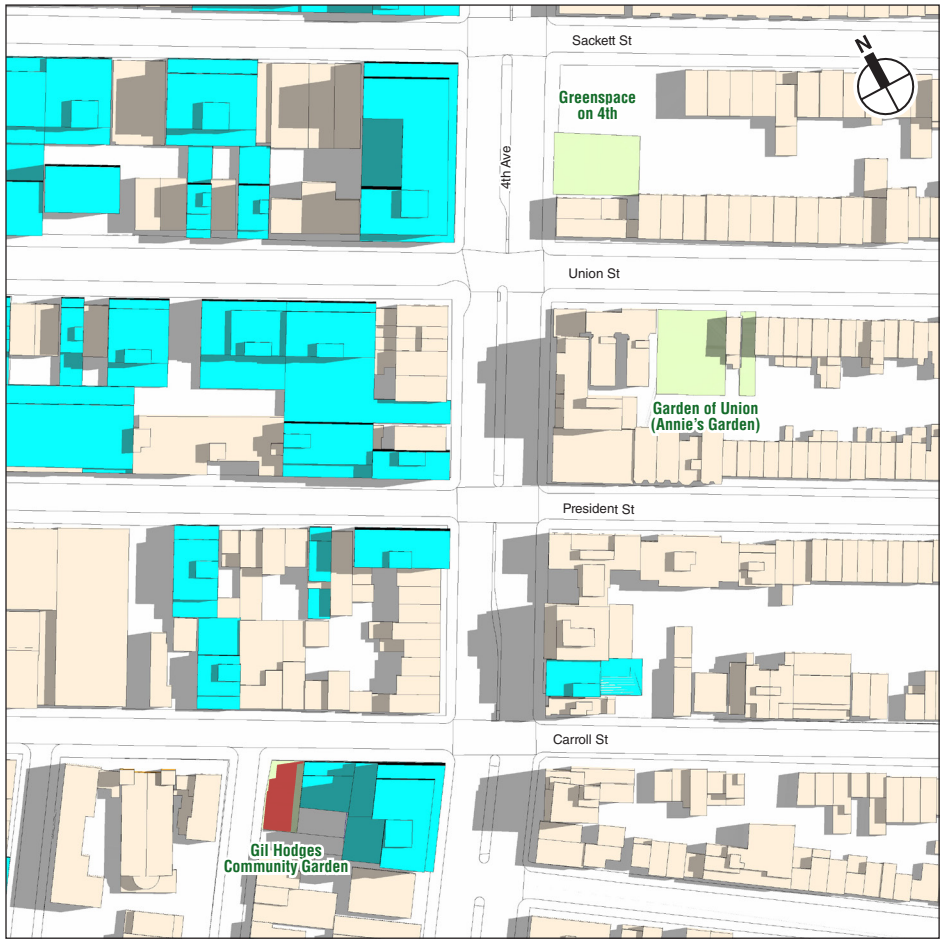

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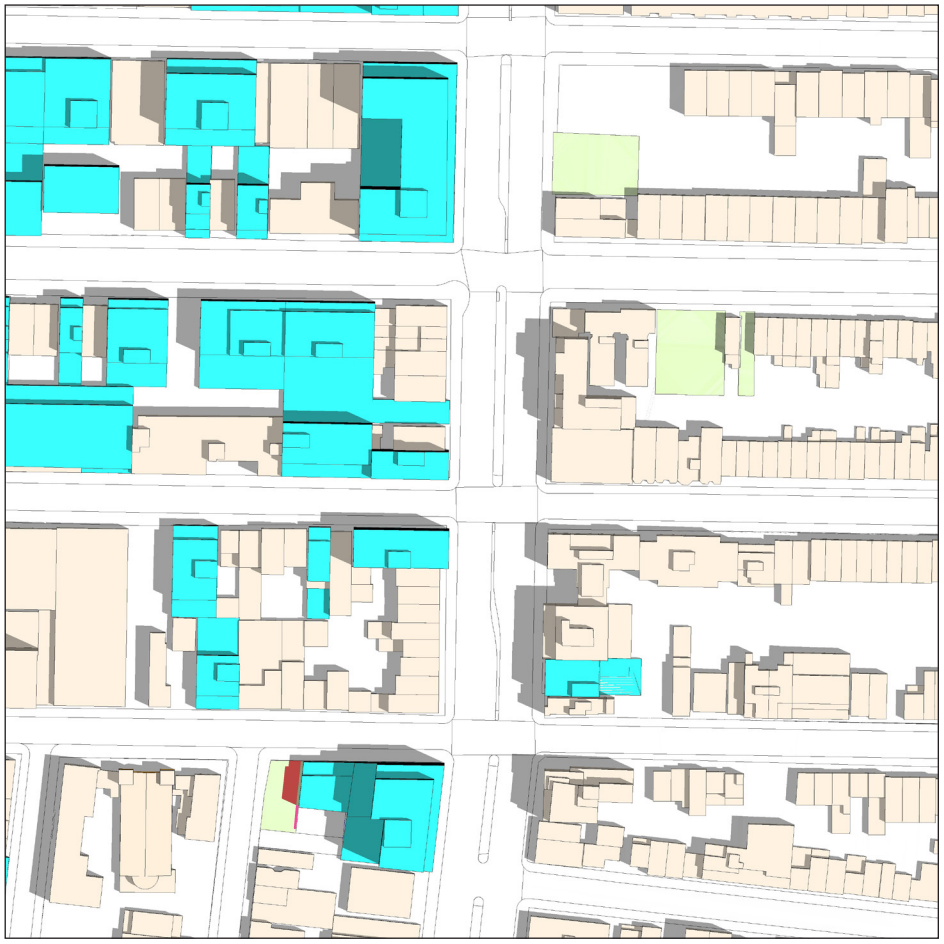

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

Reduced Shadow

June 21

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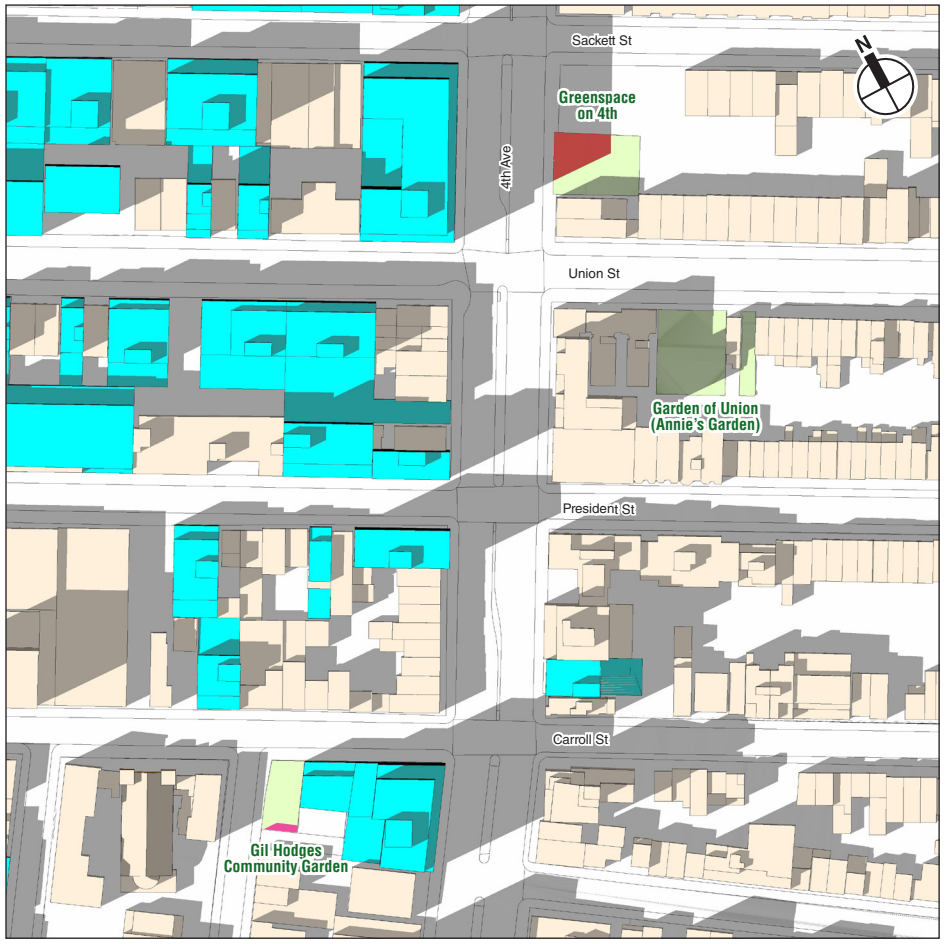

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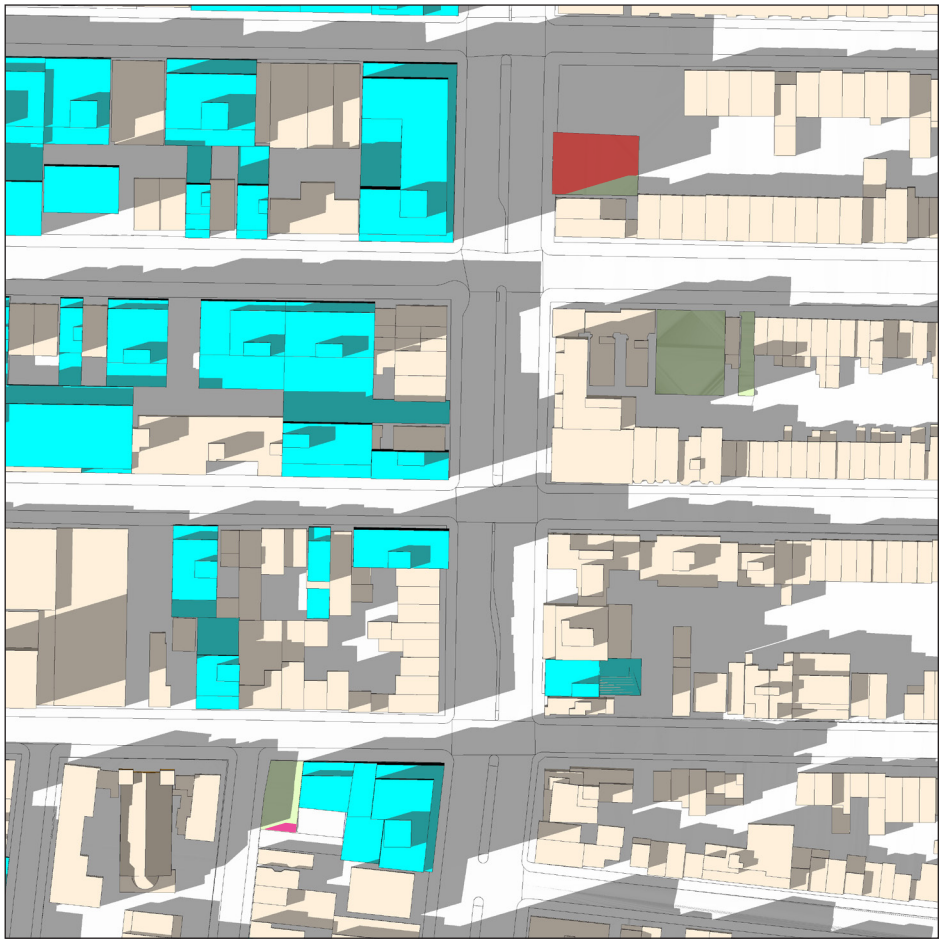

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

Reduced Shadow

June 21

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-66

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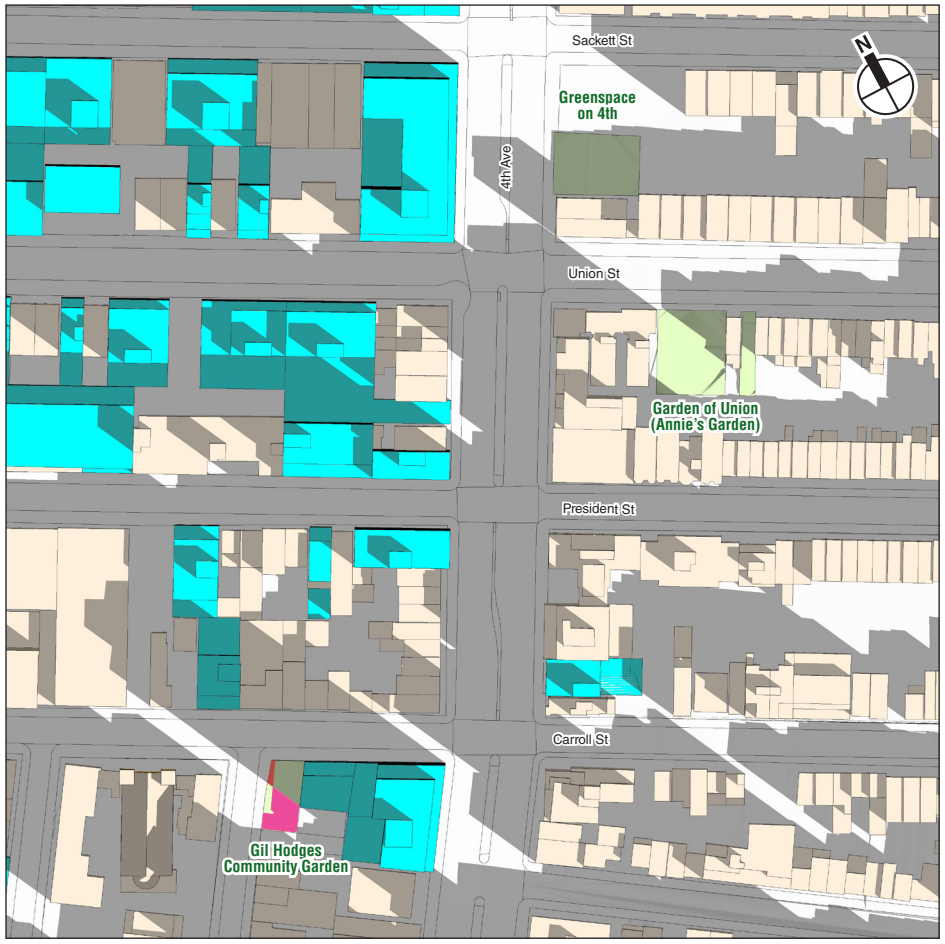

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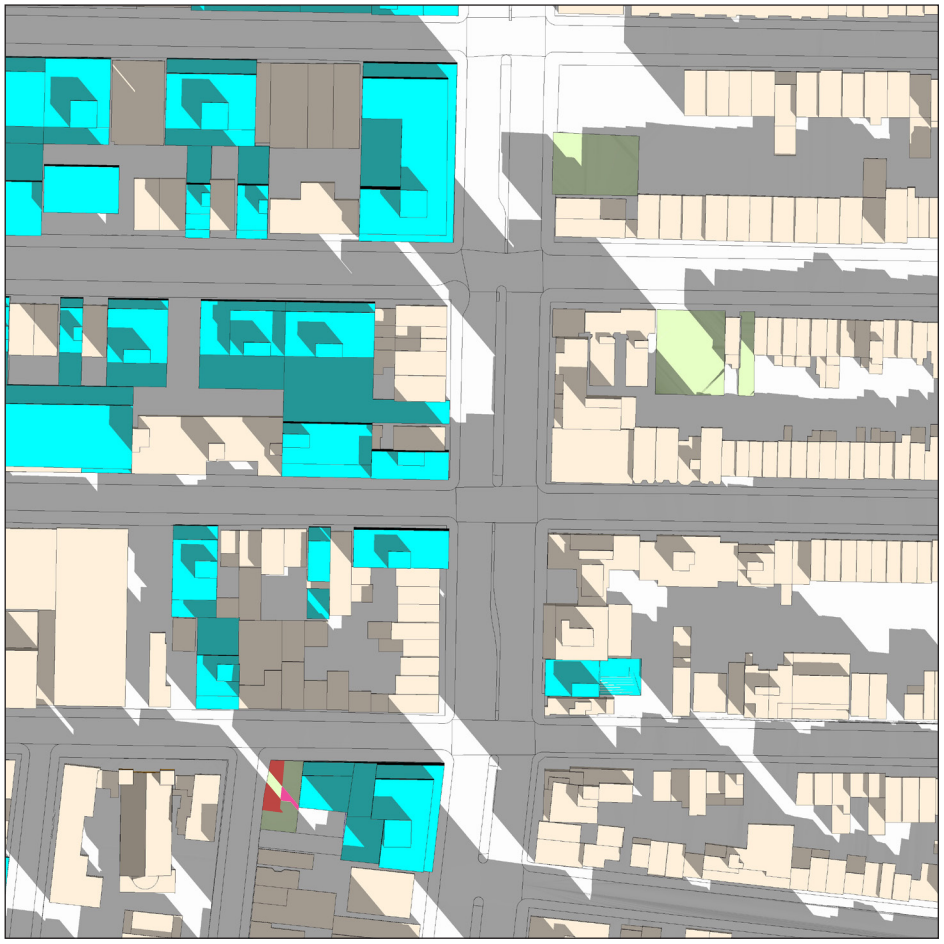

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

Reduced Shadow

December 21

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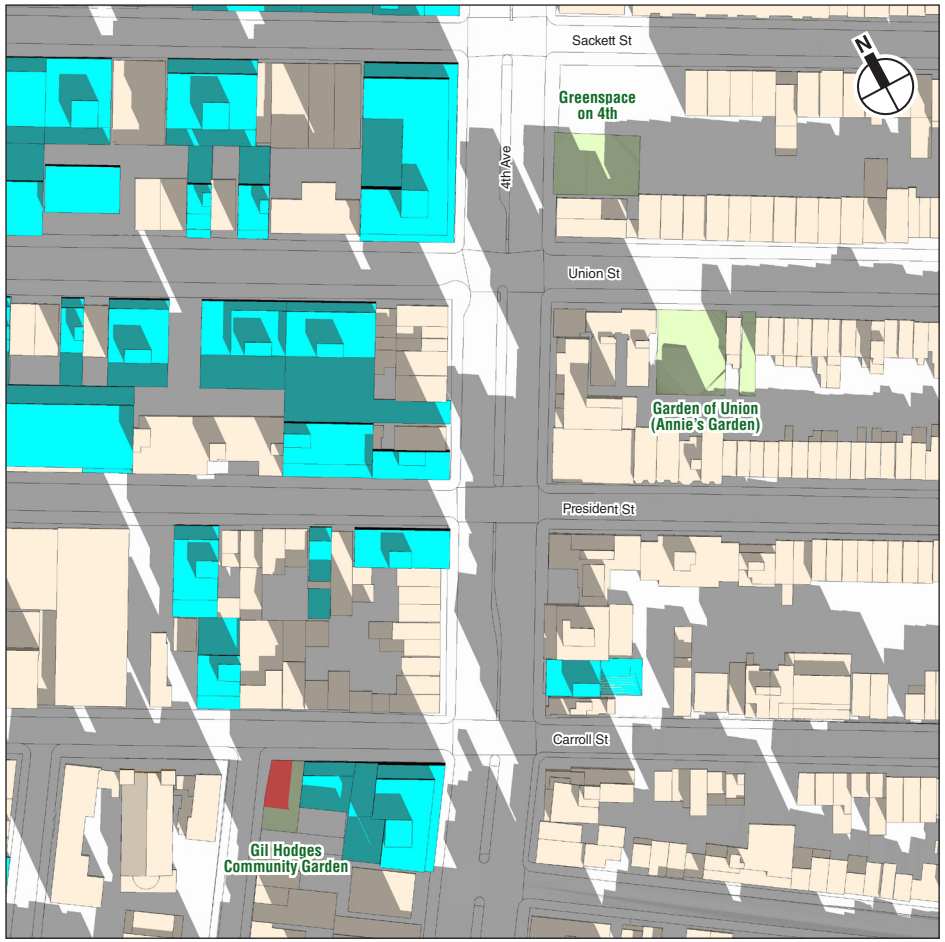

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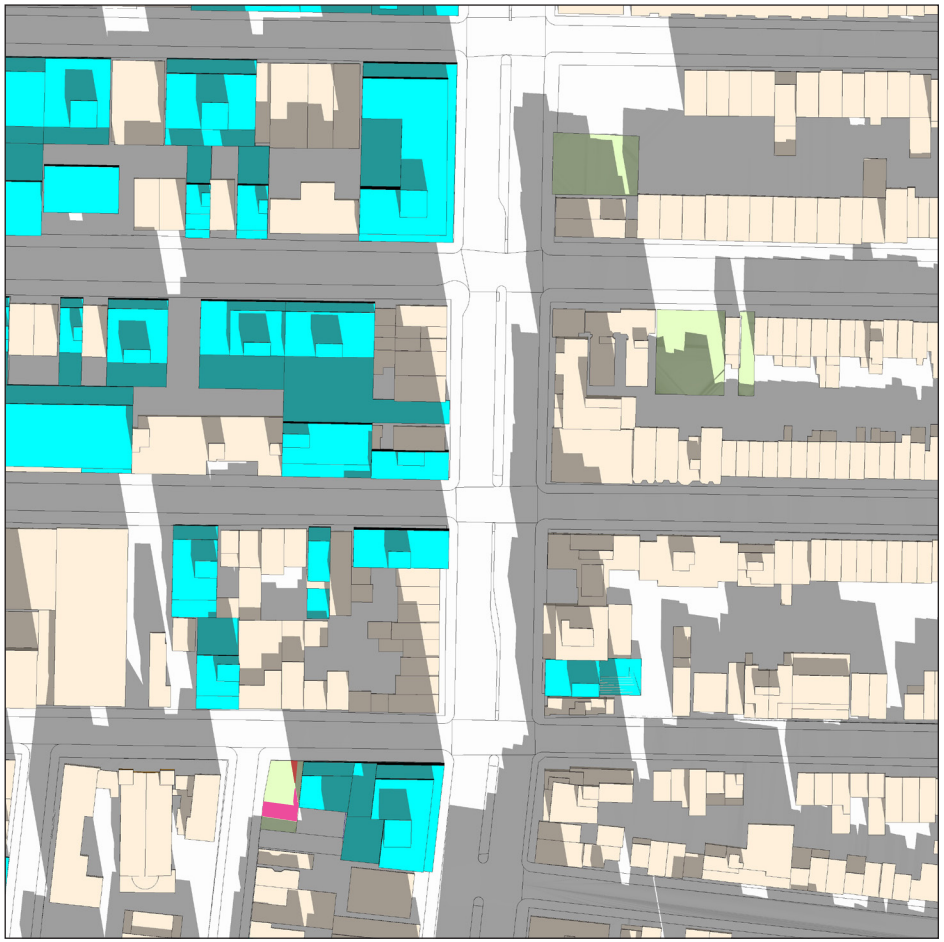

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Publicly Accessible Open Space

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Reduced Shadow

December 21



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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

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Reduced Shadow

1.14.21



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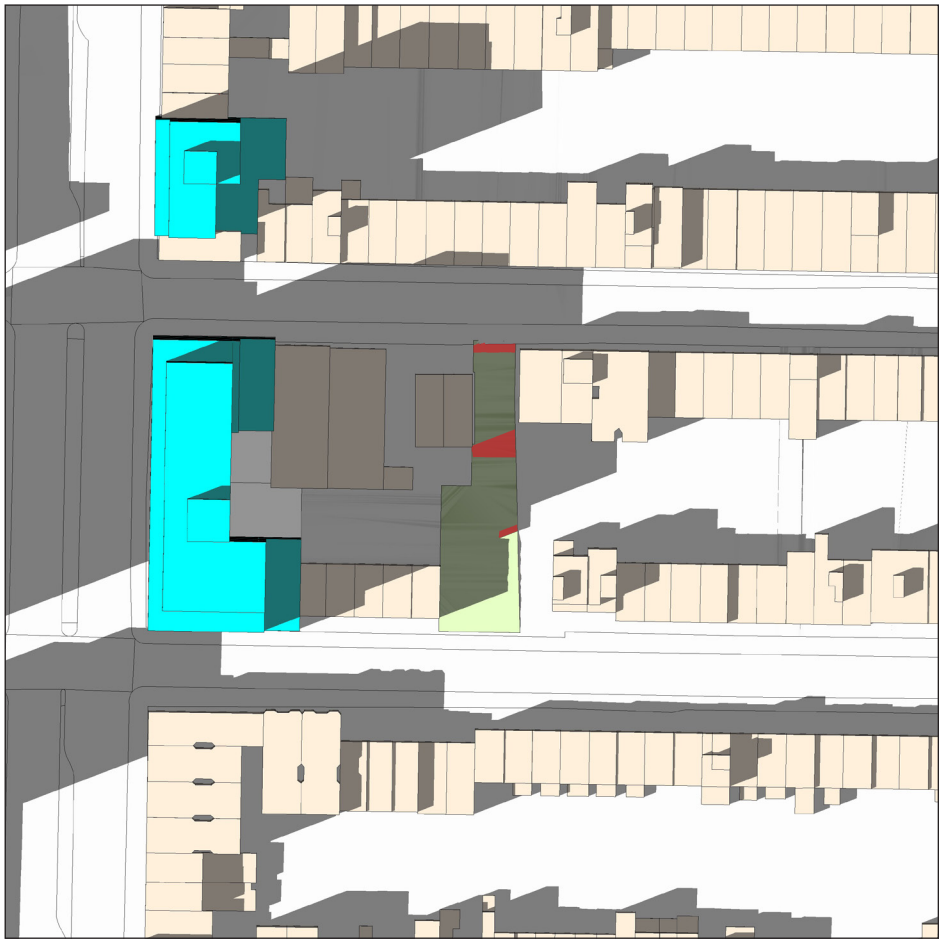

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June 21

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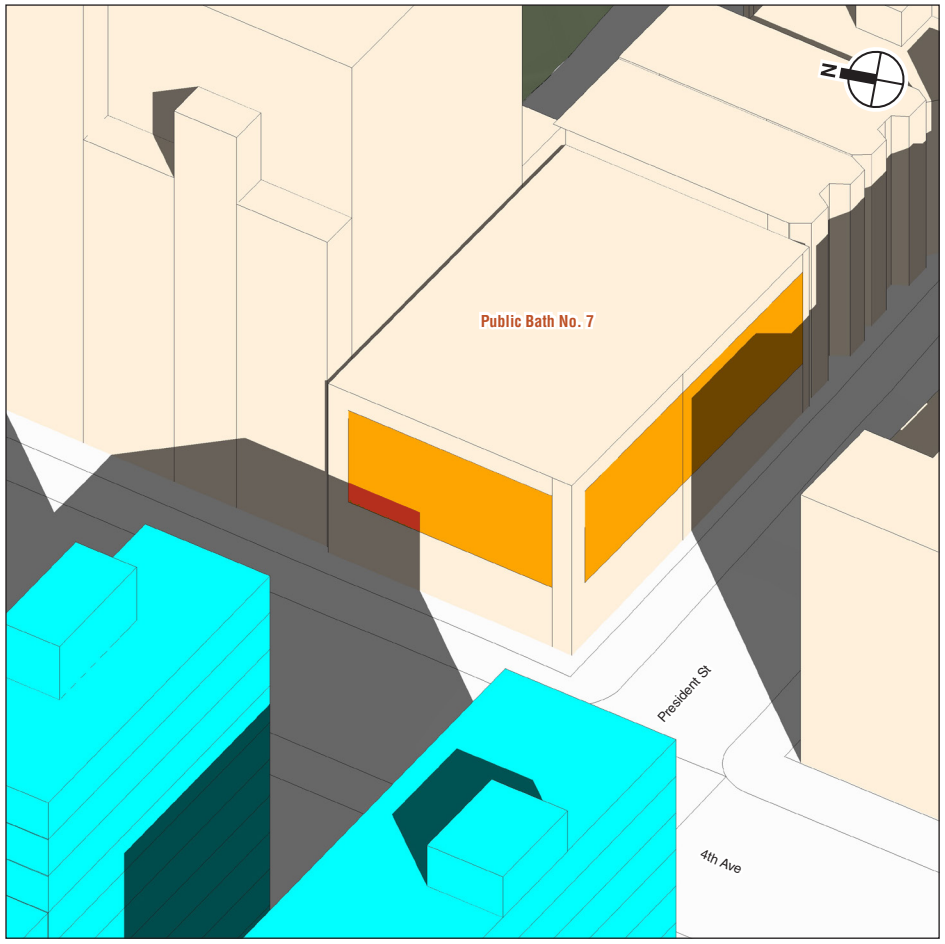

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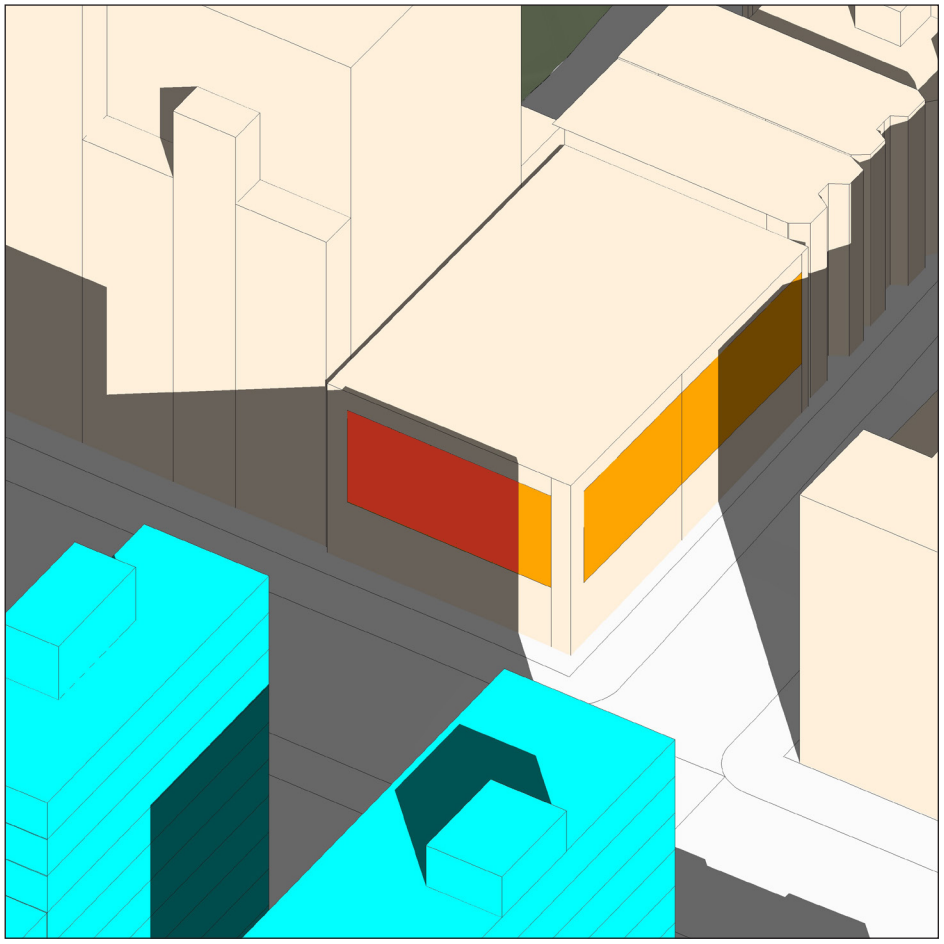

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Publicly Accessible Open Space

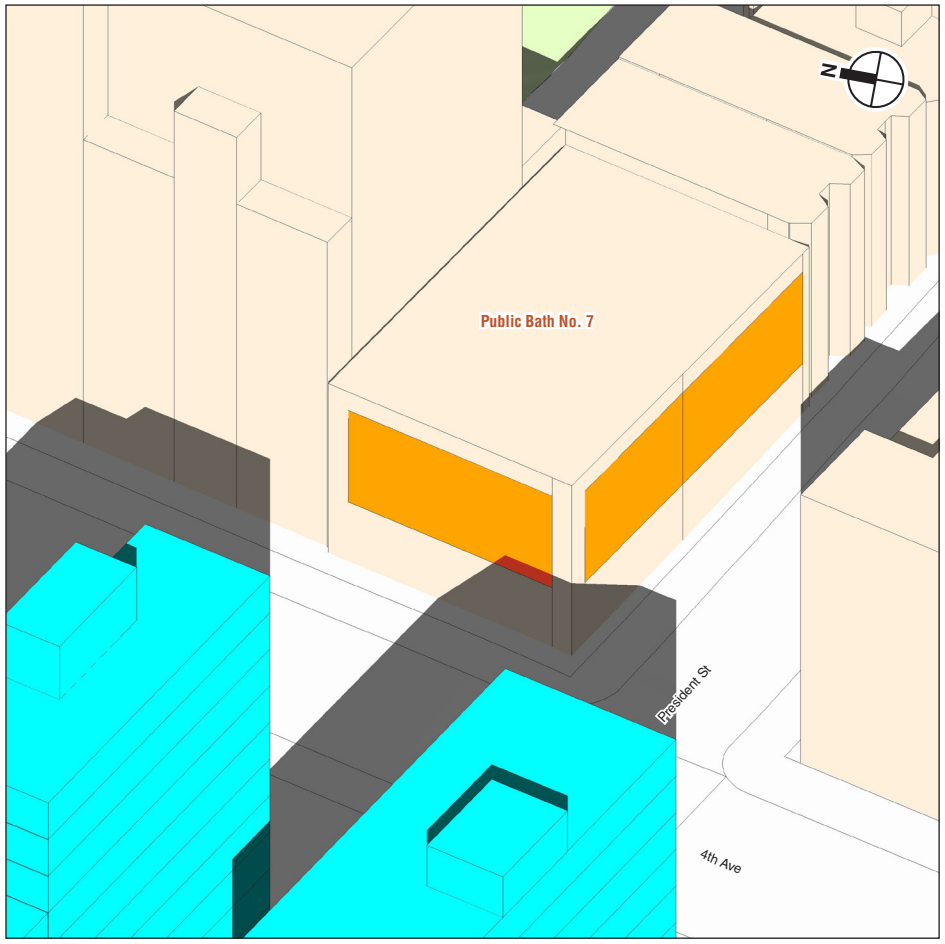
Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

Historic Resources with Sunlight-Sensitive Features

March 21 / September 21

1.14.21



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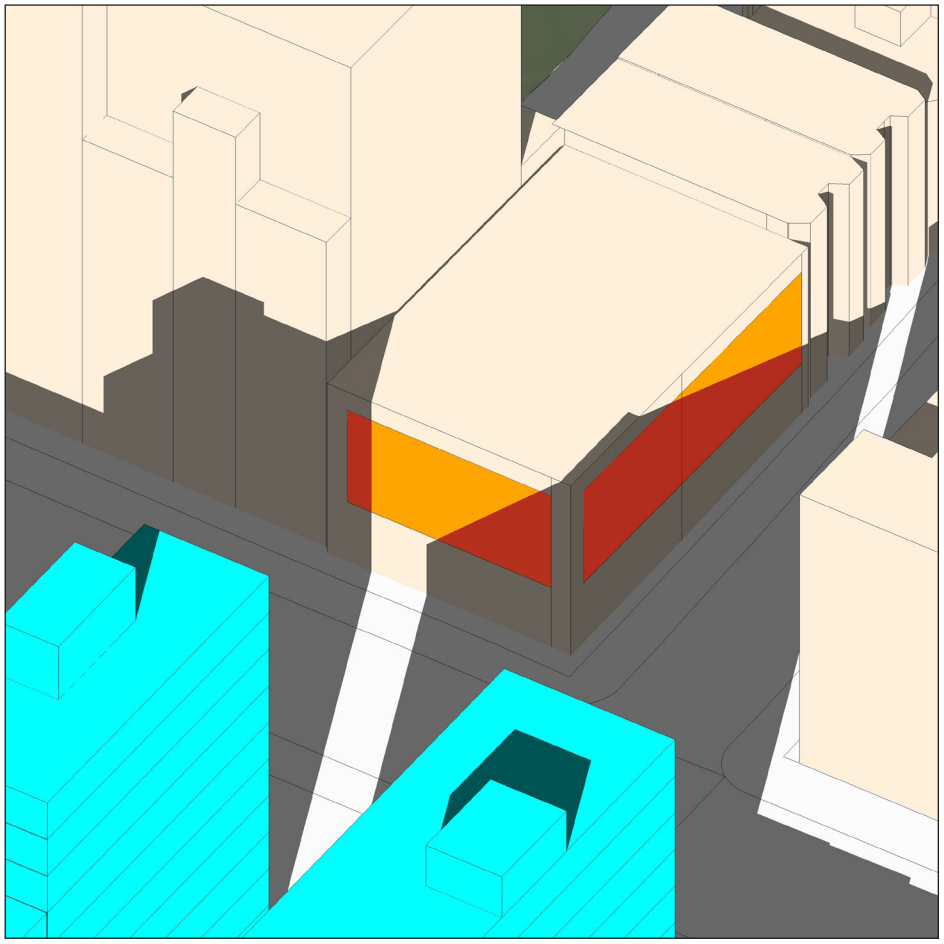

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Publicly Accessible Open Space

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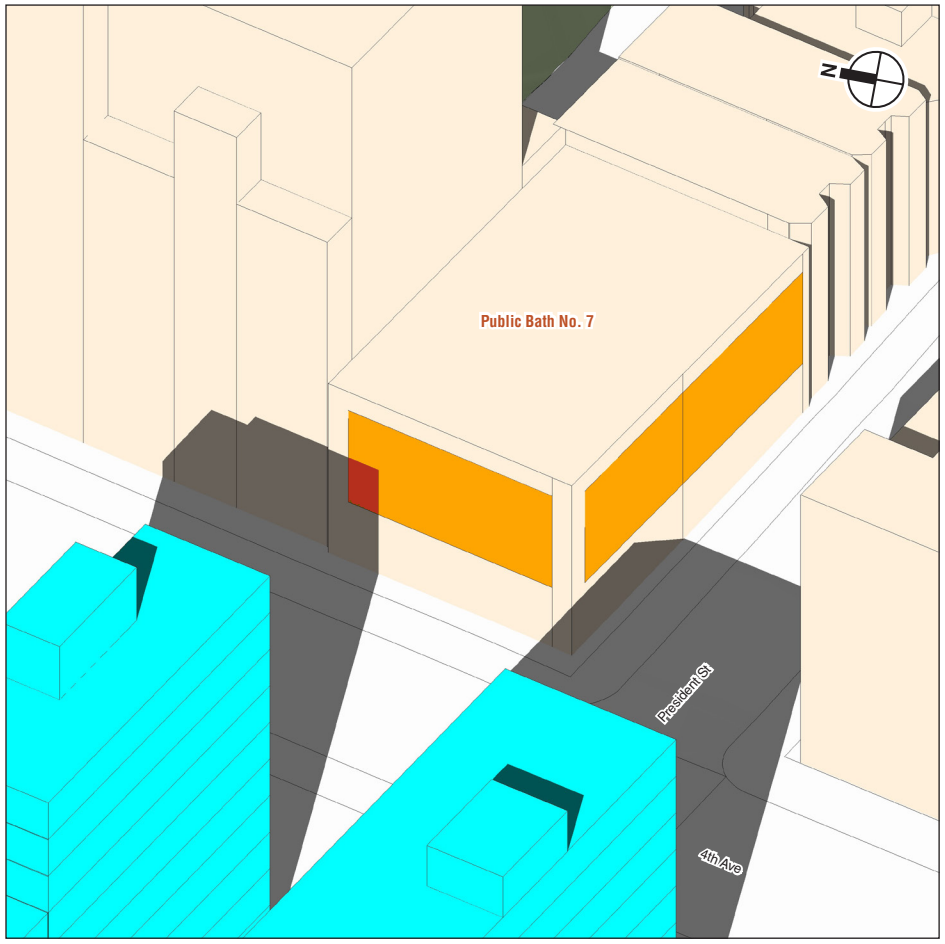
1.14.21



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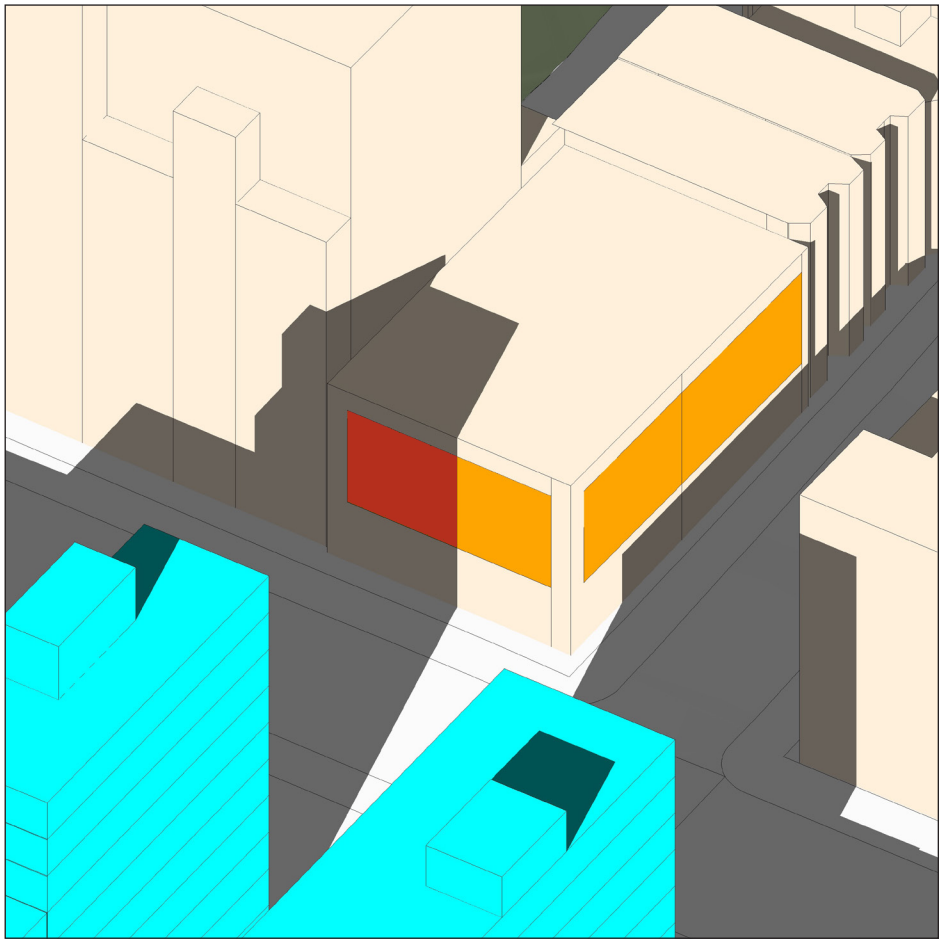

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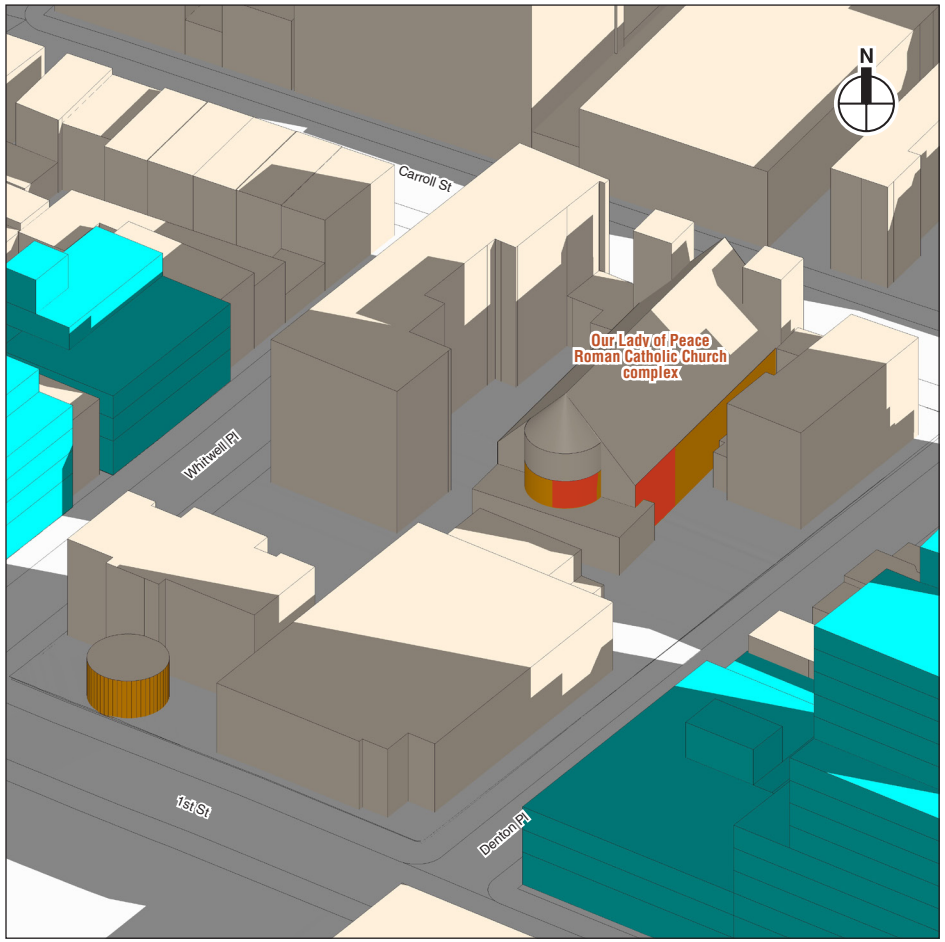
Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

Historic Resources with Sunlight-Sensitive Features

1.14.21



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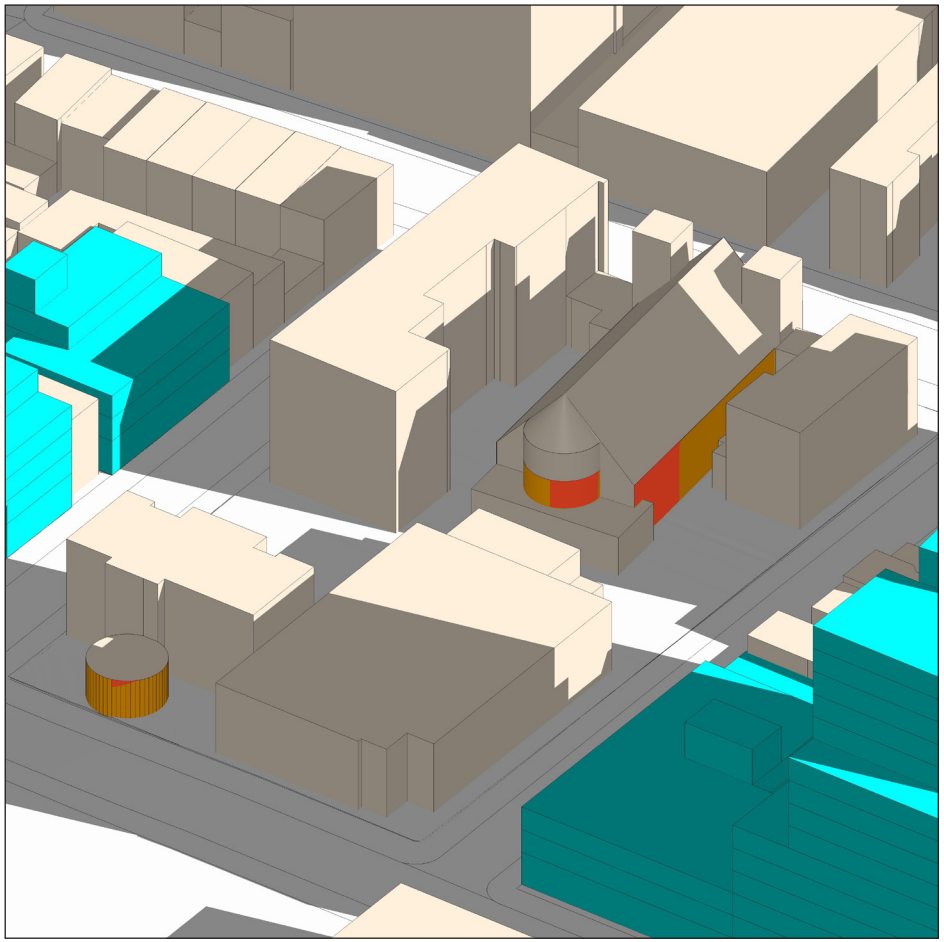

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Publicly Accessible Open Space

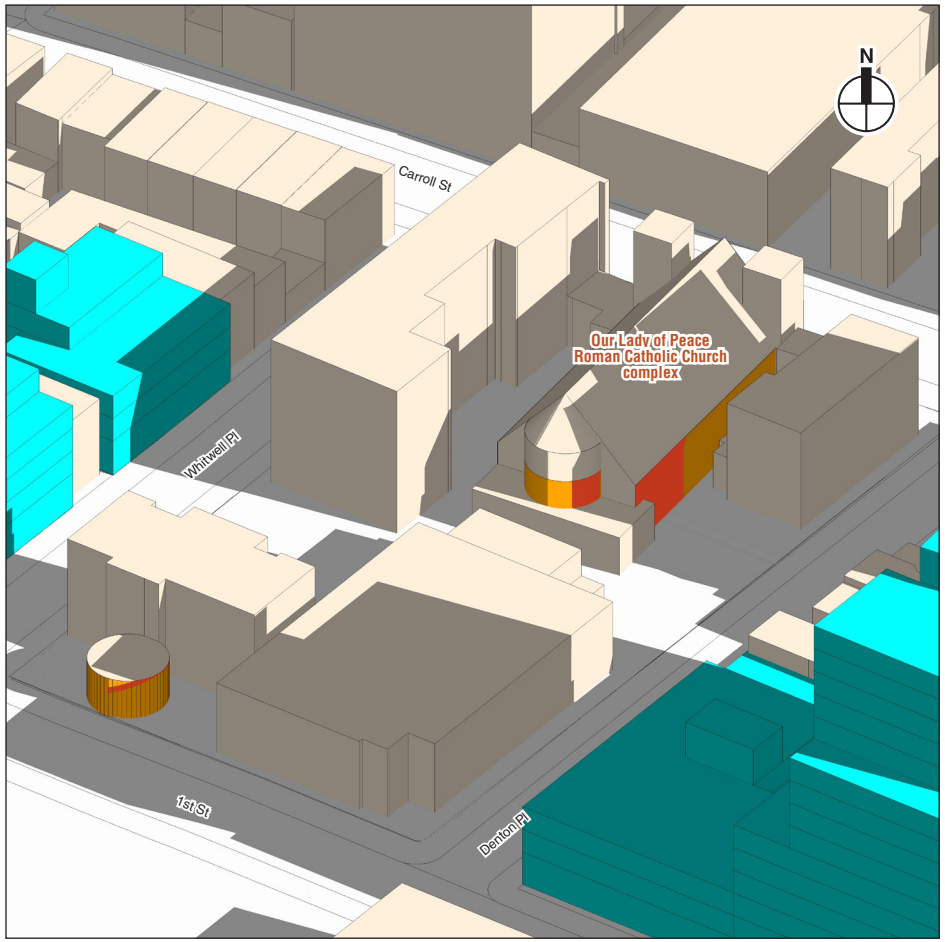
Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

Historic Resources with Sunlight-Sensitive Features

March 21 / September 21

1.14.21



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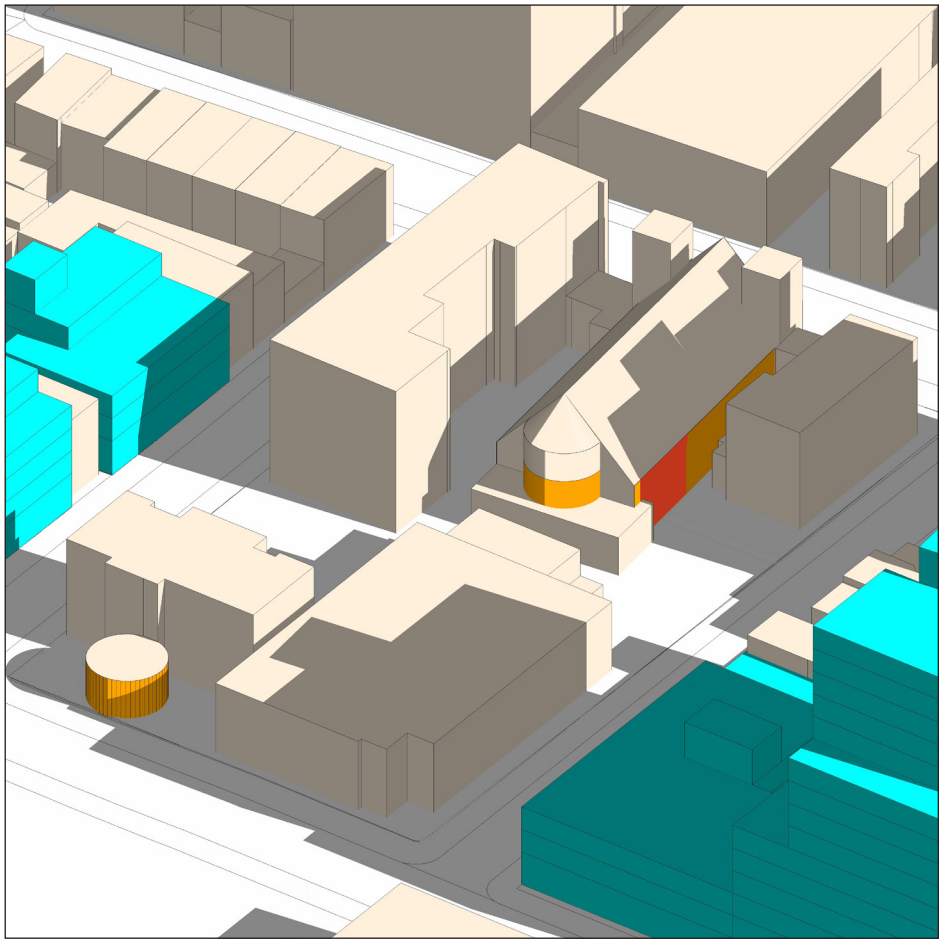

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

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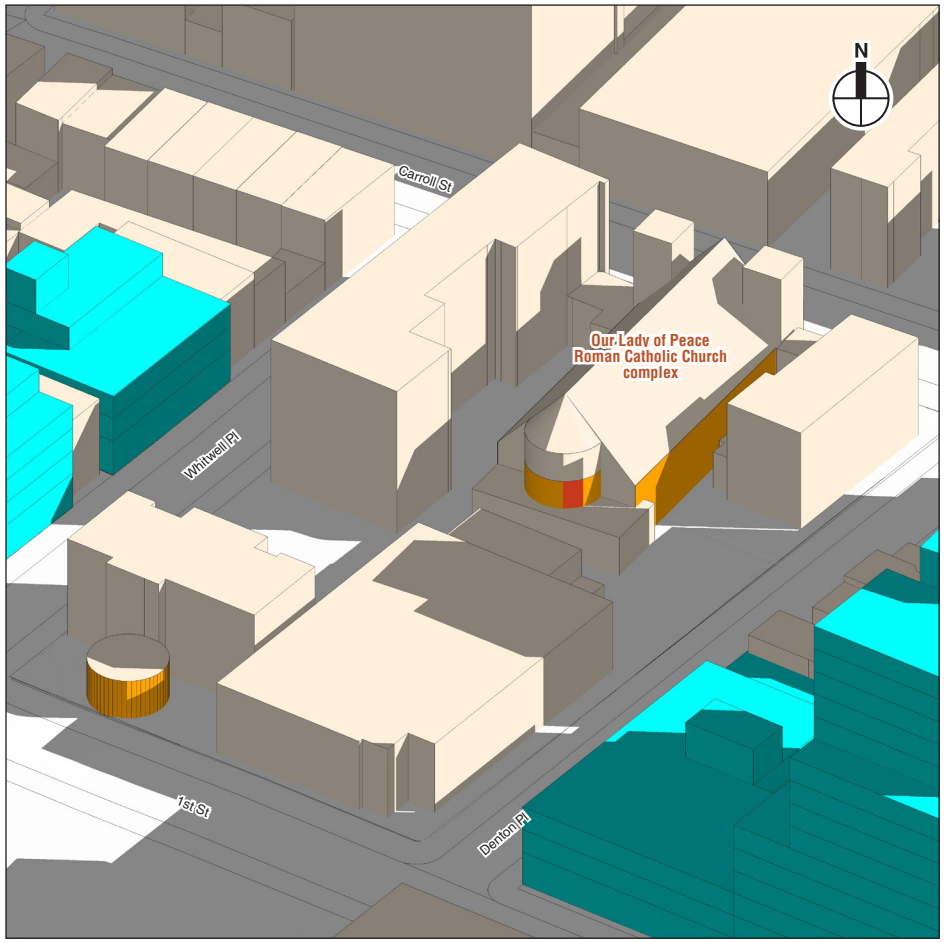
March 21 / September 21

1.14.21



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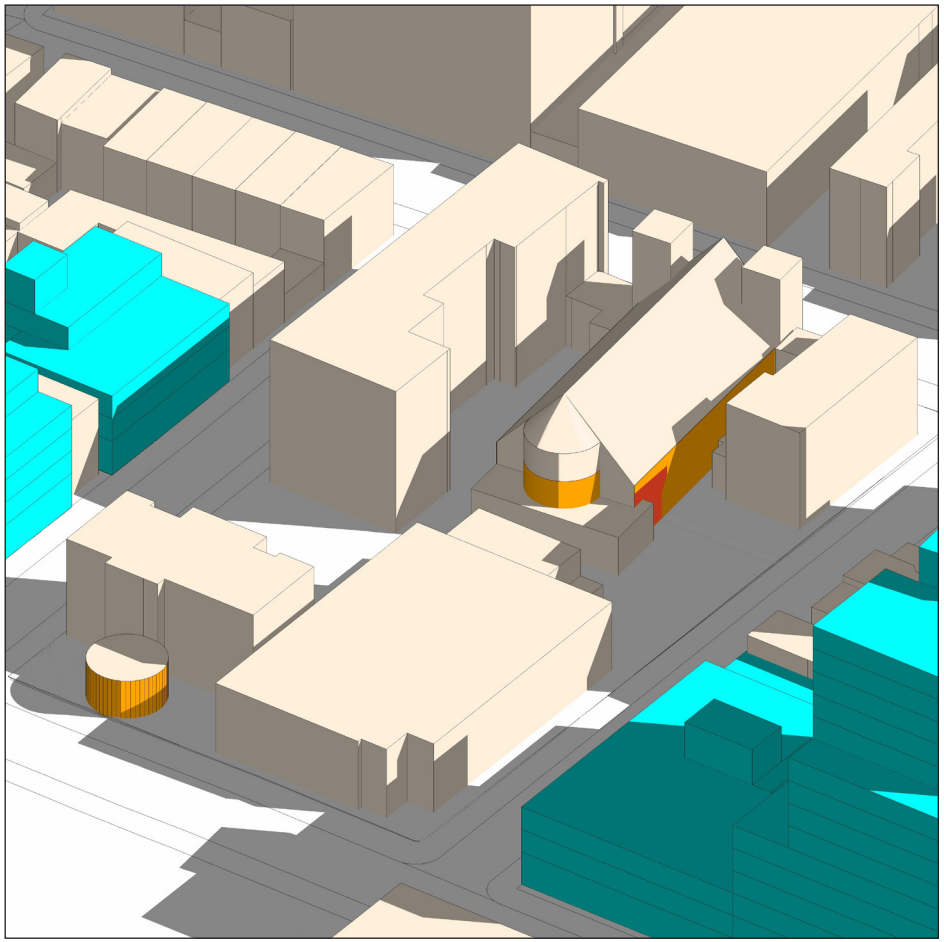

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Publicly Accessible Open Space

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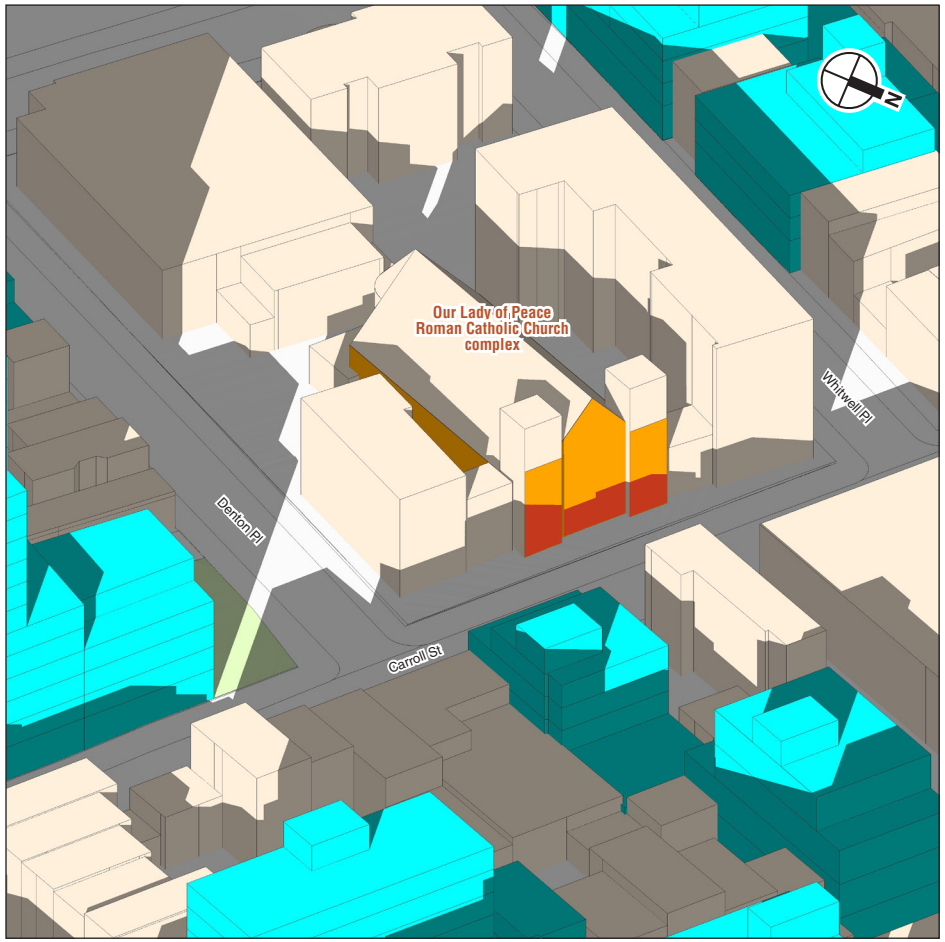

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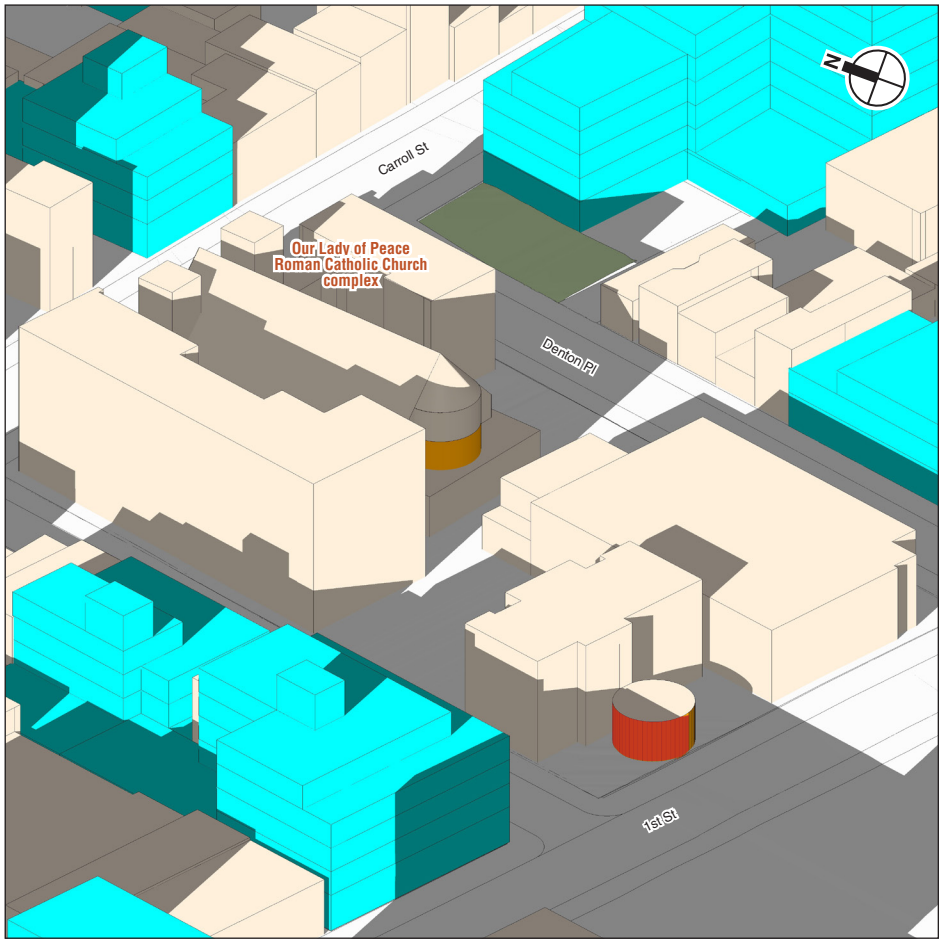

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

Historic Resources with Sunlight-Sensitive Features

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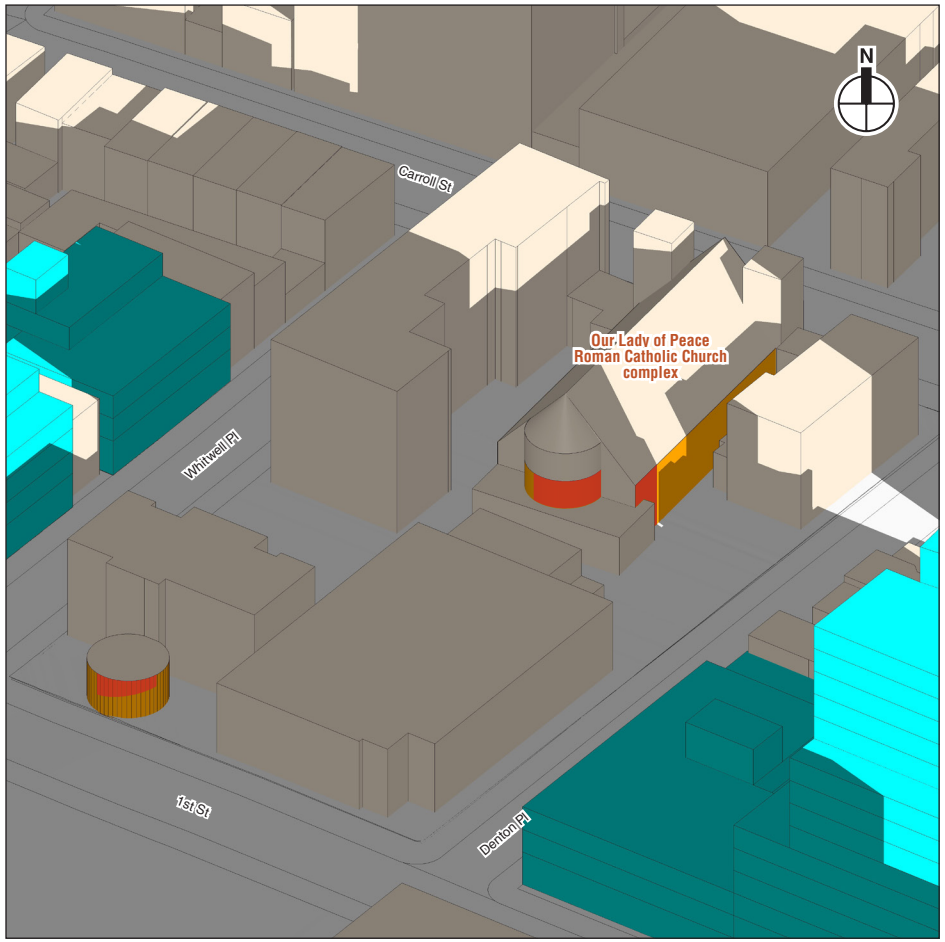

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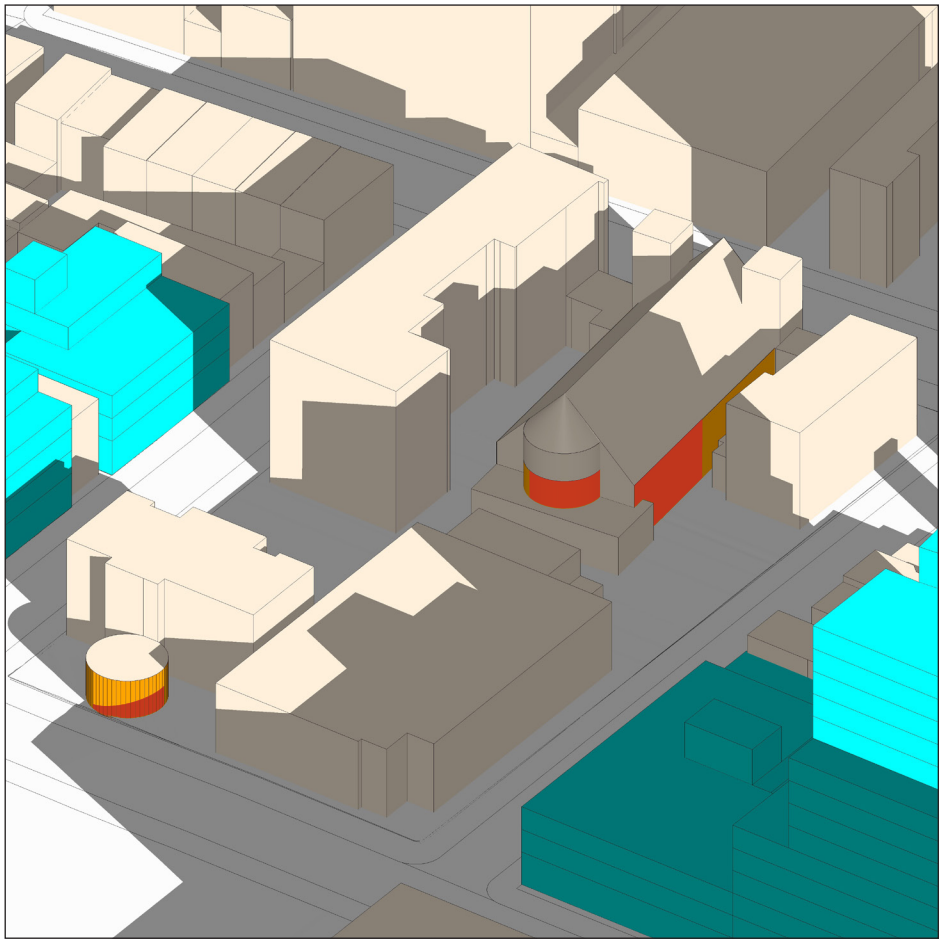

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Publicly Accessible Open Space

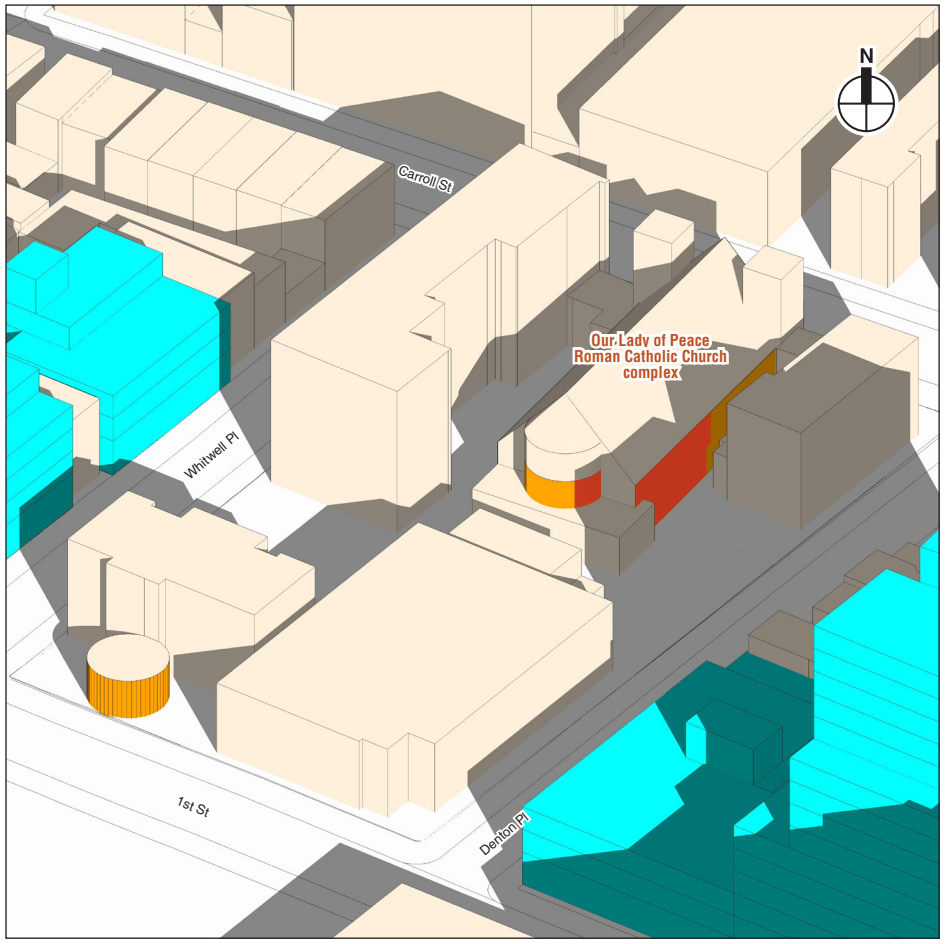
Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

Historic Resources with Sunlight-Sensitive Features

December 21

1.14.21



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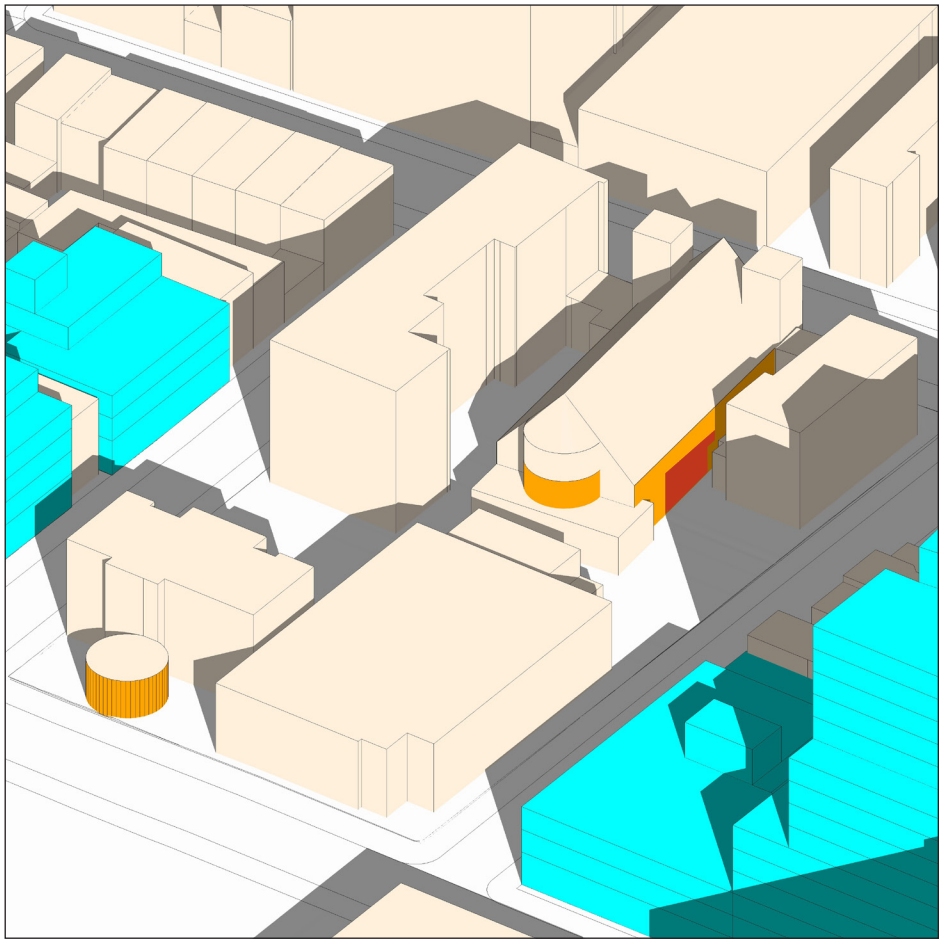

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Publicly Accessible Open Space

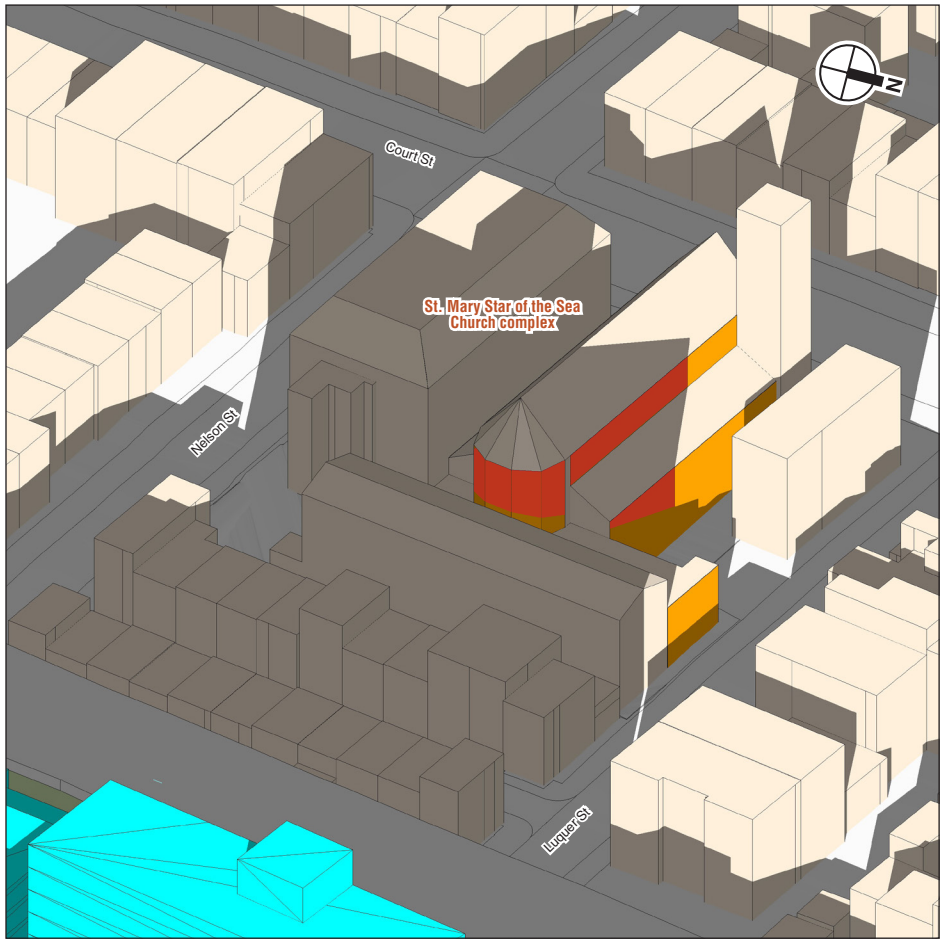
Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

Historic Resources with Sunlight-Sensitive Features

December 21

1.14.21



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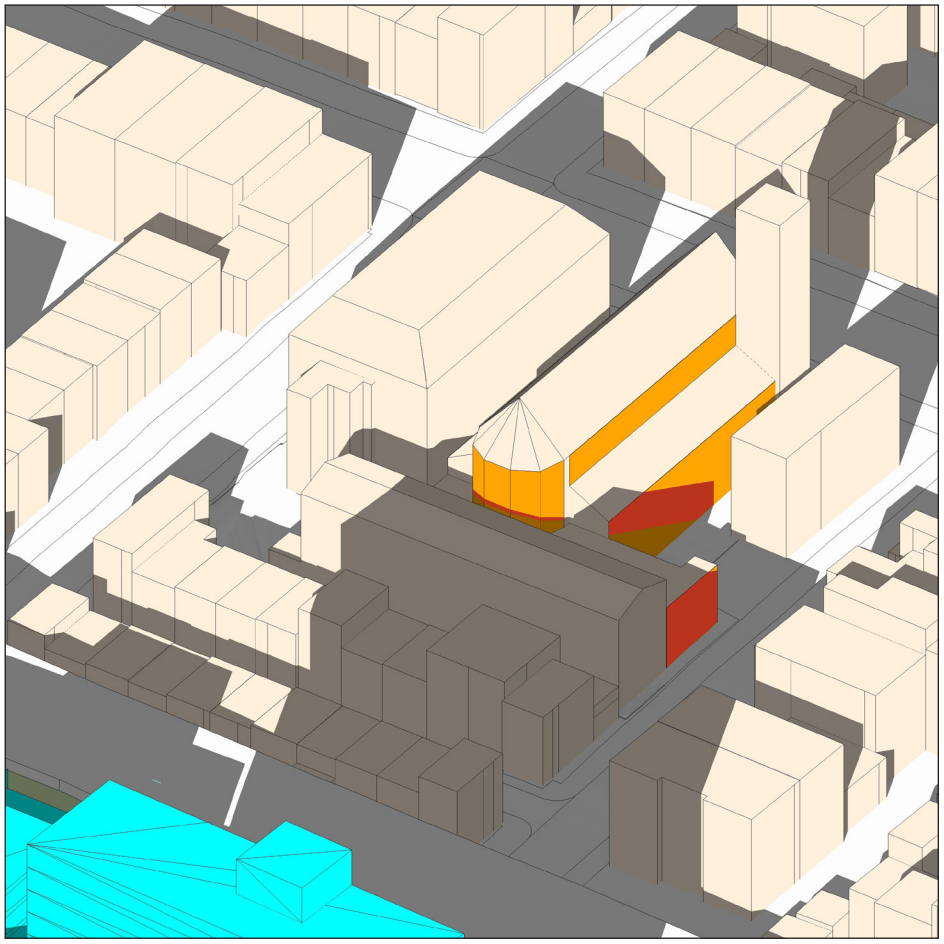

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

Historic Resources with Sunlight-Sensitive Features

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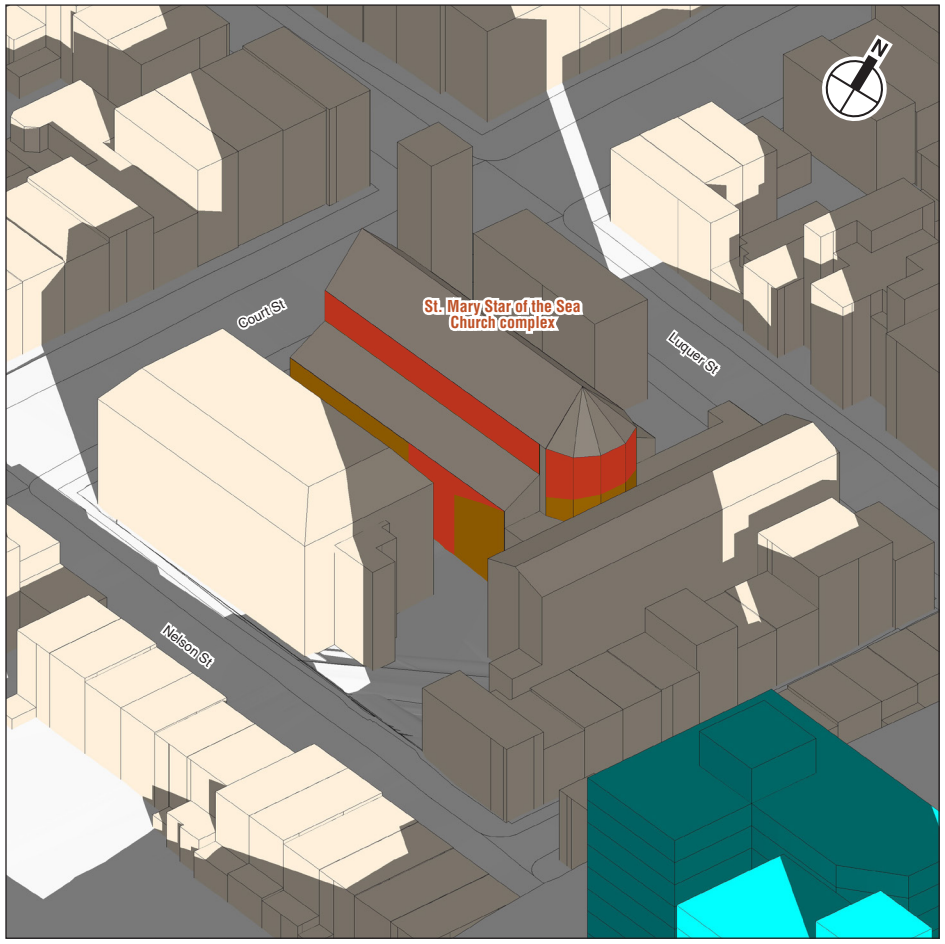

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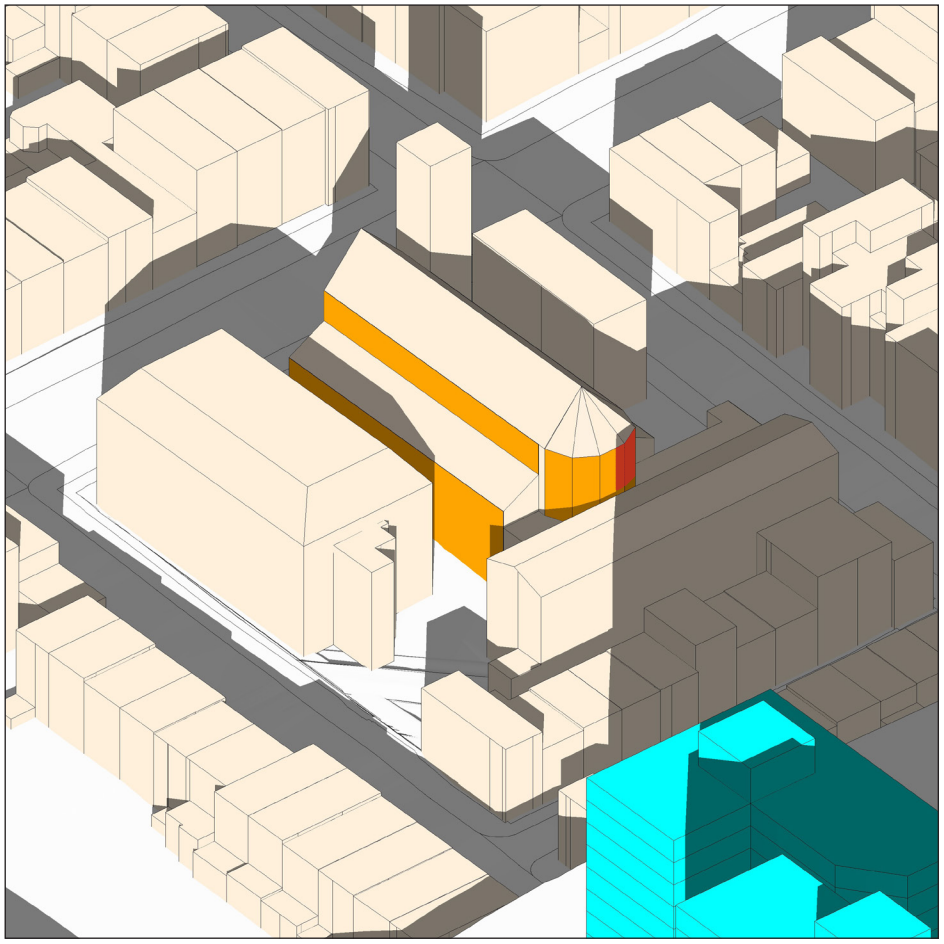

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

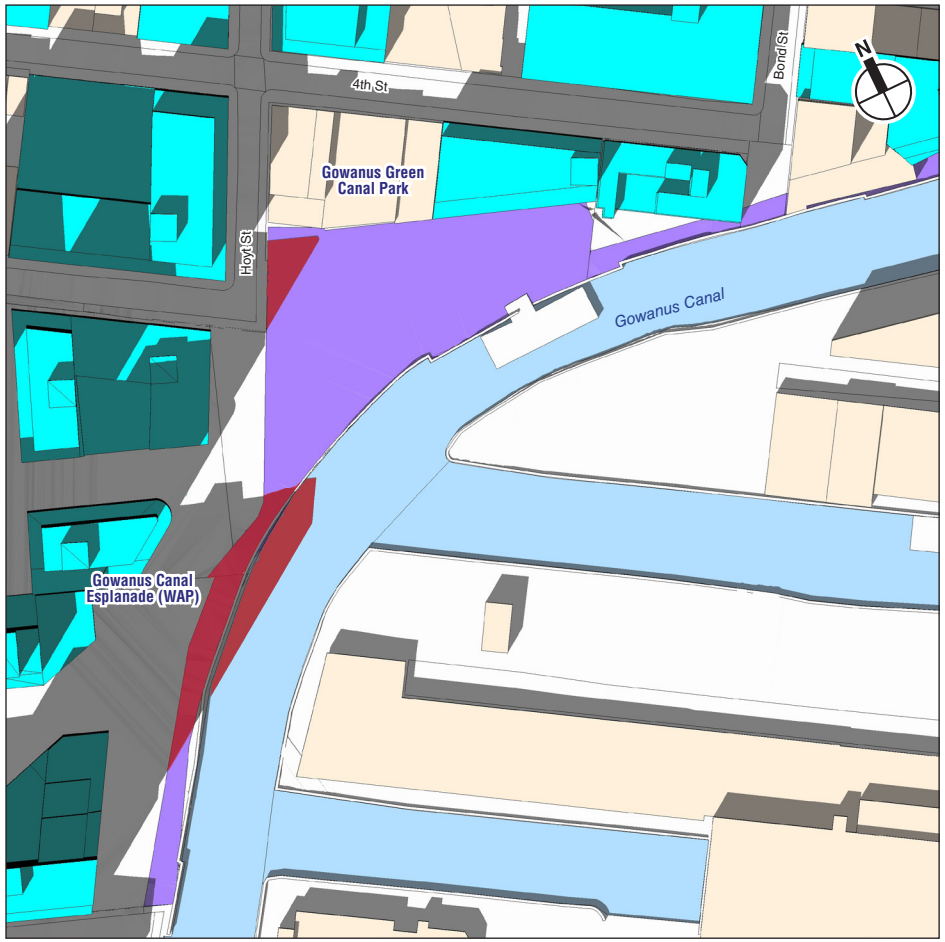
Historic Resources with Sunlight-Sensitive Features

December 21

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-81

1.14.21



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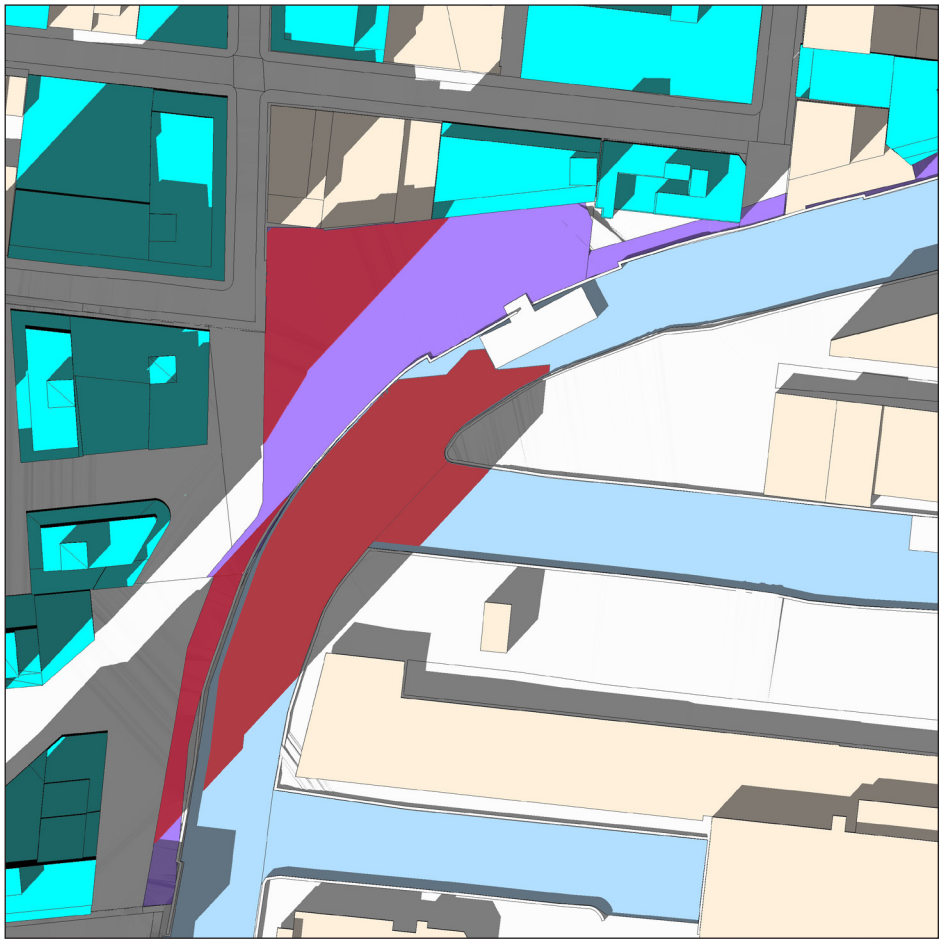

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Publicly Accessible Open Space

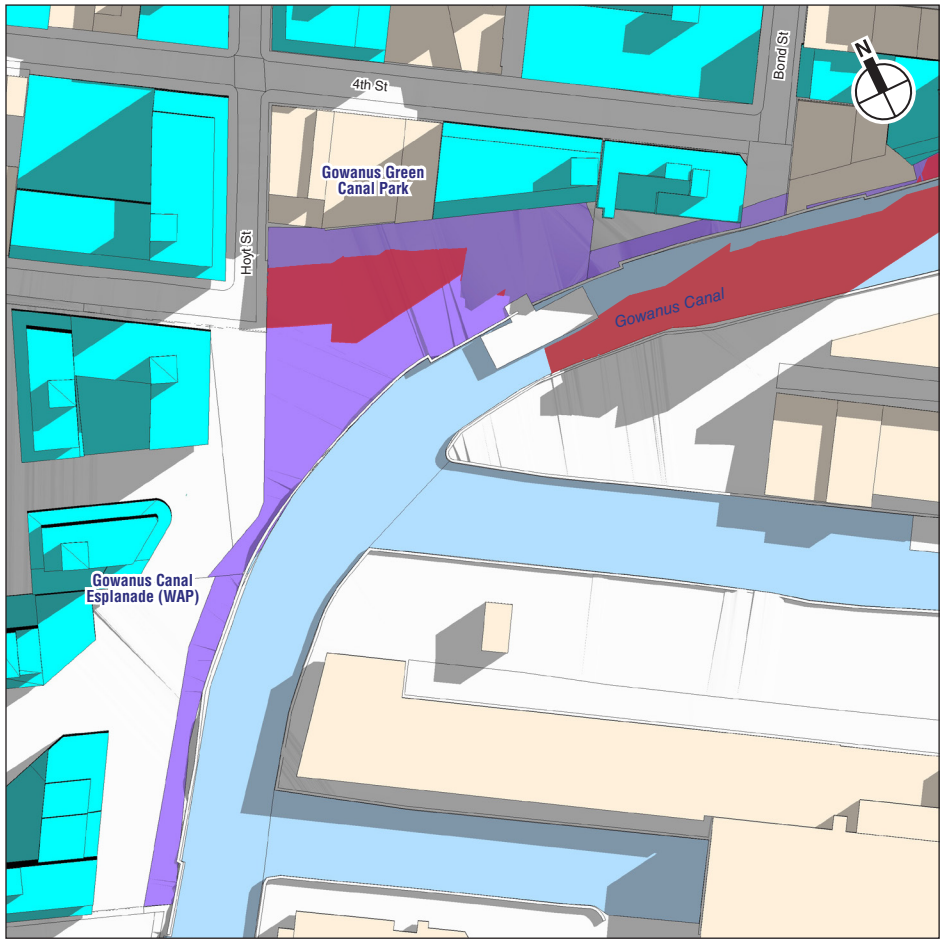
Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

Project-Generated Open Space

March 21 / September 21

1.14.21



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7:30 AM

Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

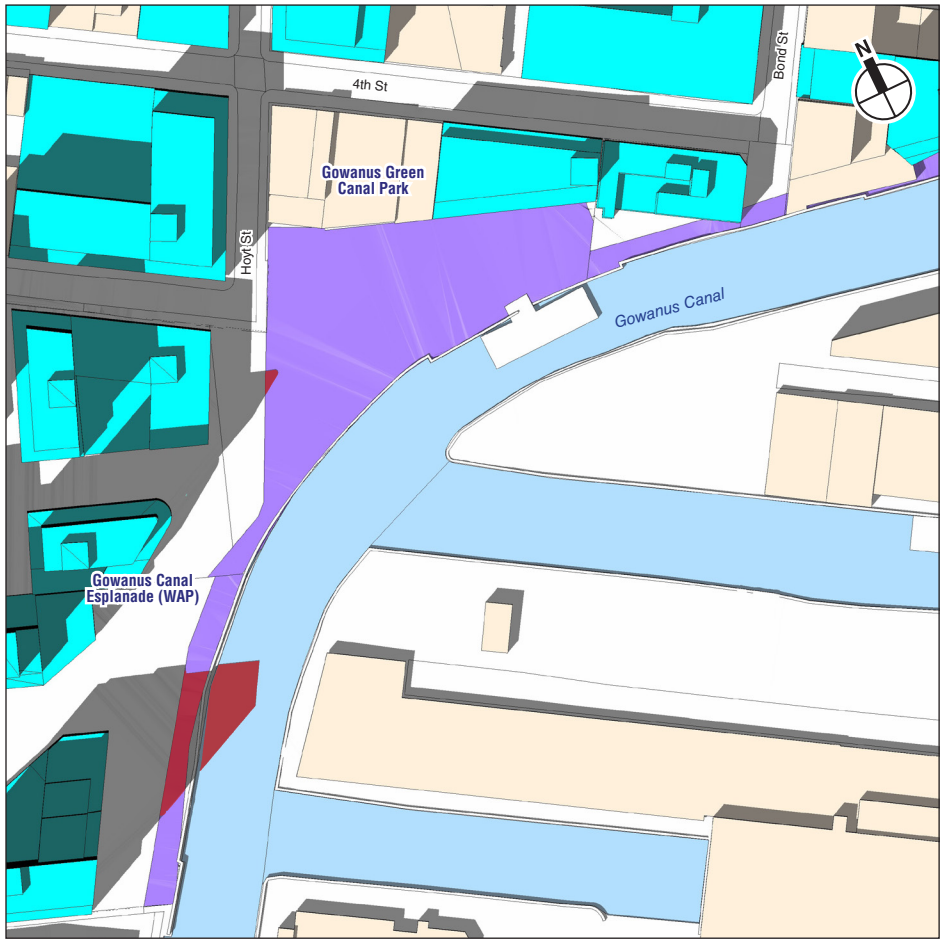
Project-Generated Open Space

May 6 / August 6

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-83

1.14.21



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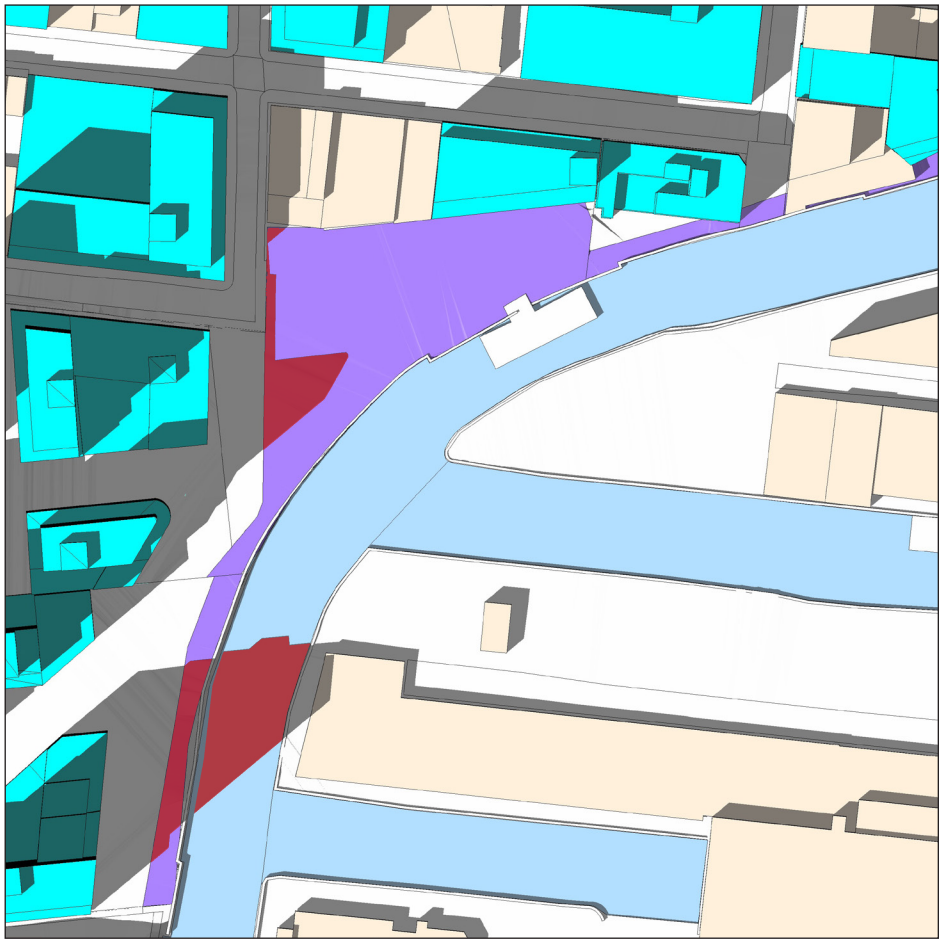

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

Project-Generated Open Space

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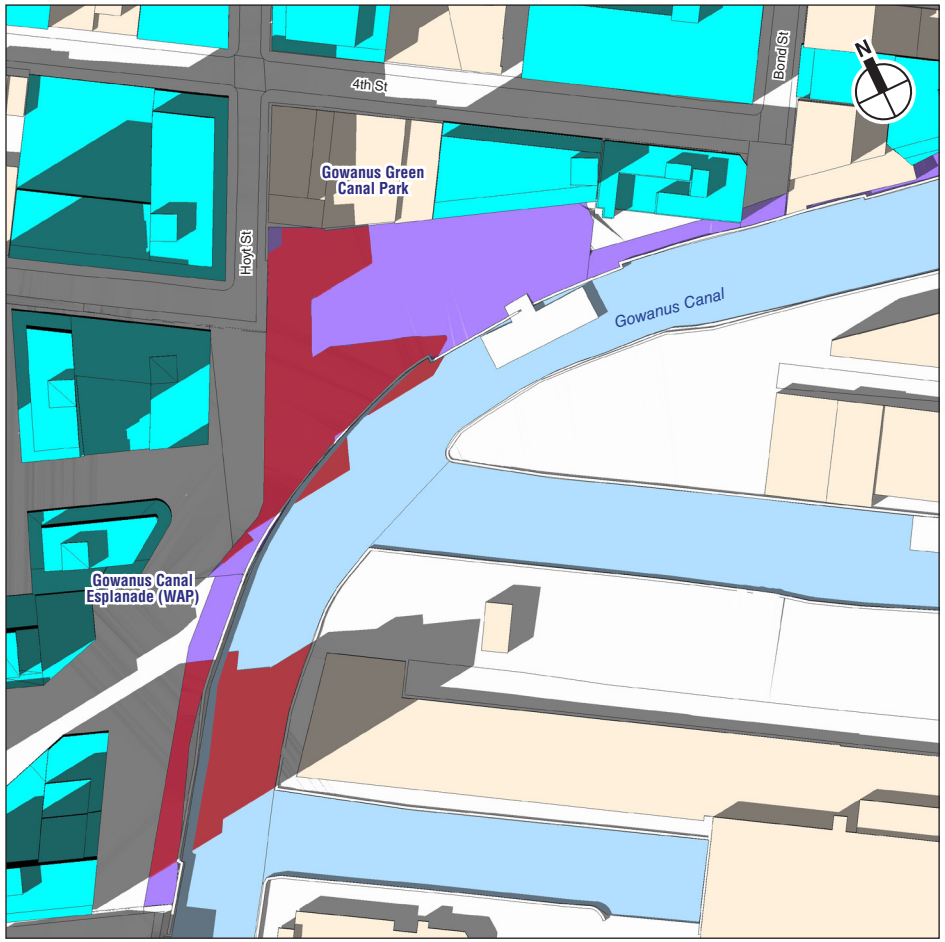

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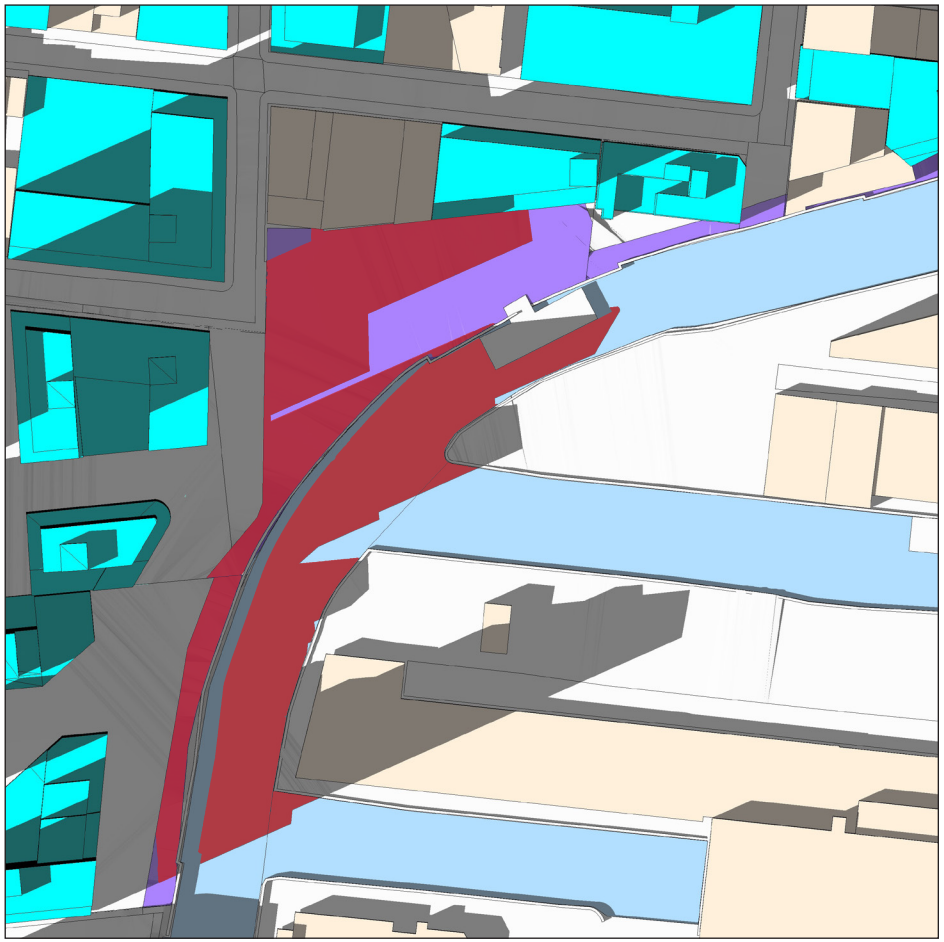

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

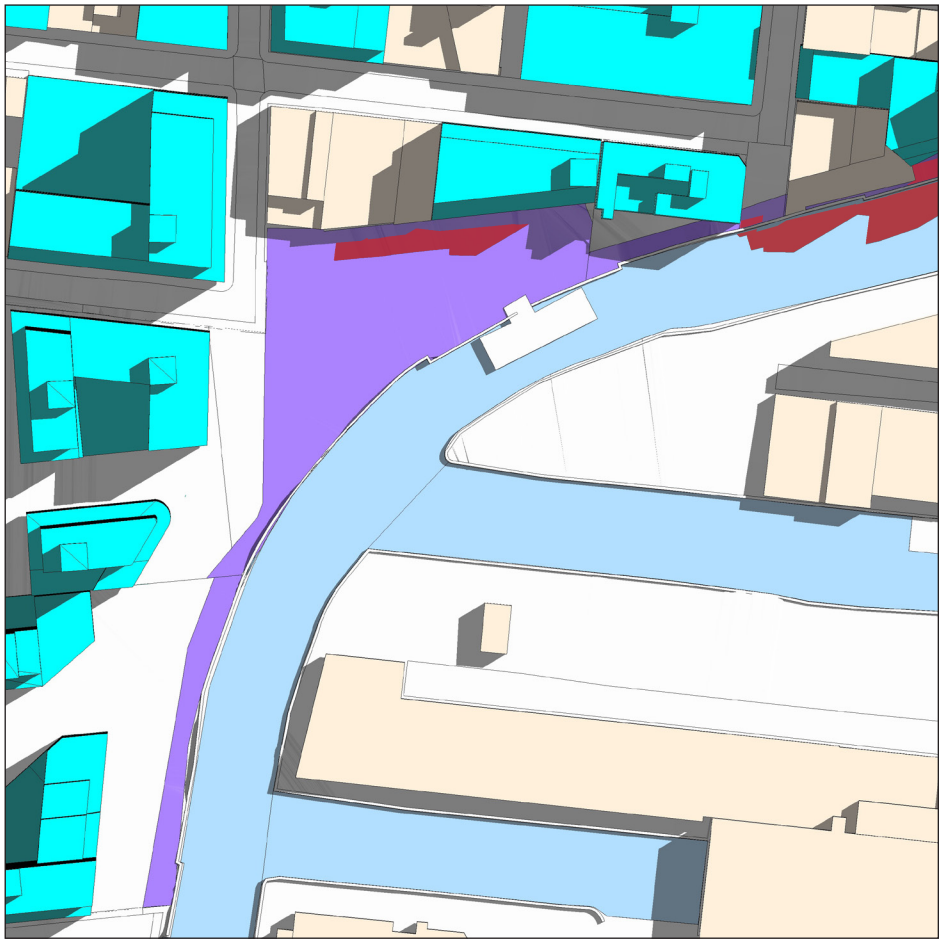
Projected and Potential Development Sites Requiring Shadow Analysis

Project-Generated Open Space

1.14.21



6:30 AM



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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

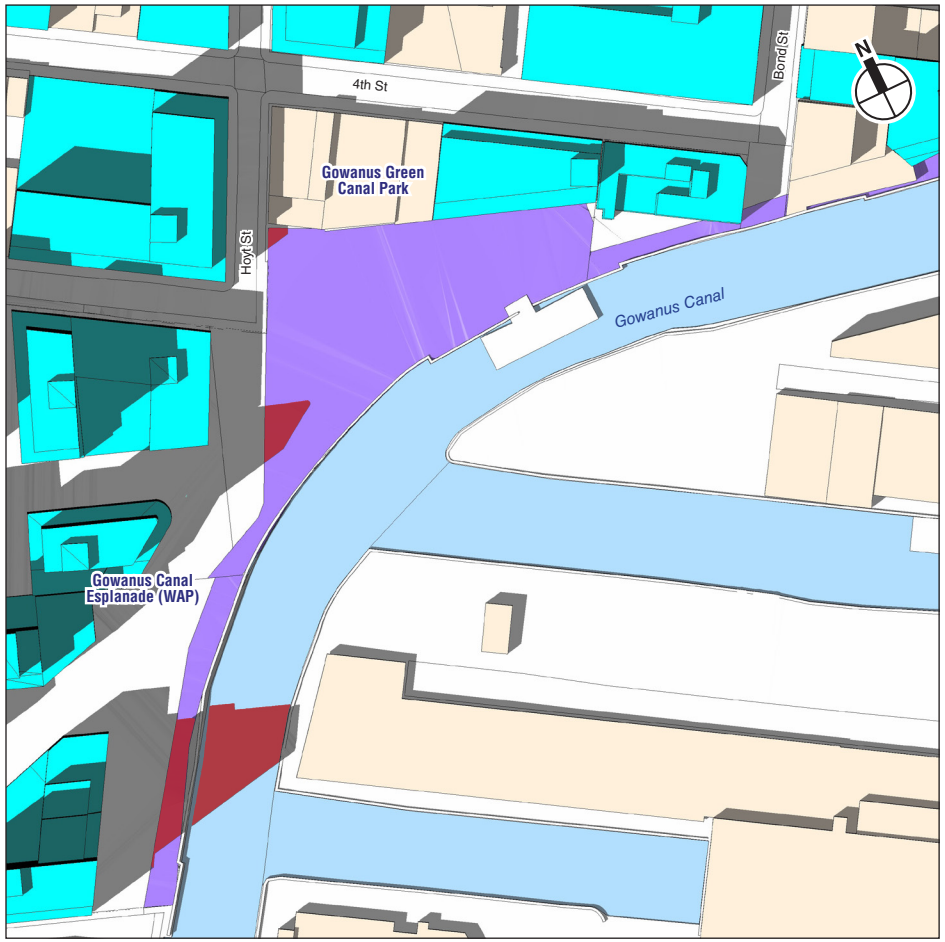
Project-Generated Open Space

June 21

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-86

1.14.21



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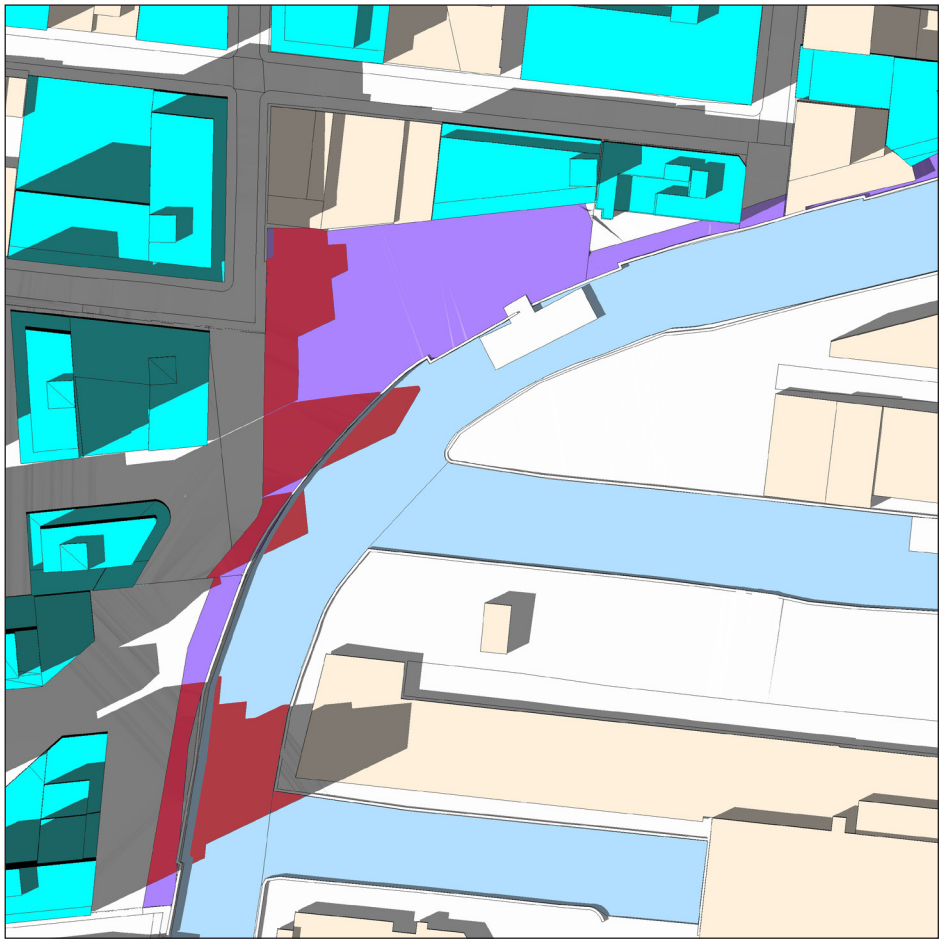

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

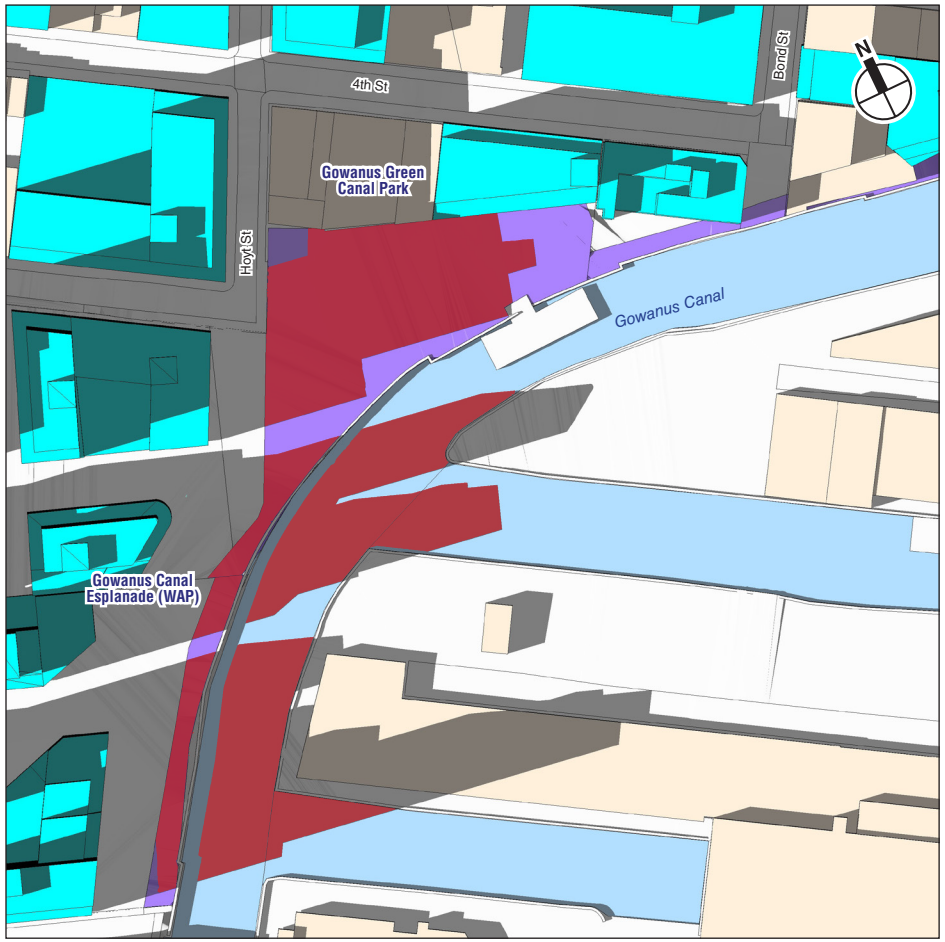
Project-Generated Open Space

June 21

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-87

1.14.21



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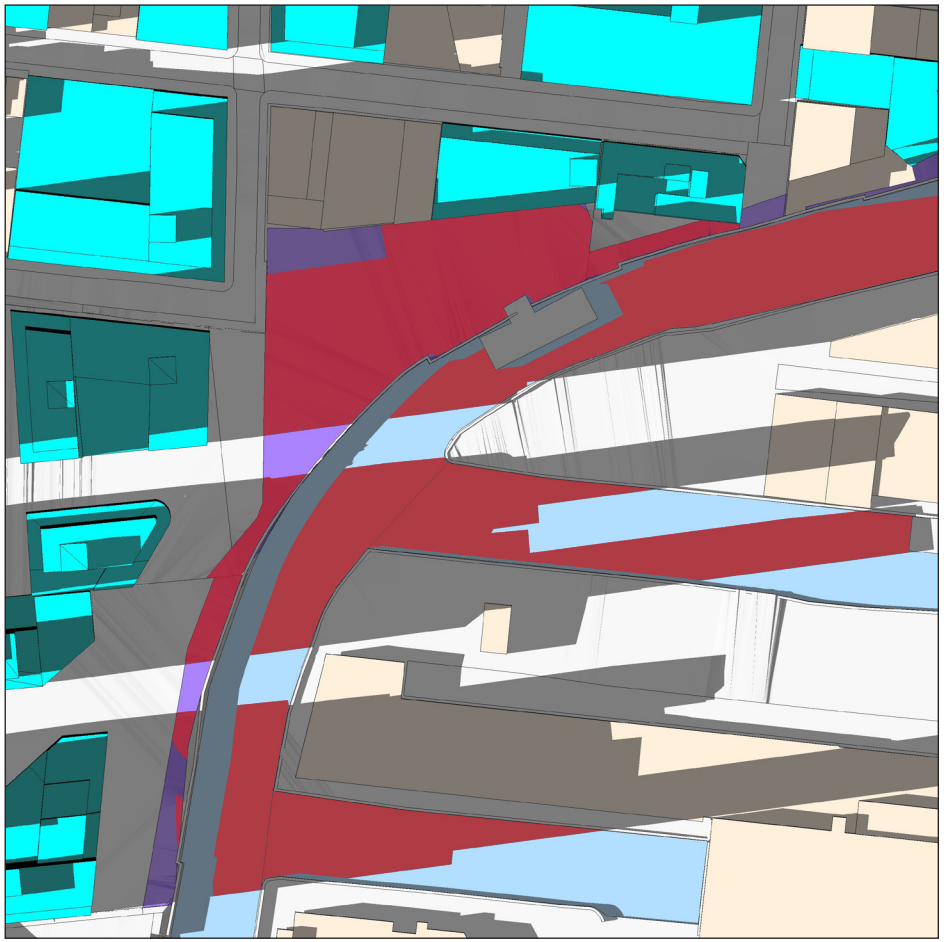

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

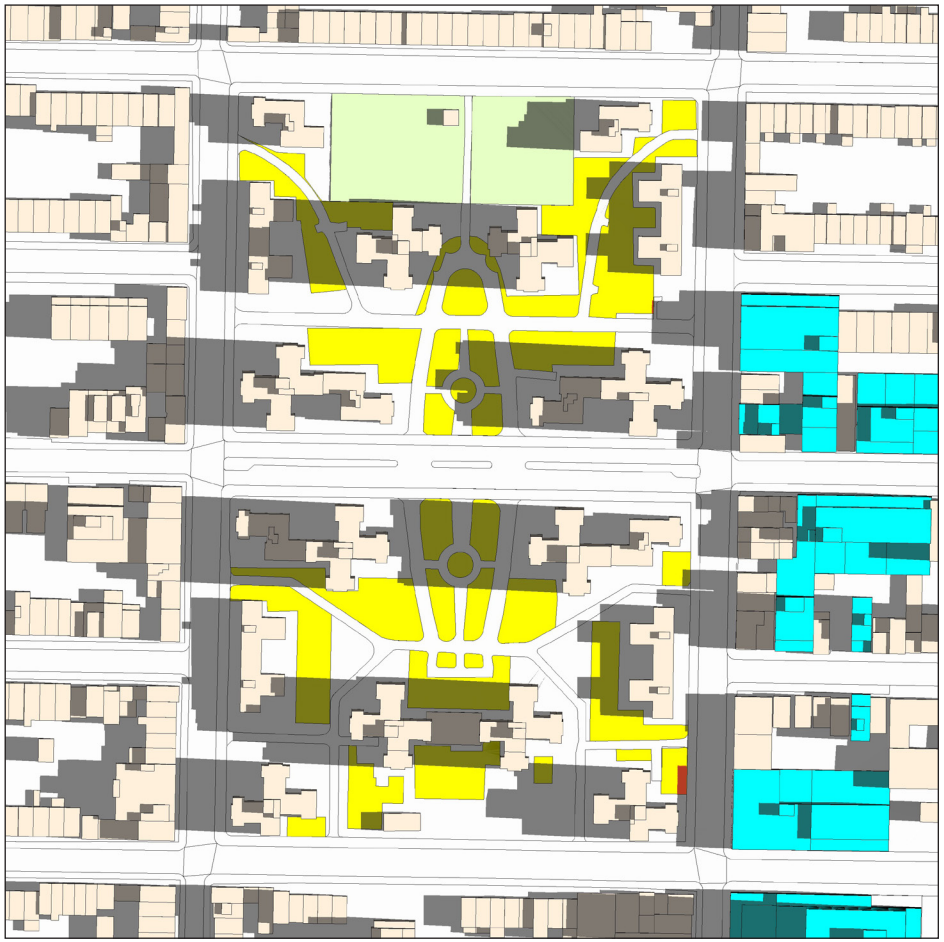
Projected and Potential Development Sites Requiring Shadow Analysis

Project-Generated Open Space

1.14.21



7:45 AM



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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

NYCHA Open Space

March 21 / September 21

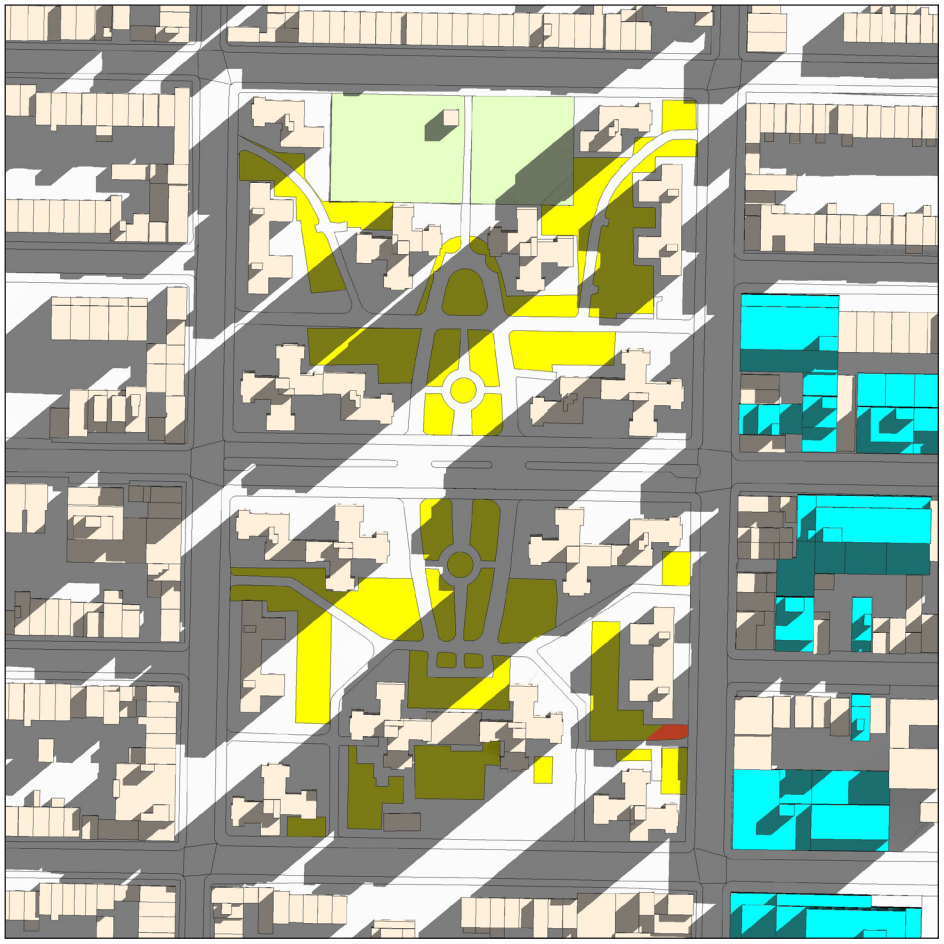
GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-89

1.14.21



6:00 AM



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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

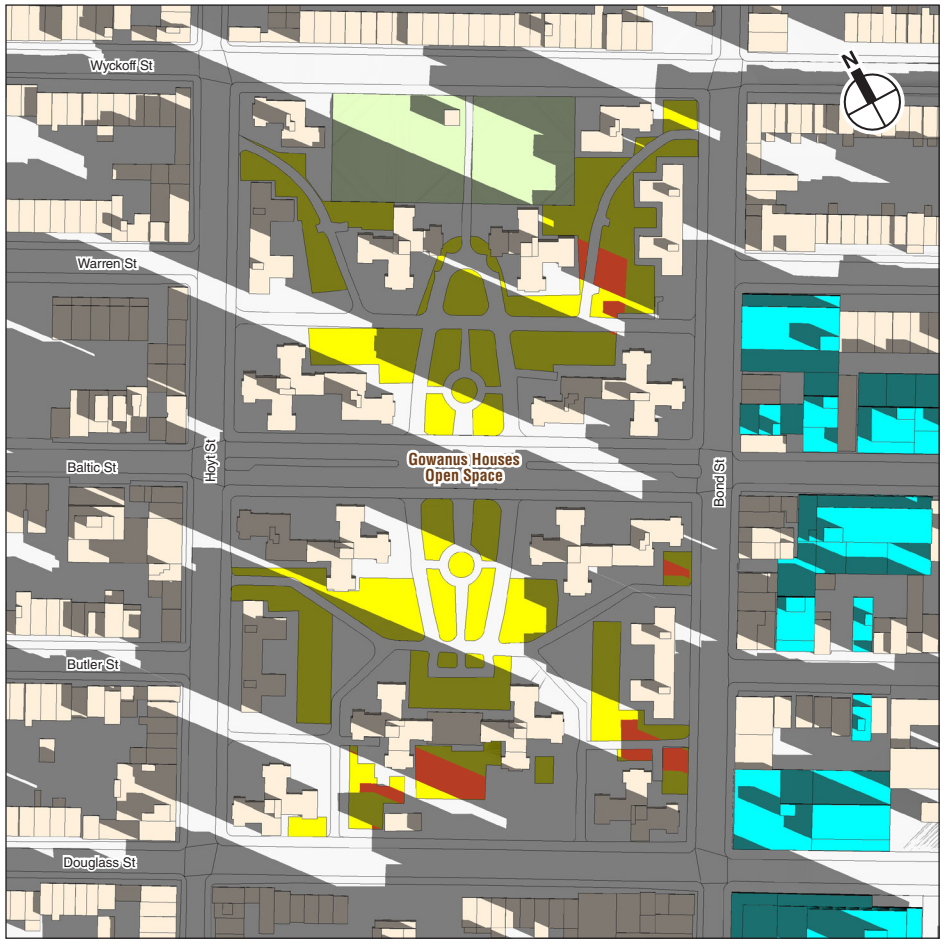
NYCHA Open Space

June 21

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-90

1.14.21



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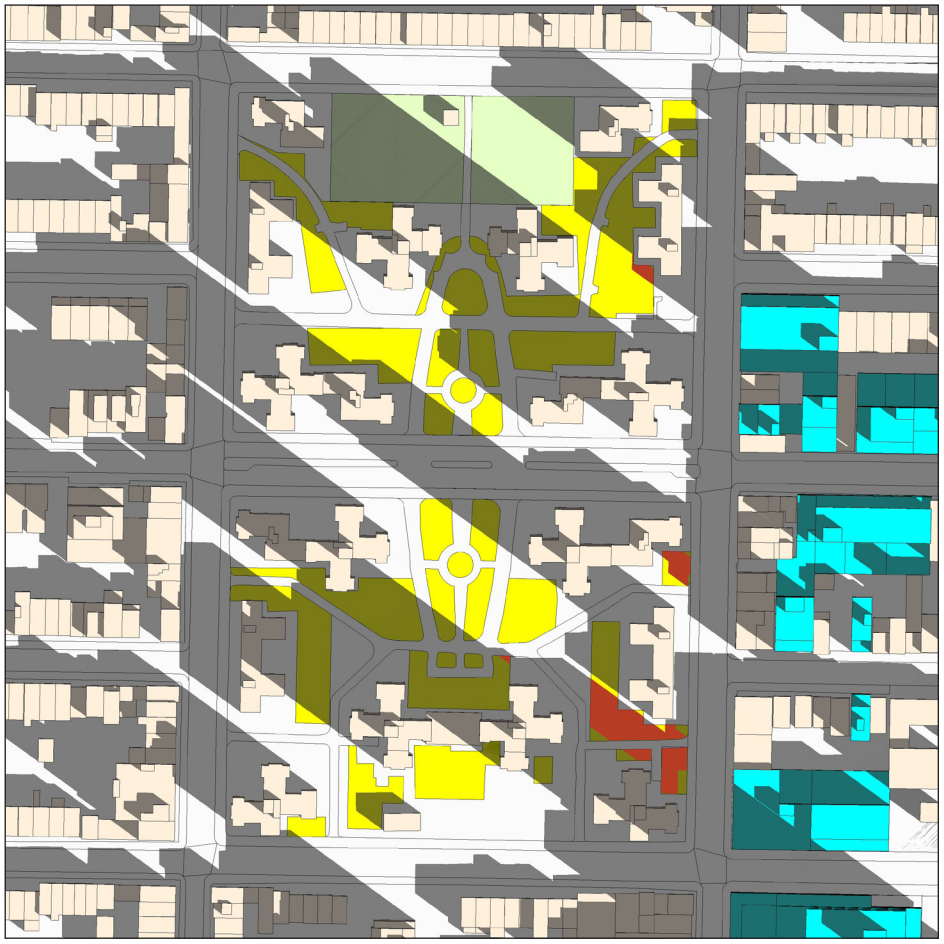


10:00 AM

Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

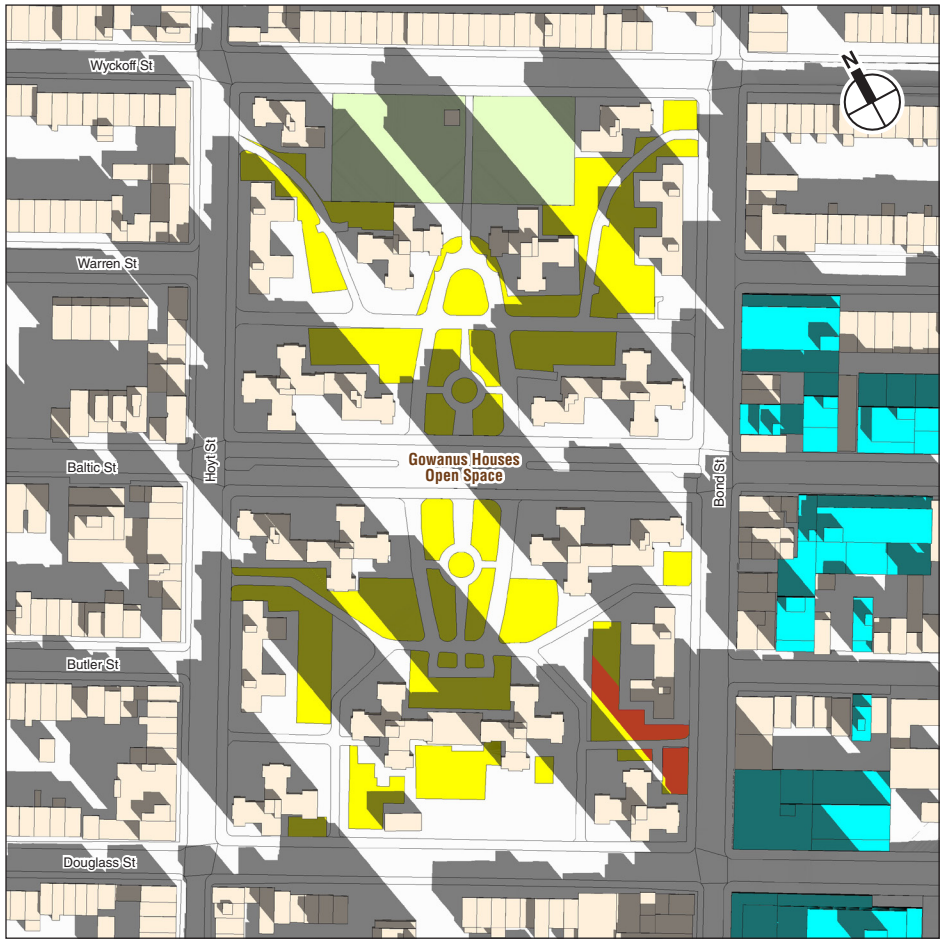
NYCHA Open Space

December 21

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-91

1.14.21



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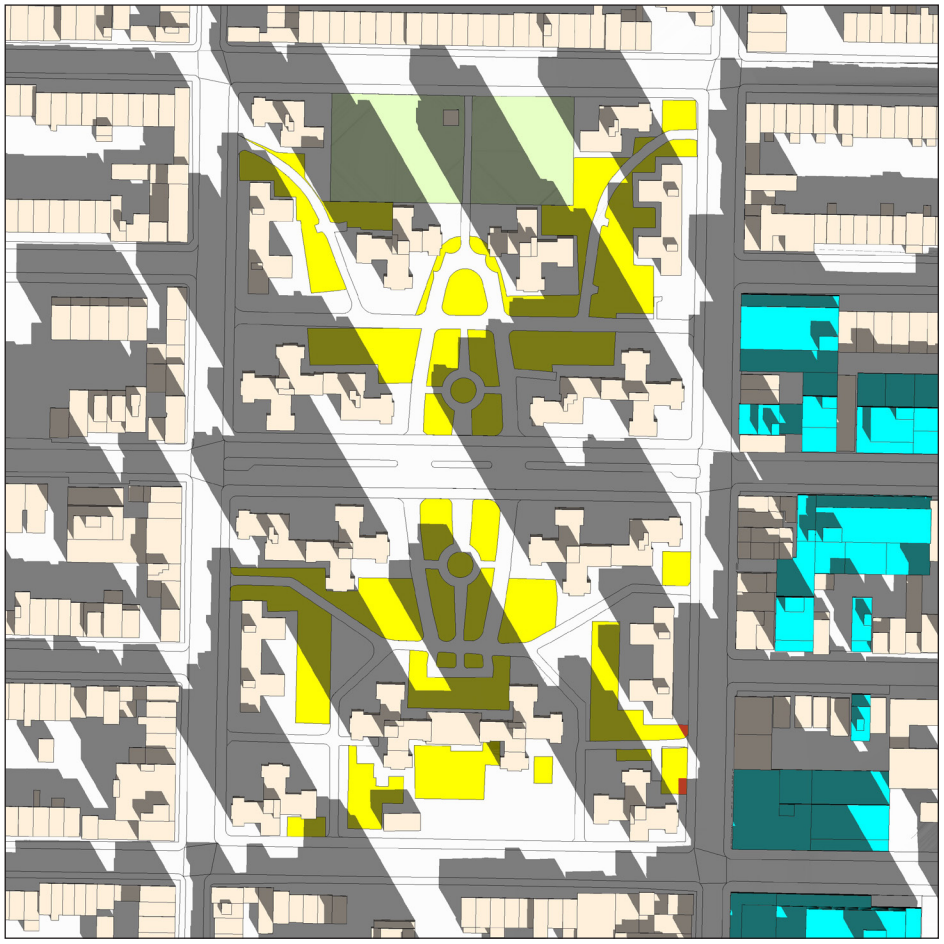

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Publicly Accessible Open Space

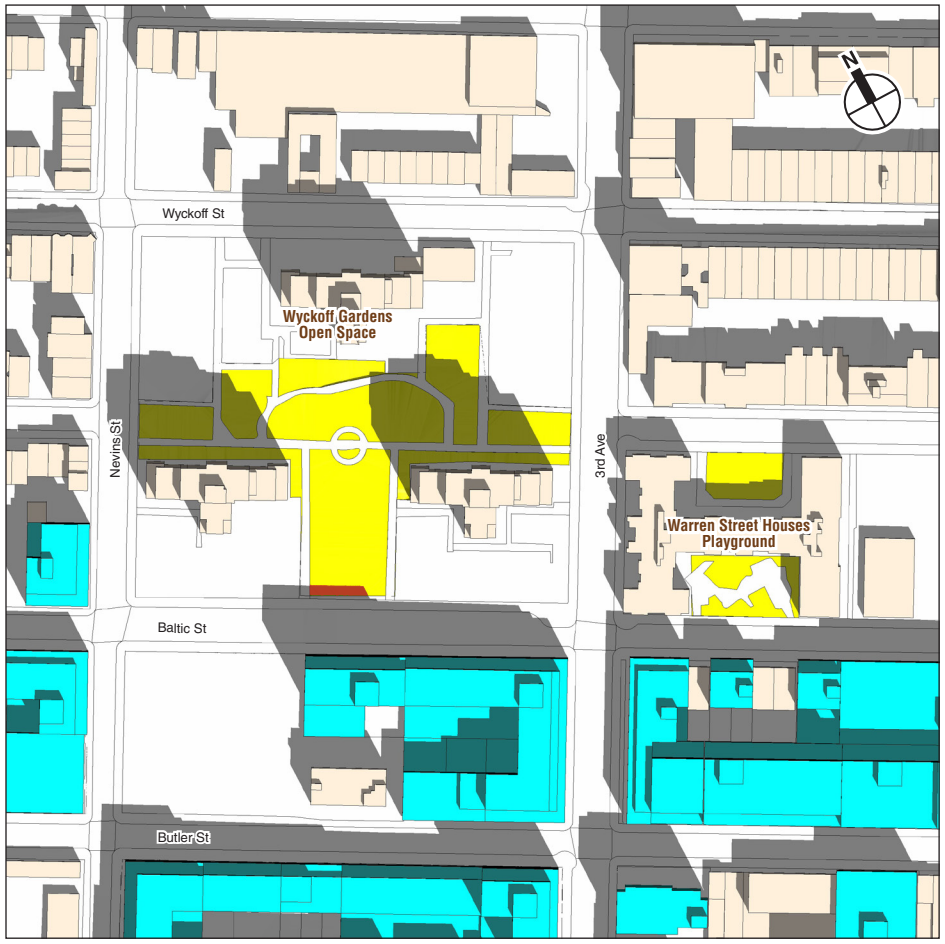
Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

NYCHA Open Space

December 21

1.14.21



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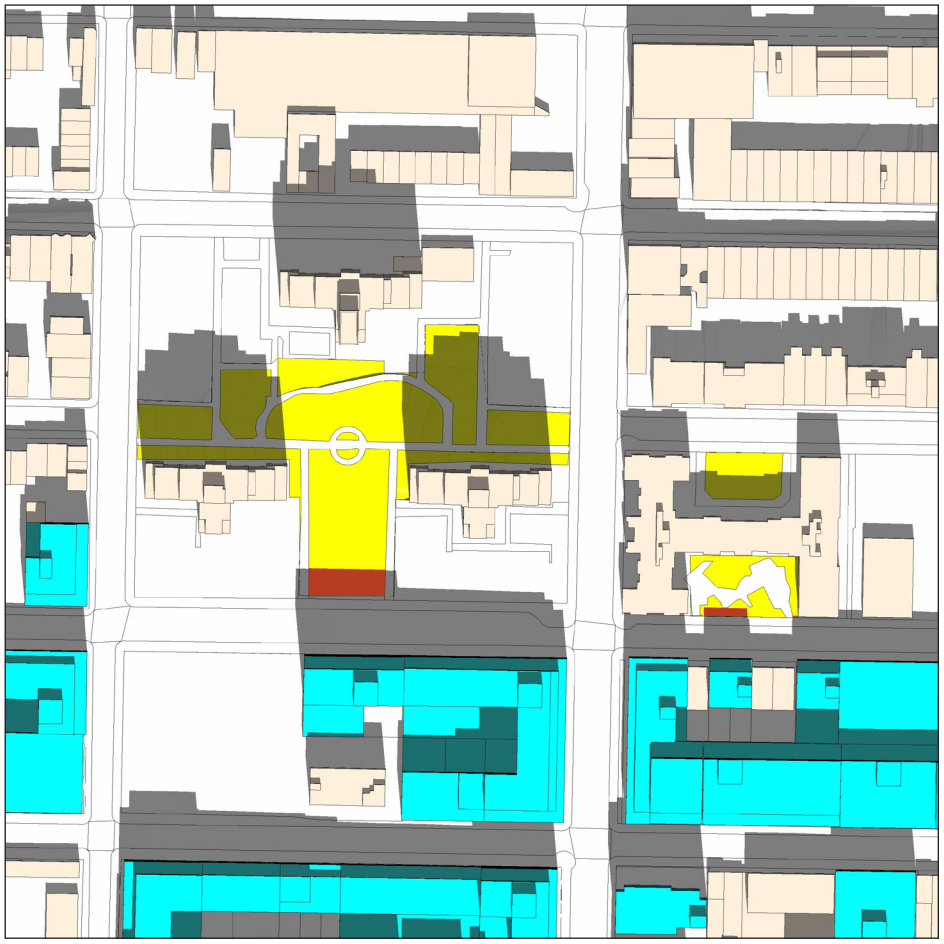

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Publicly Accessible Open Space

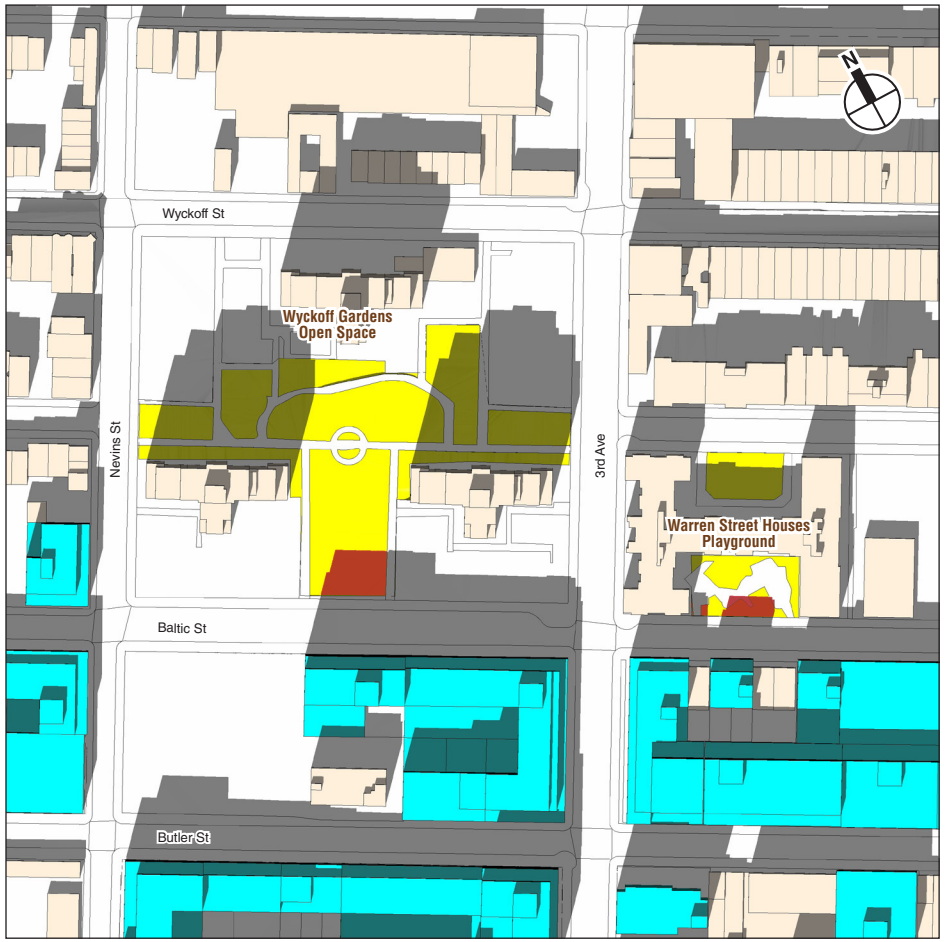
Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

NYCHA Open Space

March 21 / September 21

1.14.21



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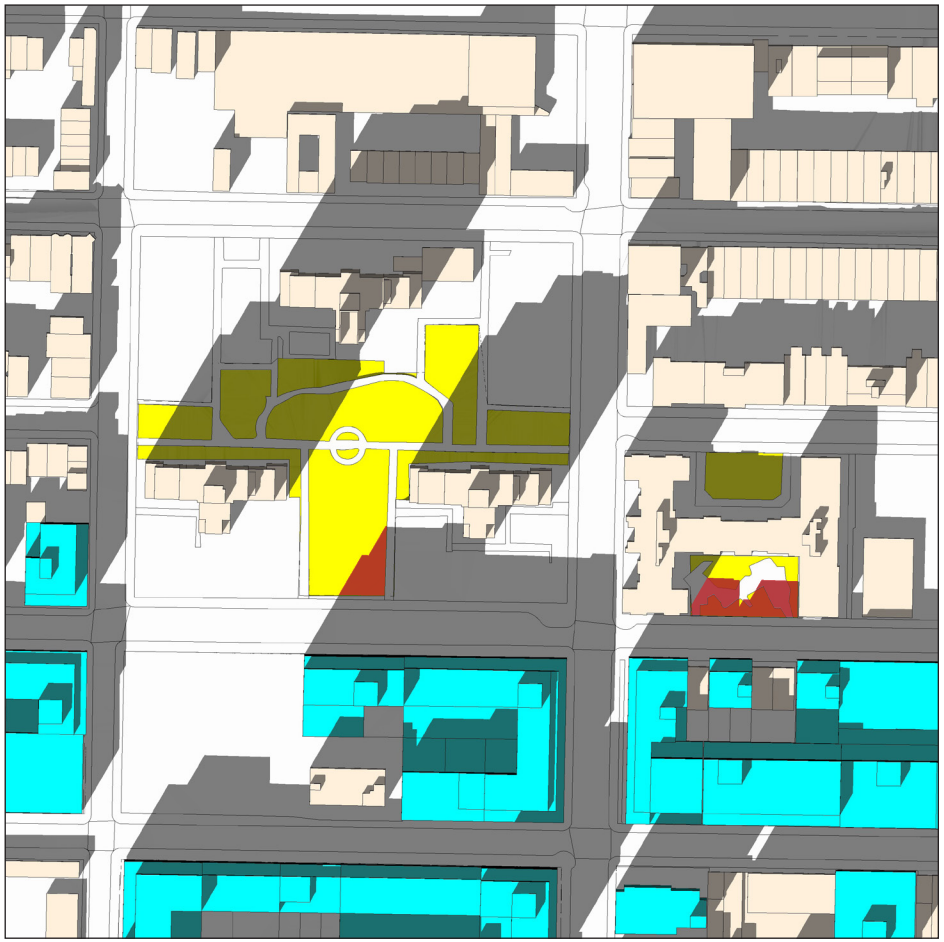

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Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

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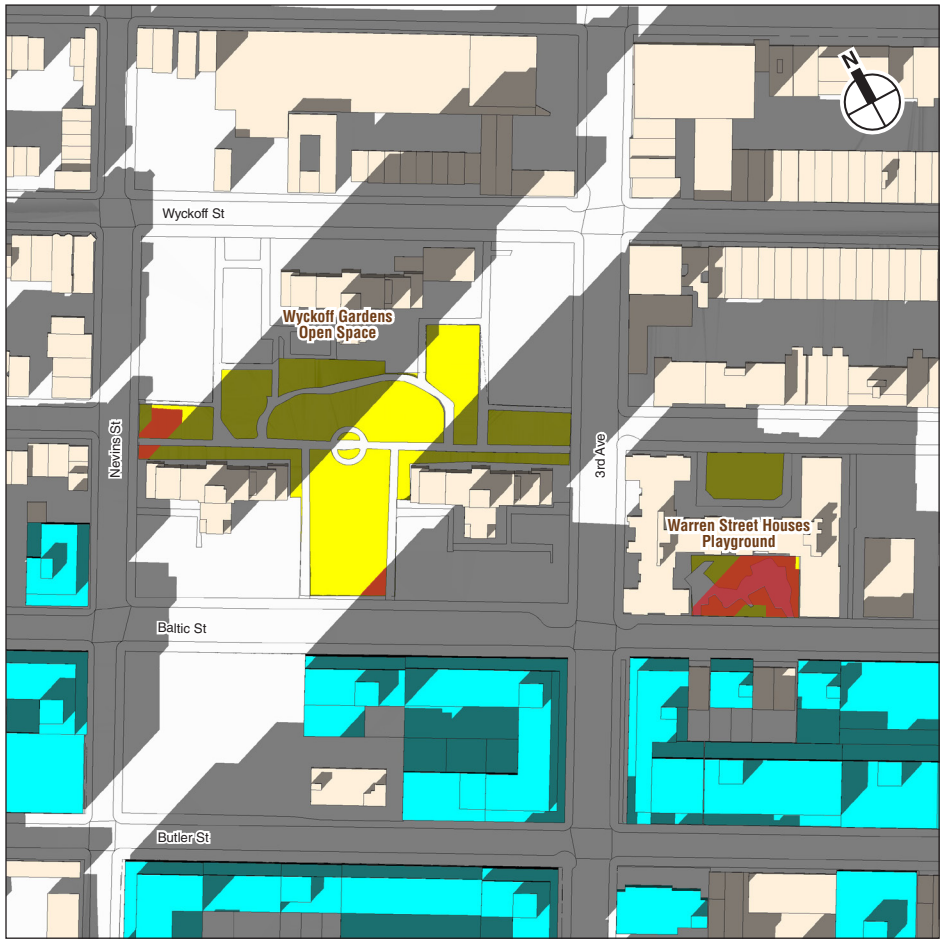
NYCHA Open Space

March 21 / September 21

1.14.21



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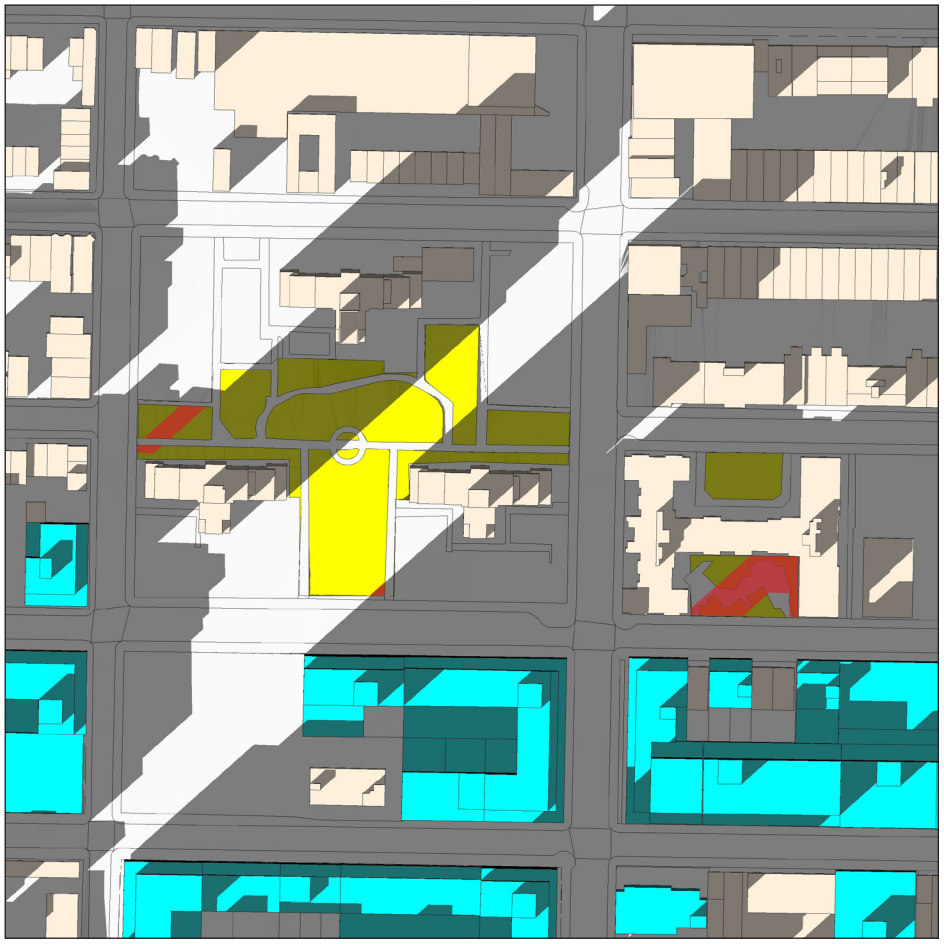

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Publicly Accessible Open Space

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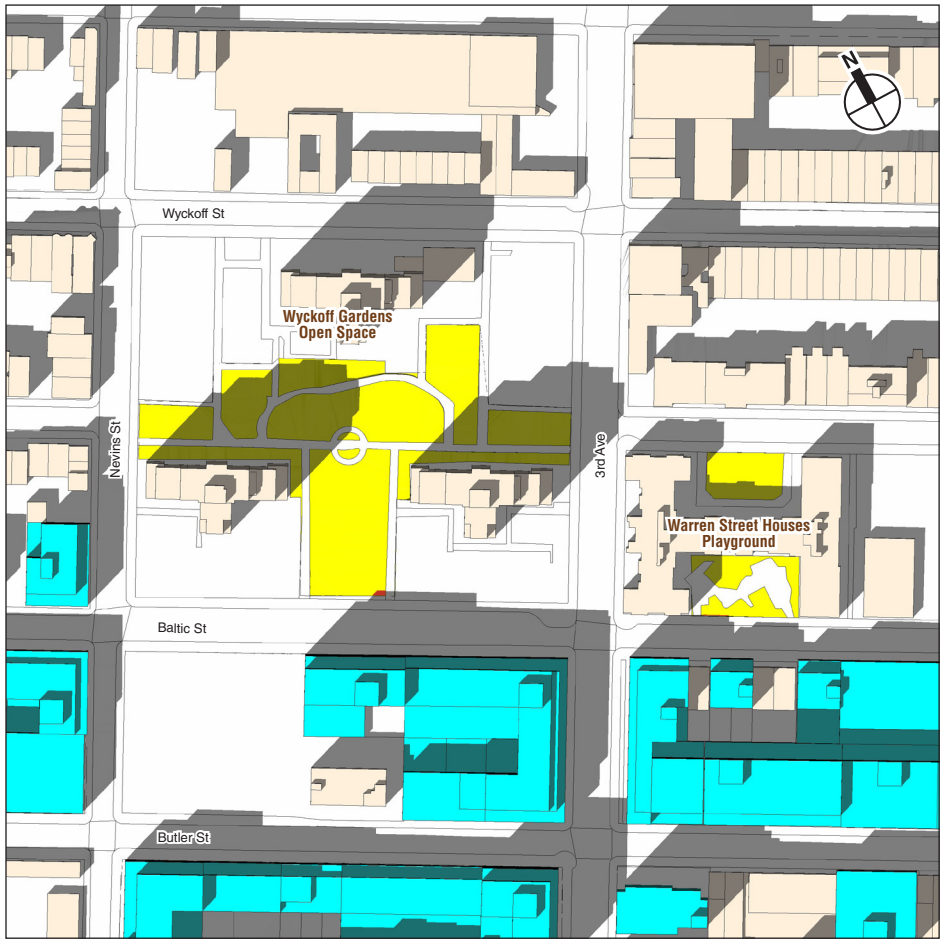
NYCHA Open Space

March 21 / September 21

1.14.21



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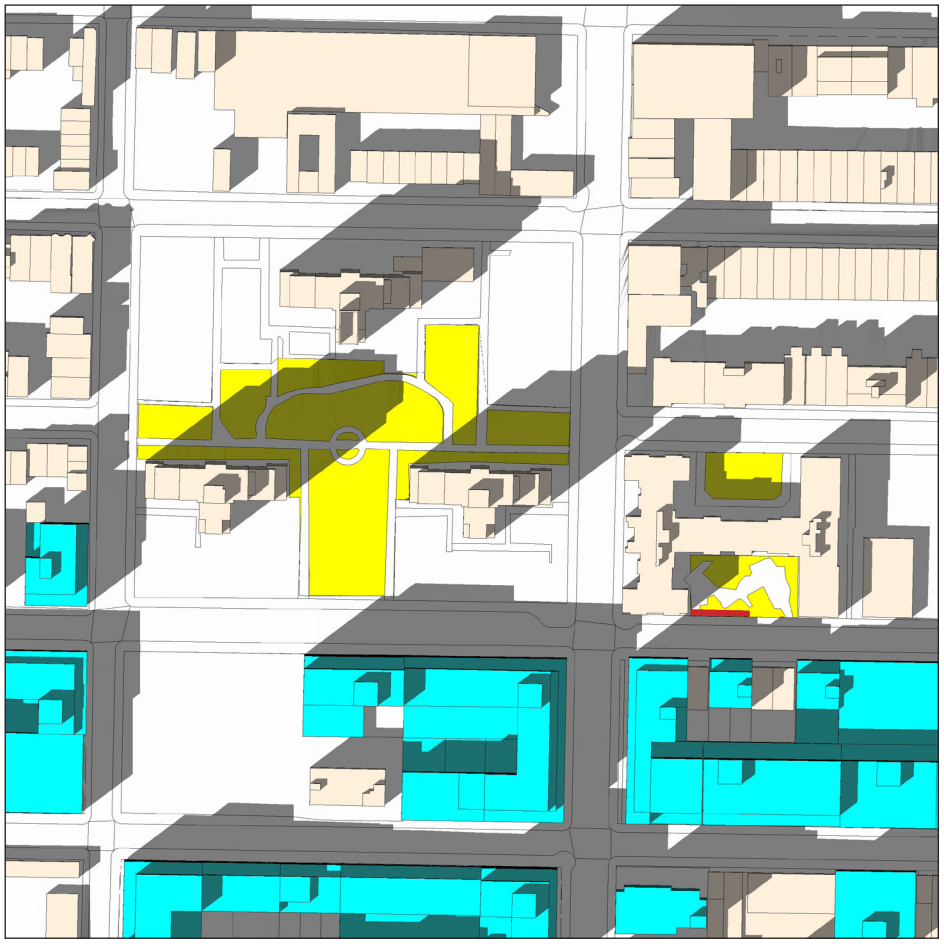

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Publicly Accessible Open Space

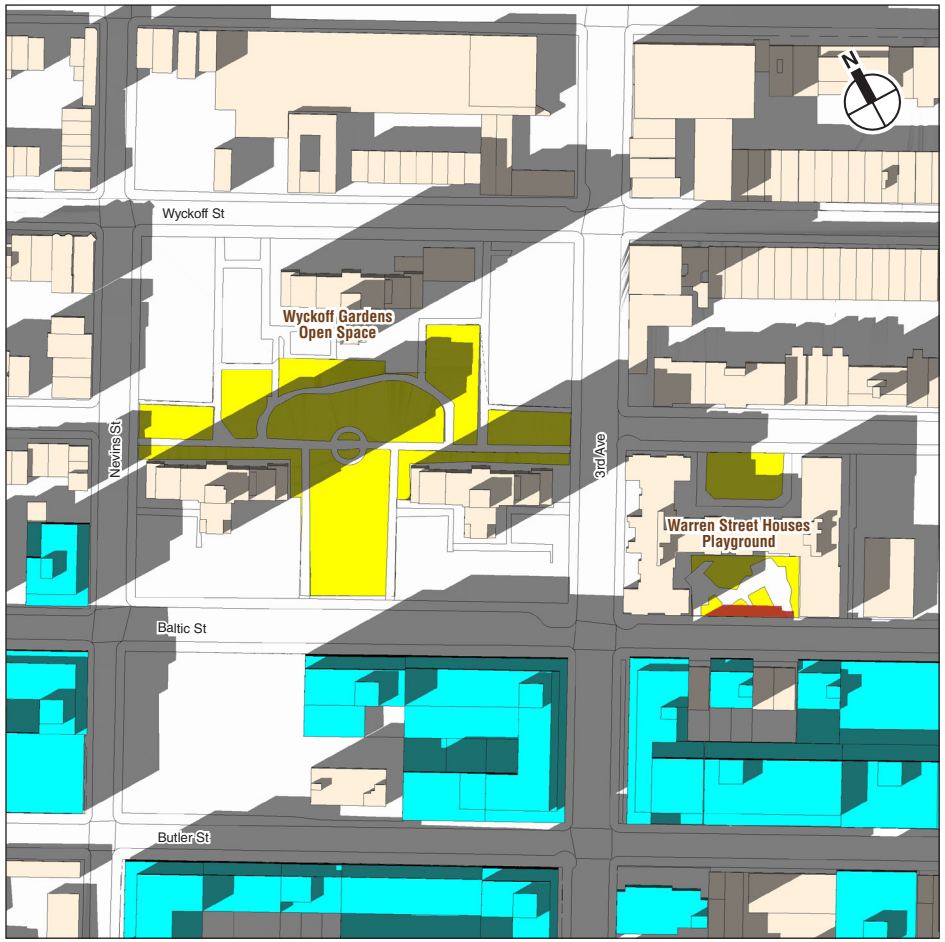
Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

NYCHA Open Space

May 6 / August 6

1.14.21



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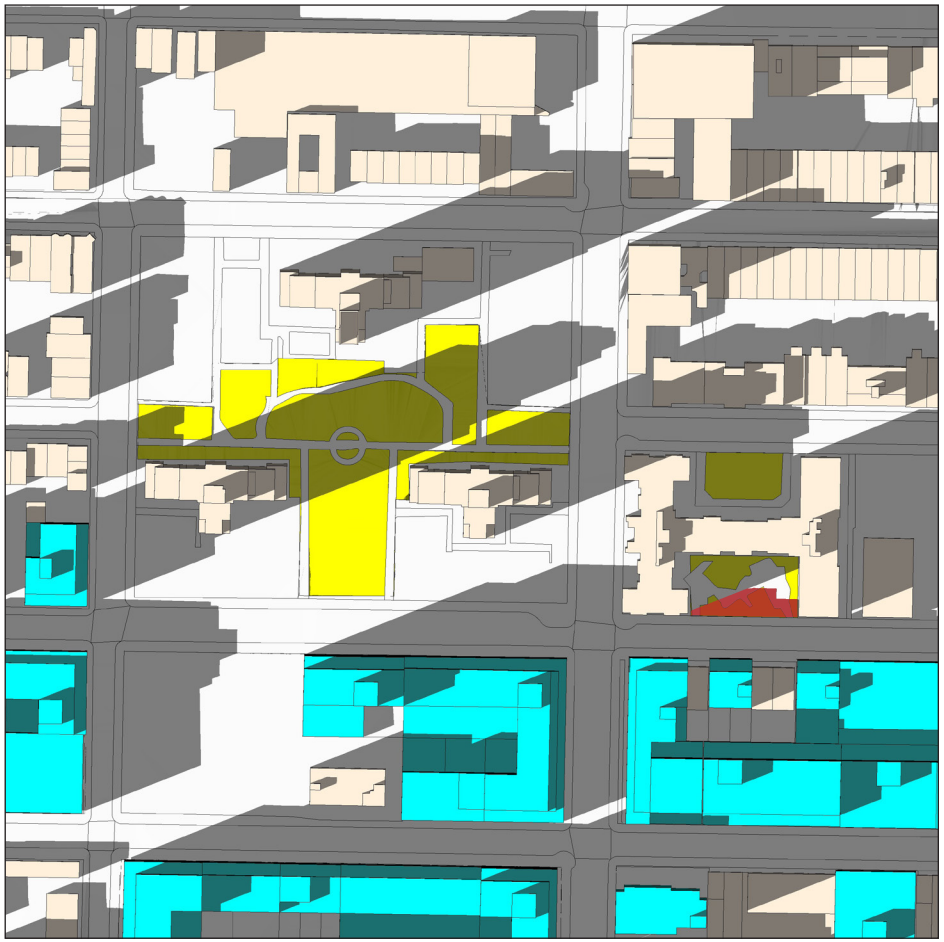

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Publicly Accessible Open Space

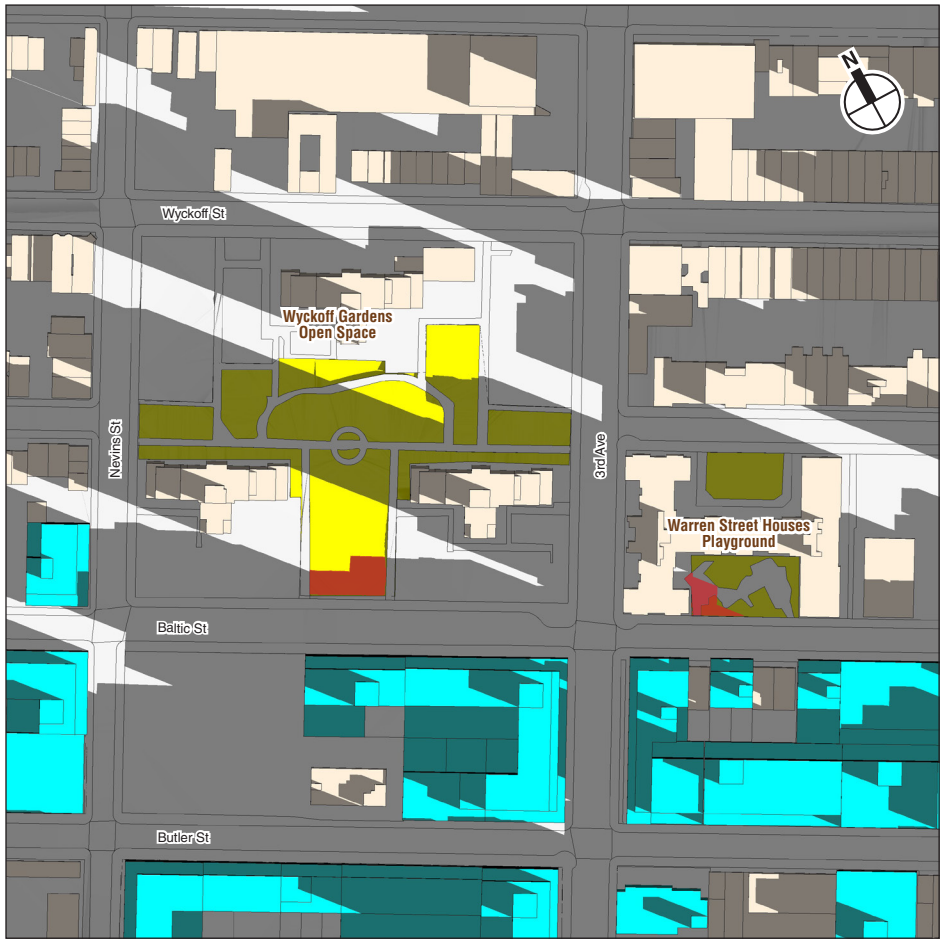
Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

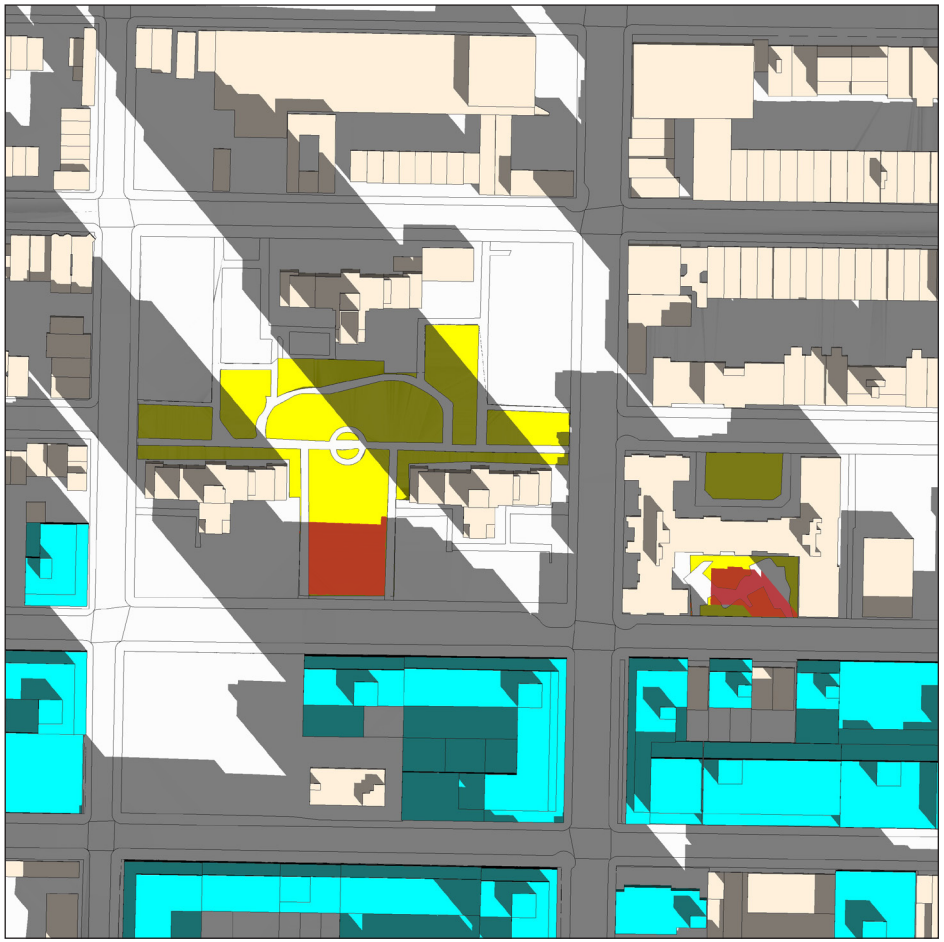
NYCHA Open Space

May 6 / August 6

1.14.21



8:51 AM



11:00 AM

Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

NYCHA Open Space

December 21

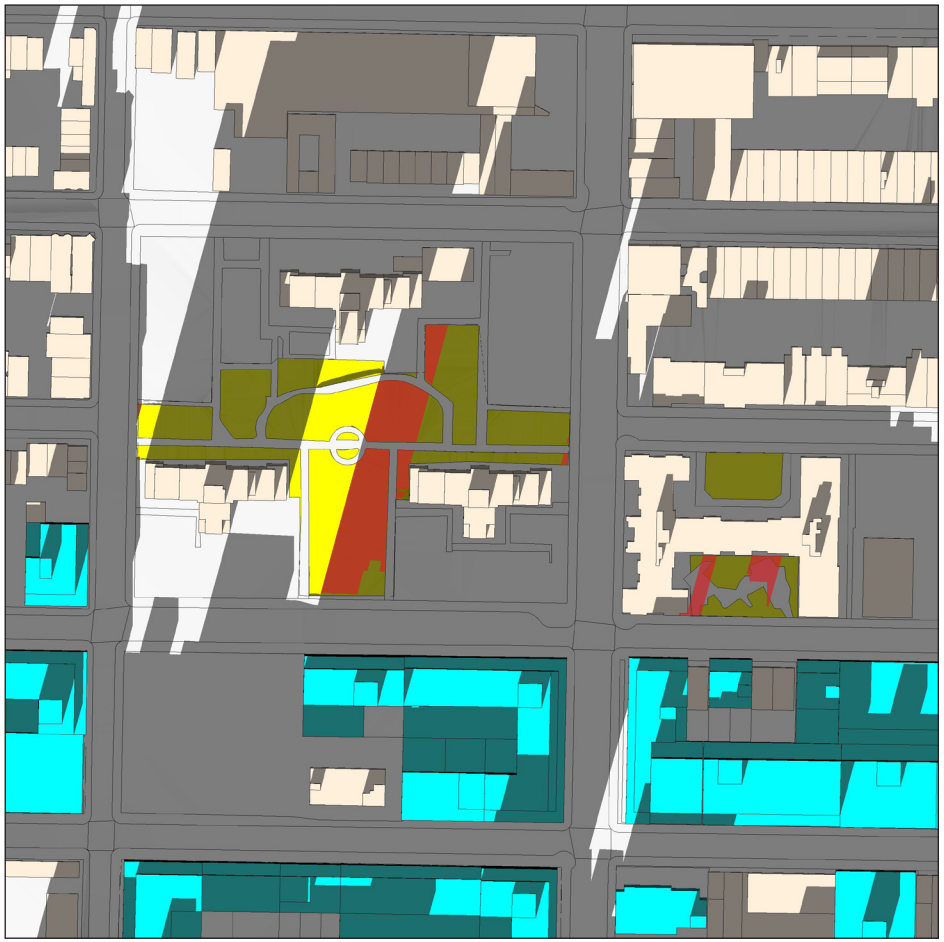
GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-98

1.14.21



1:00 PM



2:52 PM

Publicly Accessible Open Space

Incremental Shadow on Sunlight-Sensitive Resource

Projected and Potential Development Sites Requiring Shadow Analysis

NYCHA Open Space

December 21

GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS

Figure 6-99

Table 6-2
Incremental Shadow Durations

	March 21 7:36 AM–4:29 PM	May 6 6:27 AM–5:18 PM	June 21 5:57 AM–6:01 PM	December 21 8:51 AM–2:53 PM
Publicly Accessible Open Spaces				
Greenstreet on Douglass Street	2:15PM–4:29 PM Total: 2 hr 14 min	1:45 PM–5:18 PM Total: 3 hr 33 min	1:45 PM–6:01 PM Total: 4 hr 16 min	10:30 AM–12:09 PM 2:10 PM–2:53 PM Total: 2 hr 22 min
Gowanus CSO Facility Open Space	7:36 AM–4:29 PM Total: 8 hr 53 min	6:27 AM–10:15 AM 11:30 AM–5:18 PM Total: 9 hr 36 min	5:57 AM –9:45 AM 12:40 PM–6:01 PM Total: 9 hr 29 min	8:51 AM–2:53 PM Total: 6hr 2 min
Thomas Greene Playground	7:36 AM–10:45 AM 11:00 AM–4:29 PM Total: 8 hr 38 min	6:27 AM–9:30 AM 2:00 PM–6:00 PM Total: 7 hr 2 min[3]	5:57 AM–8:55 AM 2:15 PM–6:01 PM Total: 6 hr 44 min	8:51 AM–2:53 PM Total: 6 hr 2 min
363-365 Bond St Public Access Area	7:36 AM–10:00 AM 2:00 PM–4:29 PM Total: 4 hr 53 min	6:27 AM–9:30 AM 2:45 PM–5:18 PM Total: 5 hr 36 min	5:57 AM–9:20 AM 3:45 PM–6:01 PM Total: 5 hr 39 min	8:51 AM–11:40 AM 2:00 PM–2:53 PM Total: 3 hr 42 min
Gowanus Canal Sponge Park	9:15 AM–10:10 AM 2:00 PM–4:29 PM Total: 3 hr 24 min	1:30 PM–5:18 PM Total: 3 hr 48 min	5:57AM–6:45 AM 1:30 PM–6:01 PM Total: 5hr 19 min	8:51 AM–10:40 AM 2:15 PM–2:53 PM Total: 2hr 27 min
Dolly's Park Community Garden	7:45 AM–9:00 AM 2:15 PM–4:29 PM Total: 3 hr 29 min	6:45 AM–7:30 AM 1:50 PM–4:25 PM Total: 3 hr 20 min	1:50 PM–4:45 PM Total: 2 hr 55 min	--
J.J. Byrne Playground	3:15 PM–4:29 PM Total: 1 hr 14 min	3:00 PM–5:18 PM Total: 2 hr 18 min	3:10 PM–6:01 PM Total: 2 hr 51 min	--
Washington Park	3:15 PM–4:29 PM Total: 1 hr 14 min	3:00 PM–5:18 PM Total: 2 hr 18 min	3:10 PM–6:01 PM Total: 2 hr 51 min	--
Whole Foods Public Access Area	7:36 AM–7:55 AM Total: 19 min	6:27 AM–8:10 AM 4:30 PM–5:18 PM Total: 3 hr 31 min	5:57AM–8:15 AM 4:00PM–6:01 PM Total: 3 hr 19 min	8:51 AM–9:10 AM Total: 19 min
1st Street Turning Basin	7:36 AM–8:50 AM 9:35 AM–10:30 AM 12:35 PM–3:12 PM 4:05 PM–4:29PM Total: 5 hr 10 min	6:27 AM–9:25 AM 2:30 AM–3:00 PM Total: 3 hr 28 min	5:57 AM–9:45 AM Total: 3 hr 48 min	8:51 AM–2:47 PM Total: 5 hr 56 min
St. Mary's Park	7:36 AM–11:50 AM Total: 4h 14 min	6:27 AM–11:05 AM Total: 4 hr 38 min	5:57 AM–10:55 AM Total: 4 hr 58 min	8:51 AM–12:23 PM Total: 3 hr 32 min
Community Gardens				
Warren St. Marks Community Garden	--	3:35 PM–4:10 PM Total: 35 min	3:25 PM–5:00 PM Total: 1 hr 35 min	--
Greenspace on 4th	4:10 PM–4:29 PM Total: 19min	3:15 PM–5:18 PM Total: 2hr 3 min	3:15 PM–6:01 PM Total: 2 hr 46 min	--
Gil Hodges Community Garden	7:36 AM–1:15 PM Total: 5 hr 39 min	6:27 AM–12:30 PM Total: 6 hr 3 min	5:57 AM–12:20 PM Total: 6 hr 23 min	9:45 AM–1:45 PM Total: 4 hr
Project-Generated Open Spaces				
Gowanus Green Development / Open Space	2:30 PM–4:29 PM Total: 1 hr 59 min	6:27 AM–8:00 AM 2:30 PM–5:18 PM Total: 3 hr 21 min	5:57 AM–8:15 AM 2:35 PM–6:01 PM Total: 5 hr 44 min	2:52 PM–2:53 PM Total: 1 min
	--			--
Gowanus Canal Esplanade (WAP)	7:36 AM–4:29 PM Total: 8 hr 53 min	6:27 AM–5:18 PM Total: 10 hr 51 min	5:57 AM–6:01 PM Total: 12 hr 4 min	8:51 AM–2:53 PM Total: 6 hr 2 min
Historic Resources with Sunlight-Sensitive Features				
Public Bath No. 7	3:50 PM–4:29 PM Total: 39 min	4:00 PM–5:18 PM Total: 1 hr 18 min	4:15 PM–6:01 PM Total: 1 hr 46 min	--
Our Lady of Peace Roman Catholic Church complex	7:36 AM–8:51 AM Total: 1 hr 15 min	7:13 AM–8:06 AM 5:11 PM–5:18 PM Total: 1 hr	5:57 AM–6:10 AM 5:34 PM–6:01 PM Total: 40 min	8:51 AM–11:10 AM Total: 2 hr 19 min
St. Mary Star of the Sea Church Complex	8:10 AM–8:15 AM Total: 5 min	6:27 AM–7:20 AM Total: 53 min	6:27 AM–6:31 AM Total: 4 min	8:51 AM–9:55 AM Total: 1 hr 4 min
NYCHA Open Spaces				
Gowanus Houses Open Space	7:36 AM–9:00 AM Total: 1 hr 24 min	6:27 AM–6:43 AM Total: 6 min	5:57 AM–6:45 AM Total: 48 min	8:51 AM–11:40 AM Total: 2 hr 49 min
Wyckoff Gardens Open Space	11:45 AM–4:29 PM Total: 4 hr 44 min	2:45 PM – 3:05 PM Total: 20 min	--	8:51 AM–2:53 PM Total: 6 hr 2 min
Warren Street Houses Playground	12:45 PM–4:29 PM Total: 3 hr 44 min	3:20 PM–5:18 PM Total: 1 hr 58 min	--	8:51 AM–2:52 PM Total: 6 hr 2 min
Sunlight-Sensitive Natural Resources				
Gowanus Canal	7:36AM–12:10 PM 2:15PM–4:29 PM Total: 6 hr 48 min	6:27 AM–11:15 AM 2:00 PM–5:18 PM Total: 8 hr 6 min	5:57 AM–11:00 AM 2:10 PM–6:01 PM Total: 8 hr 54 min	8:51 AM–1:10 PM 2:20 PM–2:53 PM Total: 4 hr 52 min

[3] The analysis period was extended to 6:00 PM (7:00 PM Eastern Daylight Time) on this day, for this particular resource, to account for the heavy use and operating hours of the pool in the summer months.

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 shadows.

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.

SUNLIGHT-SENSITIVE PUBLIC OPEN SPACES

GREENSTREET ON DOUGLASS STREET

This small Greenstreet feature is located where Douglass Street ends on the west side of the Gowanus Canal. It contains planted areas, two trees, and two benches. In the future with the Proposed Actions, this waterfront open space feature could be redesigned, and will in any case be integrated into a network of publicly accessible waterfront features and walkways on both sides of the Canal.

On the March 21/September 21 analysis day, the Greenstreet would receive incremental shadow for approximately 2 hours and 14 minutes in the afternoon, from 2:15 PM until the end of the analysis day at 4:29 PM (see **Figures 6-5 and 6-6**). All vegetation affected by incremental shadow would receive over 6 hours of direct sunlight throughout the day.

On the May 6/August 6 analysis day, the Greenstreet would receive incremental shadow for approximately 3 hours and 33 minutes in the afternoon, from 1:45 PM to 5:18 PM (see **Figures 6-13 to 6-14**). All vegetation affected by incremental shadow would receive over 7 hours of direct sunlight throughout the day.

On the June 21 analysis day, the Greenstreet would receive incremental shadow for approximately 4 hours and 16 minutes in the afternoon, from 1:45 PM to 6:01 PM (see **Figures 6-19 to 6-21**). All vegetation affected by incremental shadow would receive over 8 hours of direct sunlight throughout the day.

On the December 21 analysis day, the Greenstreet would receive a total duration of approximately 2 hours and 22 minutes of new shadow, from 10:30 AM to 12:09 PM, and then in the afternoon from 2:10 PM to 2:53 PM (see **Figures 6-23 to 6-25**).

Assessment

Development resulting from the Proposed Actions would cast incremental shadow on this Greenstreet on all four analysis days. Total durations could last from 2 hours and 22 minutes on the December 21 and March 21/September 21 analysis days to over 4 hours on June 21. The Greenstreet would receive enough direct sunlight throughout the growing season (at least the four to six hours specified in the *CEQR Technical Manual*) to support a variety of plant life, and therefore project-generated shadow would not threaten the viability of its vegetation.

Regarding the recreational use of the space, under existing conditions, the usage of the two benches was observed to be low based on site visits. Benches would receive direct sunlight throughout the afternoon during the winter timeframe. During the hotter months, the afternoon incremental shadows could be a welcome respite from the summer sun for passive recreational users.

Further, as noted above, the Proposed Actions would result in over six acres of new open space, including a continuous waterfront esplanade. This feature may be redesigned as an integral part of the network of publicly accessible waterfront open spaces. In the late mornings of the winter, when this feature would be in shadow, other nearby portions of the west side of the Canal near Douglass Street would be in sun for users seeking open space. In the mid- to late afternoons, year round, when this feature would experience incremental shadow, nearby sections of the east side of the Canal would be in sun. Consequently, the Proposed Actions would not cause significant adverse shadow impacts to the use of this feature, currently a Greenstreet space, but in the future a portion of a larger network of waterfront features and walkways.

GOWANUS CSO FACILITY OPEN SPACE

The Gowanus CSO Facility open space is an approximately 1.6-acre publicly accessible open space anticipated to be developed in connection with the Gowanus Combined Sewer Overflow (CSO) Facility at the north end of the Gowanus Canal. The CSO tanks will be mostly underground, allowing for the open space to be developed on the surface over the wastewater infrastructure. Preliminary plans for the open space include benches, walkways, and planted areas; however, the full programming and layout of the open space is currently not known. Therefore, the analysis will focus on identifying the extent and duration of incremental shadows on various areas of the park and how potential features and vegetation might fare in the resulting shade conditions.

On the March 21/September 21 analysis day, the Gowanus CSO Facility open space would receive incremental shadow from 7:36 AM to 4:29 PM. Large areas of the open space would remain in sun throughout this analysis day. Incremental shadow would fall across the northern area of the open space at the start of the analysis day and decrease throughout the morning. At approximately 10:00 AM the incremental shadow would exit the northeast corner of the open space, while other incremental shadow would enter at the southwest corner (see **Figures 6-2 and 6-3**). Incremental shadow would sweep across the southern portion of the open space through the afternoon. At 3:20 PM the incremental shadow from the proposed developments on the west side of the Gowanus Canal would enter the northern area of the open space and remain until the end of the analysis day at 4:29 PM (see **Figures 6-4 to 6-6**). All areas of the space affected by incremental shadow would receive between 4 and 8 hours of direct sun.

On the May 6/August 6 analysis day, the Gowanus CSO Facility open space would receive incremental shadow from 6:27 AM to 10:15 AM and 11:30 AM to 5:18 PM. Large areas of the open space would remain in sun until the end of the analysis day. Incremental shadow would start across the northern area of the open space and decrease in size throughout the morning until 10:15 AM, when it exits (see **Figures 6-7 to 6-10**). At 11:30 AM the incremental shadow enters again along Degraw Street. The incremental shadow would be limited to the southern half of the open space until approximately 3:30 PM, when incremental shadow would enter along the west side of the open space, beside the Gowanus Canal. Incremental shadow would move across the open space and remain until the end of the analysis day at 5:18 PM (see **Figures 6-11 to 6-14**). All areas of the space affected by incremental shadow would receive over 7 hours of direct sun.

On the June 21 analysis day, the Gowanus CSO Facility open space would receive incremental shadow from 5:57 AM to 9:45 AM and again in the afternoon from 12:40 PM to 6:01 PM. Large areas of the open space would remain in sun from 6:30 AM until the end of the analysis day. Incremental shadow would cover most of the open space for the first 30 minutes of the analysis day. It would quickly move north throughout the morning; by 7:00 AM, it would be limited to less than half of the open space (see **Figure 6-15**). By 9:45 AM the incremental shadow would exit the resource at the northeast corner (see **Figures 6-16 and 6-17**). The incremental shadow would enter the open space again in the afternoon at 12:40 PM and would be limited to a small sliver along Degraw Street. At approximately 3:20 PM incremental shadow would enter along the west side of the open space, beside the Gowanus Canal (see **Figures 6-18 and 6-19**). Incremental shadow would move across the open space and remain until the end of the analysis day at 6:01 PM (see **Figures 6-19 to 6-21**). All areas of the space affected by incremental shadow would receive over 8 hours of direct sun.

On the December 21 analysis day, the Gowanus CSO Facility open space would receive incremental shadow from 8:51 AM to 2:53 PM. The incremental shadow would be limited to the southern half of the open space during the morning hours (see **Figure 6-23**). By 12:00 PM the shadow would increase in size to cover the southern and western areas of the open space. From 1:00 PM until the end of the analysis day at 2:53 PM the incremental shadow would be large in size and only leave small areas along the sides of the open space in direct sunlight (see **Figures 6-24 and 6-25**).

Assessment

The Gowanus CSO Facility open space would experience incremental shadows of varying duration and coverage on all four representative analysis days. On the March 21/September 21 analysis day, incremental shadow would be on the resource at all times during the day but would be dispersed through different sections of the open space, and substantial areas of the open space would remain in sunlight throughout the day for users seeking sunlight. Incremental shadow on the May 6/August 6 and June 21 analysis days would be long in duration overall, but would fall on different areas of the park at different times, and large areas of sunlight would remain throughout the day. As shadows are not static and move from west to east throughout the day, there would typically be a number of benches and areas at any given time that would receive direct sunlight on these representative analysis days, and the Proposed Actions are not expected to have a significant effect on the utilization or enjoyment of this open space. On the December 21 analysis day the incremental shadow would cover substantial areas of the open space and leave few small areas of remaining sunlight throughout the day. During the winter, when temperatures would be colder, use of the open space would not be as high compared to warmer months; therefore, incremental shadow would not affect the utilization or enjoyment of this open space resource.

In addition, all areas of the space would continue to receive enough direct sunlight throughout the growing season, particularly in the May-to-August heart of the growing season that supports vegetation. Therefore, the incremental shadows that could result from the Proposed Actions are not anticipated to adversely impact the Gowanus CSO Facility open space.

THOMAS GREENE PLAYGROUND

Thomas Greene Playground is a 2.54-acre publicly accessible open space spanning one block bounded by Douglass Street, Degraw Street, 3rd Avenue, and Nevins Street. Thomas Greene Playground currently contains seating areas, planted landscaping, a playground with spray showers, handball courts, basketball courts, a skate park, and two swimming pools open during

the summer months. In the No Action condition (as well as the With Action condition) Thomas Greene Playground is anticipated to be substantially renovated, as discussed in Chapter 5, "Open Space." The soil beneath Thomas Greene Playground was identified by the U.S. Environmental Protection Agency (EPA) as being contaminated and continues to leach coal tar waste underground and into the Gowanus Canal. During the remediation process, the existing Thomas Greene Playground and Douglass and Degraw ("Double D") Pool will be closed and unusable. It is assumed that the remediation and reconstruction of the resource will be completed by the 2035 analysis year. Currently, the programming and layout of the reconstructed park is not confirmed. Therefore, the analysis will focus on identifying the extent and duration of incremental shadows on various areas of the park, and how potential features and vegetation might fare in the resulting shade conditions. In addition, given the heavy use of the Douglass and Degraw Pool in the summer months, the analysis will include a consideration of incremental shadow effects on the pool at its current location in the western part of the park, on the May 6/August 6 and June 21 analysis days. The facility includes two pools, a large, main pool and a small "kiddie" pool, and concrete deck surrounding them. The pool is open in the summer from 11:00 AM to 7:00 PM Eastern Daylight Time (EDT), with a break for pool cleaning between 3:00 PM and 4:00 PM EDT. Given in Eastern Standard Time, which is used throughout this analysis per CEQR guidelines, the pool is open from 10:00 AM to 6:00 PM, with a cleaning break from 2:00 PM to 3:00 PM.

On the March 21/September 21 analysis day, Thomas Greene Playground would receive incremental shadow for all but 15 minutes of the analysis day, but the size of the incremental shadow would vary. From 7:36 AM to 10:45 AM incremental shadow would fall on the eastern area of the park (see **Figure 6-2 and 6-3**). The incremental shadow would cover more than a quarter of the park for the first approximately 45 minutes of the analysis day, after which the shadow would become smaller until it exited at 10:45 AM. At 11:00 AM incremental shadow would enter the southern edge of the park, and would remain small at first (see **Figures 6-3 and 6-4**). The incremental shadow would become larger in the early afternoon but remain limited to the southern area of the park along Degraw Street (see **Figure 6-5**). The incremental shadow would continue to move toward the northeast of the park, and another incremental shadow would also enter at the northwest corner at 2:30 PM (**Figure 6-5**). By 3:30 PM the incremental shadow would cover more than half the park, including the southern half and northwest areas (see **Figure 6-6**). An hour later, at the end of the analysis day, incremental shadow would cover most of the park (**Figure 6-6**).

On the May 6/August 6 analysis day incremental shadow coverage would be limited to the morning from 6:27 AM to 9:30 AM (see **Figures 6-7 and 6-9**) and again in the afternoon from 2:00 PM to 5:18 PM (see **Figures 6-12 to 6-14**). In the early morning incremental shadow would fall on areas in the north and east parts of the park. The incremental shadow would move northeast (clockwise) and by 7:30 AM would be limited to a small area along the east side of the park. This incremental shadow would continue to become smaller and would exit the park at 9:30 AM. The incremental shadow would enter the park again from the south at 2:00 PM. The incremental shadow in the afternoon would be limited to the southern edge of the park along Degraw Street, with the exception of a longer shadow extending into an area in the southwest corner. At 4:30 PM this shadow from the southwest would extend into the middle of the park. However, most of the park would remain in sun at this time and until nearly the end of the analysis day at 5:18 PM, when incremental shadow coverage would reach about half the park area, mostly in the southern half.

With respect to the Douglass and Degraw Pool, in its current location in the park, incremental shadow would enter the western edge of the large, main pool at 3:15 PM. Both the main and the

smaller kiddie pool would be mostly covered by incremental shadow from 4:00 PM until 6:00 PM, when the pool closes.[4]

On the June 21 analysis day, Thomas Greene Playground would receive incremental shadow for a total duration of approximately 6 hours and 44 minutes from 5:57 AM to 8:55 AM (see **Figures 6-15 and 6-16**) and again from 2:15 PM to 6:01 PM (see **Figures 6-19 to 6-21**). New shadow would start at the beginning of the analysis day at 5:57 AM and cover nearly the entire park except for a small portion in the middle. However, the shadow would quickly move northeast (clockwise), and by 7:00 AM more than two-thirds of the park would be in direct sunlight. By 8:00 AM, incremental shadow would be limited to a small area along the east side of the park and it would exit the park at 8:55 AM. In the afternoon, at 2:15 PM incremental shadow would enter the park at the southwest corner. The incremental shadow in the afternoon would be limited to this corner until around 4:00 PM when it would start to increase and move east along the southern part of the park. By 5:30 PM incremental shadow would also enter the west side of the park but would remain limited to the south and west part of the park. Most of the park would continue to be in sun throughout the afternoon.

With respect to the Douglass and Degraw Pool, in its current location in the park, the pools would remain in direct sunlight throughout the day until 3:30 PM when incremental shadow would enter the southeast corner of the main pool. Incremental shadow would cover the southern portion of the main pool from 4:00 PM until 5:15 PM, after which it would again be entirely in sunlight. The kiddie pool would be in incremental shadow from 4:20 PM to 5:30 PM and the incremental shadow would cover the entire pool for most of that period. Incremental shadow would again enter the main pool at 5:30 PM and cover the southern part of it until closing time at 6:00 PM (7:00 PM EDT), leaving most of it in sun during this time. Incremental shadow would also cover a portion of the kiddie pool from 5:45 PM to 6:00 PM.

On the December 21 analysis day, Thomas Greene Playground would receive sizeable areas incremental shadow for the entire analysis day from 8:51 AM to 2:53 PM (1.5 hours after sunrise and 1.5 hours before sunset) (see **Figures 6-22 to 6-25**). New shadow would start at the beginning of the analysis day and cover most of the park throughout the day. After 1:00 PM, and continuing until the end of the analysis day at 2:53 PM, almost all the direct sunlight would be eliminated from the park.

Assessment

This open space resource would experience incremental shadows of varying duration and coverage on all four representative analysis days. As described above, incremental shadow on May 6/August 6 and June 21 analysis days would be long in duration but would be dispersed through different sections of the park, and substantial areas of the park would remain in sunlight throughout each day for users seeking sunlight. The pools would only receive incremental shadow in the later afternoon and the shadows from project-generated developments would never fully eliminate direct sunlight. However, in the late afternoon of the May 6/August 6 analysis day, the pools would be mostly or entirely in incremental shadow from approximately 3:45 PM to 6:00 PM when it closes (i.e. 7:00 PM EDT). This extent and duration of new shadow would come at a time of day

[4] As described in the Tier 3 Assessment section above, according to standard *CEQR* methodology the analysis period ends 90 minutes before sunset, which on May 6 and August 6 would be 5:18 PM. However, given the heavy use of the pool in the summer months, the analysis period was extended to its closing time of 6:00 PM (7:00 PM Eastern Daylight Time) for this particular facility.

when temperatures and use of the pool are at their highest and have the potential to affect both the pool's operation and the user experience. Therefore, a significant impact on the Double D Pool could occur on this analysis day. On the June 21 analysis day, substantial areas of the main pool would remain in sun throughout the late afternoon despite the incremental shadows, and the kiddie pool would be mostly or entirely in incremental shadow only about an hour, and in sun for the rest of the day. The incremental shadow would not affect the utilization or enjoyment of the pool on this analysis day.

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. On the March 21/September 21 analysis day, incremental shadow would overall be long in duration, but would fall on different areas of the park at different times, and areas of sunlight would remain throughout the day. On December 21, while the park would receive sizeable incremental shadow coverage, it would continue to receive some direct sunlight as shadows move from west to east over the course of the day. Incremental shadow on December 21, when temperatures would be colder, pools and sprinklers would be closed, and the use of the active recreational space would not be as high (compared to warmer months), would not affect the utilization or enjoyment of this open space resource.

Incremental shadows would reduce the hours of direct sunlight received by portions of the park with vegetation, plantings, and trees during the growing season. During the March 21/September 21 analysis day a small area along Degraw Street in the southeast part of the park would receive between 2.5 to 4 hours of direct sunlight. However, this area would receive 4 or more hours of sunlight throughout the heart of the growing season, represented by the May 6/August 6 and June 21 analysis days. On the May 6/August 6 analysis day, most of the park would receive 8 or more hours of direct sun, the exception being the southeast corner, which would receive between 4 and 8 hours, and on June 21 all areas of the park would receive over 8 hours. The reconstructed Thomas Greene Playground would continue to be able to support a wide variety of shade-tolerant as well as full-sun-tolerant species throughout its area. Therefore, the incremental shadows that could result from the Proposed Actions are not anticipated to adversely impact the trees and plantings of Thomas Greene Playground.

As discussed above, while a timeline for the remediation and reconstruction of the park has not been set, it is anticipated to be completed by the 2035 analysis year. While the exact programming and layout of the reconstructed park is not yet currently known, this analysis can be taken into account when planning the programming and landscaping for the reconstructed park.

In the spring, summer, and fall, the northern half of the park receives the most sun, and the southeastern corner, the least. Therefore, recreational activities that depend most on sunlight, such as sitting and sunning, or water features such as a pool or sprinklers, would likely be best located in the northern half or central area and not in the southeast corner.

In summary, the Proposed Actions would result in a significant adverse shadow impact to the use of the Douglass and Degraw Pool on the May 6/August 6 analysis day. No other significant adverse shadow impacts to either use or vegetation of Thomas Greene Playground would occur on this or any other analysis day.

363-365 BOND STREET PUBLIC ACCESS AREA

363-365 Bond Street Public Access Area is a newly developed open space operated by 363 Bond Street. The Public Access Area is located between the Gowanus Canal and the 365 Bond development and spans from Carroll to 2nd Streets. It features planted areas, trees, seating areas, and a boat launch. In the future with the Proposed Actions, this waterfront open space feature will be integrated into a network of publicly accessible waterfront features and walkways on both sides of the Canal.

On the March 21/September 21 analysis day, 363-365 Bond Street Public Access Area would receive incremental shadow from 7:36 AM to 10:00 AM and from 2:00 PM to 4:29 PM. In the morning, the incremental shadow would cover approximately the northern half of the space (see **Figures 6-26 and 6-27**). The incremental shadow would decrease in size and move east, exiting the space completely at 10:00 AM (see **Figure 6-28**). The resource would remain in direct sunlight through the afternoon until 2:00 PM when incremental shadow would enter in the southwest corner. The incremental shadow would be small in extent for the rest of the day, due to the existing shadows from the 365 Bond Street development (see **Figures 6-30 and 6-31**). By 3:30 PM most of the space would be in existing shadow, and the incremental shadow would eliminate the remaining small area of sunlight in the southern end until the end of the analysis day at 4:29 PM. Vegetation in the southern area of the park between 1st and 2nd Streets would receive 6 to over 8 hours of direct sunlight throughout the day. The northern section of the resource, between Carroll and 1st Streets, would receive more incremental shadow throughout the day given the curvature of the shoreline, with most areas of vegetation receiving 4 to 6 hours of direct sunlight.

On the May 6/August 6 analysis day, 363-365 Bond Street Public Access Area would receive incremental shadow from 6:27 AM to 9:30 AM and from 2:45 PM to 5:18 PM. The incremental shadow would move quickly northeast (clockwise) and by 8:00 AM it would cover about half of the northern section and continue to decrease in size and move north until it exits at 9:30 AM (see **Figures 6-32 to 6-34**). The resource would remain in direct sunlight through most of the afternoon. At 2:45 PM the incremental shadow would enter again at the southwest corner. The incremental shadow would be small in extent for the rest of the day (see **Figure 6-36**). All vegetation affected would receive between 4 and 9 hours of direct sunlight throughout the day.

On the June 21 analysis day, 363-365 Bond Street Public Access Area would receive incremental shadow from 5:57 AM to 9:20 AM and 3:45 PM to 6:01 PM. The incremental shadow would move quickly northeast (clockwise), and by 8:00 AM it would cover about half of the northern section and continue to decrease in size and move north until it exits at 9:20 AM (see **Figures 6-37 and 6-38**). At 3:45 PM the incremental shadow would enter again at the southern end of the resource (see **Figure 6-40**). The incremental shadow would be small in extent for the rest of the analysis day (see **Figures 6-40 and 6-41**). All vegetation would receive from 4 to over 10 hours of direct sunlight throughout the day.

On the December 21 analysis day, 363-365 Bond Street Public Access Area would receive incremental shadow from 8:51 AM to 11:40 AM and again from 2:00 PM to 2:53 PM. In the morning, the incremental shadow would cover different portions of the space at different times, as shown in **Figures 6-42 and 6-43**. Incremental shadow in the afternoon would start as a small sliver in the southwest corner of the resource and quickly increase in extent (see **Figure 6-44**). Incremental shadow would eliminate direct sunlight for the last 13 minutes of the analysis day.

Assessment

Incremental shadow would cover portions of the 363-365 Bond Street Public Access Area on all four analysis days, ranging in duration from 3 hours and 42 minutes on the December 21 analysis day to 5 hours and 39 minutes on the June 21 analysis day. On the late spring and summer analysis days, represented by May 6/August 6 and June 21, incremental shadows would be limited to smaller areas after approximately 7:15 AM and would never eliminate all direct sunlight, even prior to 7:15 AM. On the March 21/September 21 analysis day most of the resource would receive direct sunlight throughout the day until around 3:00 PM, when existing shadows would begin to cover most of the space. By the end of the analysis day, 4:29 PM, the resource would be in complete shadow. As shadows are not static and move from west to east throughout the day, there would typically be a number of benches and areas at any given time that would receive direct sunlight on these representative analysis days, and the Proposed Actions are not expected to have a significant effect on the utilization or enjoyment of this open space. In addition, given the planned network of waterfront open spaces and walkways in the With Action condition, there would very likely be sunlit waterfront space on the opposite side of the Canal for most or all of this final hour of the analysis day accessible for users seeking sunlight. On the December 21 analysis day areas of sun would remain in the space throughout the day with the exception of the final 13 minutes. In addition, all areas of the space would continue to receive enough direct sunlight throughout the growing season, particularly in the May-to-August heart of the growing season, to support vegetation. Therefore, the incremental shadows that could result from the Proposed Actions are not anticipated to adversely impact this resource.

GOWANUS CANAL SPONGE PARK

Gowanus Canal Sponge Park is located along the Gowanus Canal at the end of 2nd Street and directly adjacent to 363-365 Bond Street Public Access Area. The park features a planted area and a boat launch. In the future with the Proposed Actions, this waterfront open space feature will be integrated into a network of publicly accessible waterfront features and walkways on both sides of the Canal.

On the March 21/September 21 analysis day, Gowanus Canal Sponge Park would receive incremental shadow from 9:15 AM to 10:10 AM and from 2:00 PM to 4:29 PM. In the morning, incremental shadow would sweep across the resource over a 55-minute period (see **Figures 6-27 and 6-28**). The park would remain entirely in direct sunlight through the afternoon until 2:00 PM, when incremental shadow would enter along the west side. Incremental shadow would eliminate all direct sunlight from 2:45 PM until 4:29 PM (see **Figures 6-30 and 6-31**). However, any vegetation that may be affected by incremental shadow would receive at least 6 hours of direct sunlight throughout the day.

On the May 6/August 6 analysis day, Gowanus Canal Sponge Park would receive incremental shadow from 1:30 PM to 5:18 PM (see **Figures 6-35 and 6-36**). Incremental shadow would enter along the west side and would continue to increase in size across the resource. By 3:30 PM incremental shadow would eliminate all direct sunlight and would continue to do so until the end of the analysis day at 5:18 PM. However, any vegetation that may be affected by incremental shadow would receive between 7 and 9 hours of direct sunlight throughout the day.

On the June 21 analysis day, Gowanus Canal Sponge Park would receive incremental shadow from 5:57 AM to 6:45 AM and from 1:30 PM to 6:01 PM. In the early morning, shadows fall to the southwest, and incremental shadow would cover most of the resource briefly at first but move quickly north (clockwise), decreasing in size until it exited at 6:45 AM (see **Figure 6-37**). The

resource would remain entirely in direct sunlight through the afternoon until 1:30 PM when the incremental shadow would enter again in the southwest corner (see **Figure 6-39**). By 3:45 PM incremental shadow would eliminate all direct sunlight and would continue to do so until the end of the analysis day at 6:01 PM (see **Figures 6-40 and 6-41**). However, any vegetation that may be affected by incremental shadow would receive over 7 hours of direct sunlight throughout the day.

On the December 21 analysis day, Gowanus Canal Sponge Park would receive incremental shadow from 8:51 AM to 10:40 AM and from 2:15 PM to 2:53 PM. For the first hour of the analysis day the incremental shadow would eliminate all direct sunlight from the resource (see **Figure 6-42**). Incremental shadow would start to decrease in size and move north until it exited at 10:40 AM (see **Figure 6-43**). The resource would remain entirely in direct sunlight through the afternoon until 2:15 PM when the incremental shadow would enter along the west side (see **Figure 6-44**). Incremental shadow would eliminate direct sunlight for the last 13 minutes of the analysis day.

Assessment

Incremental shadow would fall on Gowanus Canal Sponge Park on all four analysis days, ranging from 2 hours and 27 minutes on the December 21 analysis day to 5 hours and 19 minutes on the June 21 analysis day. Incremental shadow would eliminate all the sun from the park at the end of each analysis day for durations ranging from 13 minutes in winter to over 2 hours in summer. However, this small park, whose primary intended function is stormwater capture, is adjacent and connected to a larger waterfront park, the 363-365 Bond Street Public Access Area, that would continue to have available areas of sunlight during this affected period in the late spring and summer (May 6/August 6 and June 21 analysis days) and a portion of the period on the March 21/September 21 analysis day. In addition, given the network of waterfront open spaces and walkways that would be facilitated by the Proposed Actions, there would very likely be sunlit waterfront space on the opposite side of the Canal for most or all of the final hour of the analysis day in all seasons, accessible for users seeking sunlight. As shadows are not static and move from east to west throughout the day, these areas would continue to receive some direct sunlight during the day. All areas of the park would continue to receive enough direct sunlight throughout the growing season to support vegetation. Therefore, the incremental shadows that could result from the Proposed Actions are not anticipated to adversely impact Sponge Park.

DOLLY'S PARK COMMUNITY GARDEN

Dolly's Park Community Garden is located at 503 President Street on a thin lot between two buildings. Sunlight-sensitive features located within the resource include potted plants and seating areas in the front of the park and an open area located in the back, which includes a small green space and utility shed.

On the March 21/September 21 analysis day, Dolly's Park Community Garden would receive incremental shadow from 7:45 AM to 9:00 AM in the morning, and from 2:15 PM to 4:29 PM in the afternoon. In the morning, incremental shadow would fall on the lawn area in back and would remain small throughout the hour and 15 minute duration, although it would block the remaining small area of sunlight for the first 50 minutes of that period (see **Figure 6-2**). Incremental shadow would enter the lawn area again in the afternoon at 2:15 PM. The incremental shadow would cover much of the lawn in the back for the rest of the analysis day until 4:29 PM (see **Figures 6-5 and 6-6**). However, a small portion of the seating area at the front would remain in sun throughout this

period. All areas of the space affected by incremental shadow would receive between 4 and 7 hours of direct sun, except for a portion of the lawn, which would receive 3.5 to 4 hours of sun.

On the May 6/August 6 analysis day, Dolly's Park Community Garden would receive incremental shadow from 6:45 AM to 7:30 AM in the morning, and 1:50 PM to 4:25 PM in the afternoon. In the morning, incremental shadow would fall on the lawn area near the middle of the space beginning at 6:45 AM and block the small remaining area of sunlight until 7:00 AM (see **Figures 6-7 and 6-8**). It would exit at 7:30 AM and would remain small throughout the 45 minute period. Incremental shadow would enter the lawn area again in the afternoon, at 1:50 PM. The incremental shadow would cover much of the lawn in the back until 4:25 PM, after which the lawn would be entirely in existing shadows (see **Figures 6-12 to 6-13**). However, a portion of the seating area at the front would remain in sun throughout this period. All areas of the space affected by incremental shadow would receive between 4 and 8 hours of direct sun, except for a small portion of the lawn, which would receive 3 hours of sun.

On the June 21 analysis day, Dolly's Park Community Garden would receive incremental shadow from 1:50 PM to 4:45 PM. Similar to the May 6/August 6 analysis day, the incremental shadow would cover much of the lawn in the back, eliminating the remaining sun on the lawn for most of that period, until 4:45 PM, after which the lawn would be entirely in existing/No Action shadows (see **Figures 6-19 to 6-20**). A portion of the seating area at the front would remain in sun throughout this period. All areas of the space affected by incremental shadow would receive between 4 and 10 hours of direct sun.

On the December 21 analysis day, shadow from the Proposed Action would overlap with existing shadow from intervening buildings and therefore would not cast any new shadow on Dolly's Park Community Garden.

Assessment

The open space resource would experience incremental shadows of varying duration and coverage on the open grassy area occupying the rear area of Dolly's Park Community Garden during three of the analysis days, representing the spring, summer, and fall. In the afternoons, the incremental shadow would cover much of the rear area for approximately 2 to 3 hours, depending on the season, and would eliminate the remaining sun there for approximately 2 to 2.5 hours of that period. Only a small triangle of sun would remain during these times, up at the front of the space.

While the extent (relative to the area of the overall space) of incremental shadow reduces and at some points eliminates the remaining sun on the rear lawn area for approximately 2 to 2.5 hours, the development resulting from the Proposed Actions would not significantly impact the use and character of this space, which is already located between buildings on all sides and is in shadow for much of the day. Compared to other types of open spaces, like beaches or pools, this small urban pocket park's function and utility is less sunlight-dependent.

A portion of the lawn area would receive at least 3 to 3.5 hours of direct sunlight as a result of incremental shadow in the March/September and May/August analysis days with more direct sunlight during the height of the growing season in June. While this reduction in sunlight is below the *CEQR Technical Manual* guidance for minimum requirements typical for most vegetation, small grassy areas, like the one at Dolly's Park Community Garden that consists mostly of crab grass, may survive with less than four hours of sunlight and do not necessarily need direct sunlight to grow.

J.J. BYRNE PLAYGROUND

J.J. Byrne Playground is located along 3rd Street between 4th and 5th Avenues directly adjacent to Washington Park. It features seating areas, planted landscaping, a playground, spray showers, and a multi-use synthetic turf field. The historic Old Stone House, a reconstructed 17th Century farmhouse, is located in the center of the park.

On the March 21/September 21 analysis day, J.J. Byrne Playground would receive incremental shadow from 3:15 PM to 4:29 PM (see **Figure 6-45**). Incremental shadow would enter the northwestern corner of the resource where there are several mature trees and the turf field. Incremental shadow would increase in size until the end of the analysis day at 4:29 PM, limited to approximately the western third of the field. Other parts of the park would remain in sun throughout the affected period. All vegetation affected by incremental shadow would receive over 6 hours of direct sunlight throughout the day.

On the May 6/August 6 analysis day, J.J. Byrne Playground would receive incremental shadow from 3:00 PM to 5:18 PM (see **Figures 6-46 and 6-47**). Incremental shadow would enter the northwestern corner of the resource where there are several mature trees and the turf field. Small at first, incremental shadow would increase in size, extending eastward. By 4:30 PM the incremental shadow would extend across nearly half the turf field, and by the end of the analysis day at 5:18 PM it would cover virtually the entire turf field, while the other parts of the park to the west would continue to remain in sun. All vegetation affected by incremental shadow would receive over 8 hours of direct sunlight throughout the day.

On the June 21 analysis day, J.J. Byrne Playground would receive incremental shadow from 3:10 PM to 6:01 PM (see **Figures 6-48 and 6-49**). Incremental shadow would enter the northwestern corner of the park where there are several mature trees and the turf field. The incremental shadow would move eastward and by 5:00 PM would extend across approximately half of the turf field. At the end of the analysis day at 6:01 PM it would cover most of the field and also extend a little beyond the Old Stone House. Portions of the park would remain in sunlight throughout the day. All vegetation affected by incremental shadow would receive over 9 hours of direct sunlight throughout the day.

Assessment

The incremental shadows that could be generated by the Proposed Actions would not adversely affect J.J. Byrne Playground. The open space resource would experience incremental shadows of varying duration and coverage on three of the analysis days. The incremental shadow would occur in the late afternoon and would be limited primarily to a portion of the turf field. The size of the incremental shadow would be small for a time after it entered the field on each analysis day. On March 21/September 21 incremental shadow would remain in the western half of the field even at the end of the afternoon. On the May/August analysis day, incremental shadow would extend across most of the turf field in the final half-hour of the day but would never eliminate all the sun. On the June analysis day, incremental shadow would extend across most of the turf field in the final hour of the day but would never eliminate all the sun. Large areas of sun would remain throughout most of the afternoon in these seasons. Users looking for relief from the summer sun and heat in the late afternoon would find respite in the areas temporarily affected by incremental shadows. The playground areas on the east side of the park would be untouched by incremental shadow. All vegetation in the park would continue to receive the minimum hours necessary for direct sunlight during the growing seasons. Therefore, the incremental shadows that could result from the Proposed Actions are not anticipated to adversely impact J.J. Byrne Playground.

WASHINGTON PARK

Washington Park is located along 5th Street between 4th and 5th Avenues, directly adjacent to J.J. Byrne Playground. This park is entirely hard-surface, containing handball courts, basketball courts, a skate park, and a dog run.

On the March 21/September 21 analysis day, Washington Park would receive incremental shadow from 3:15 PM to 4:29 PM (see **Figure 6-45**). Incremental shadow would enter the northwestern corner of the resource where there are mature trees and a handball court. Incremental shadow would remain in this area and not increase much in extent due to intervening buildings. A large portion of Washington Park would continue to get direct sunlight. All vegetation affected by incremental shadow would receive over 5 hours of direct sunlight throughout the day.

On the May 6/August 6 analysis day, Washington Park would receive incremental shadow from 3:00 PM to 5:18 PM (see **Figures 6-46 and 6-47**). Incremental shadow would enter the northwestern corner of the resource where there are mature trees and a handball court. Starting at 4:10 PM, additional incremental shadow would enter the southwestern area of the resource where the skate park and some planted areas are located. Incremental shadow would continue to extend eastward, increasing in size, until the end of the analysis day. Large areas of sunlight would remain on the park until approximately the final half-hour of the analysis day, when only a small area of sunlight would remain. All vegetation affected by incremental shadow could receive over 7 hours of direct sunlight throughout the day.

On the June 21 analysis day, Washington Park would receive incremental shadow from 3:10 PM to 6:01 PM (see **Figures 6-48 and 6-49**). Incremental shadow would enter the northwestern corner of the resource where there are mature trees and a handball court. Starting at 4:10 PM, additional incremental shadow would enter the southwestern area of the resource where the skate park and some planted areas are located. Incremental shadow would continue to extend eastward, increasing in size, until the end of the analysis day. Substantial areas of sunlight would remain on the park until approximately the final half-hour of the analysis day. All direct sunlight would be eliminated from the resource by incremental shadow for the last 16 minutes of the analysis day. All vegetation affected by incremental shadow would receive over 8 hours of direct sunlight throughout the day.

Assessment

The incremental shadows that could be generated by the Proposed Actions would not adversely affect Washington Park. Washington Park would experience incremental shadows of varying duration and coverage on three of the analysis days. The extent of incremental shadow would remain small on March 21/September 21, limited to the northwest corner. On the late spring and summer analysis days represented by May 6/August 6 and June 21, incremental shadow would enter in mid-afternoon and remain limited in size until approximately the final half-hour of the day when it would combine with existing/No Action shadows to cover most or all the park. Substantial areas of sun would remain throughout most of the afternoon, and therefore the development resulting from the Proposed Actions would not substantially affect the use of the park. All vegetation in the park would continue to receive the minimum hours necessary of direct sunlight during the growing seasons. Therefore, the incremental shadows that could result from the Proposed Actions are not anticipated to adversely impact Washington Park.

WHOLE FOODS PUBLIC ACCESS AREA

Whole Foods Public Access Area is located at 1551 3rd Avenue adjacent to the Whole Foods Market parking lot and the 4th Street Basin of the Gowanus Canal. The park features planted areas and benches.

On the March 21/September 21 analysis day, Whole Foods Public Access Area would receive incremental shadow for approximately 19 minutes, from 7:36 AM to 7:55 AM. Incremental shadow would start at the beginning of the analysis day at the top of the park along 3rd Street (see **Figure 6-26**). The new shadow would quickly move northeast (clockwise) and exit the park by 7:55 AM.

On the May 6/August 6 analysis day, Whole Foods Public Access Area would receive incremental shadow for a total of approximately 3 hours and 31 minutes, from 6:27 AM to 8:10 AM in the morning and from 4:30 PM to 5:18 PM in the afternoon. Incremental shadow would start at the beginning of the analysis day at 6:27 AM falling on the northwestern section near 3rd Street, initially covering about a quarter of the park. The incremental shadow would move northeast (clockwise), becoming smaller rather quickly, and exiting the park at 8:10 AM (see **Figures 6-32 and 6-33**). Incremental shadow would enter the park again in the afternoon at 4:30 PM and would remain small in extent, limited to the northwest corner, until the end of the day at 5:18 PM (see **Figure 6-36**). Sunlit areas would remain in the park throughout the day. All vegetation affected by incremental shadow could receive over 8 hours of direct sunlight throughout the day.

On the June 21 analysis day, Whole Foods Public Access Area would receive incremental shadow for a total of approximately 3 hours and 19 minutes, from 5:57 AM to 8:15 AM in the morning and from 4:00 PM to 6:01 PM in the afternoon. In the morning, incremental shadow would briefly cover about two-thirds of the park but would move quickly northeast (clockwise) and decrease in size. By 6:15 AM the incremental shadow would cover about a third of the park and by 7:15 AM it would be limited to a small area near 3rd Street (see **Figure 6-37**). It would exit completely at 8:15 AM (see **Figure 6-38**). Incremental shadow would enter the park again in the afternoon at 4:00 PM, and would remain limited to the northwest corner until the end of the analysis day at 6:01 PM (see **Figures 6-40 and 6-41**). The incremental shadow would never eliminate remaining sunlight, and large sunlit areas would remain in the park for virtually the entire day. All vegetation affected by incremental shadow could receive over 7 hours of direct sunlight throughout the day.

On the December 21 analysis day, Whole Foods Public Access Area would receive incremental shadow for approximately 19 minutes, from 8:51 AM to 9:10 AM (see **Figure 6-42**). Incremental shadow would start at the beginning of the analysis day at the southeast corner of the park along 3rd Avenue and would quickly move east and exit the park by 9:10 AM, remaining quite limited in size for the entire short duration.

Assessment

The incremental shadows that could be generated by the Proposed Actions would not adversely affect the Whole Foods Public Access Area. The open space would experience incremental shadows of varying duration and coverage on all four analysis days. On the March 21/September 21 and December 21 analysis days, incremental shadow would last only 19 minutes and would be small in extent, and other areas of the park would remain in sun. On the May 6/August 6 and June 21 analysis days, there would be durations of incremental shadow in the early morning and the late afternoon. In each case, the incremental shadow would be limited to a portion of the park, while other portions would remain in sun. Given the limited extent and duration of the incremental shadow, the development resulting from the Proposed Actions would not cause significant adverse

shadow impacts to the use of this space. All vegetation in the park would continue to receive the minimum hours necessary of direct sunlight during the growing seasons. Therefore, the incremental shadows that could result from the Proposed Actions are not anticipated to adversely impact Whole Foods Public Access Area.

1ST STREET TURNING BASIN

The former 1st Street Turning Basin was part of the Canal surface waterway system until between 1954 and 1966, when it was filled. It was originally used to deliver coal via barges to an adjacent electric generating station. The EPA identified this as one site requiring remediation in order to reduce the risk of recontamination of the Gowanus canal. The site will be excavated, a cap over the exposed surface will be installed, and the upland perimeter will be restored including fortification of existing bulkheads and a new intertidal vegetative shelf on the north side. The turning basin will be restored to an open waterway suitable for navigation and recreational use. The intertidal vegetative shelf will be an ecological habitat anticipated to contain spartina and other high marsh vegetation. It is not anticipated to be accessible on foot from the adjacent upland areas.

On the March 21/September 21 analysis day, 1st Street Turning Basin would receive incremental shadow from 7:36 AM to 8:50 AM, 9:35 AM to 10:30 AM, 12:35 PM to 3:12 PM, and 4:05 PM to 4:29 PM. The incremental shadow would cover almost all of the resource in the beginning of the analysis day except for a small area on the south west side. The incremental shadow would quickly move north, and by 8:15 AM it would be limited to a small area on the east side of the resource (see **Figure 6-26**). It would continue to decrease in size and would exit the resource at 8:40 AM (see **Figure 6-27**). Incremental shadow would enter again at 9:35 AM from the development to the south and only cover a small area on the east corner, and would exit again at 10:30 AM (see **Figure 6-28**). Incremental shadow would enter again in the southeast corner at 12:35 PM but only cover a very small sliver of the resource until 3:12 PM (see **Figures 6-29 and 6-30**). The incremental shadow would again enter and move across the center of the resource for the final 25 minutes of the analysis day (see **Figure 6-31**). All plants on the vegetative shelf affected by incremental shadow would receive 4 to 6 hours of direct sunlight throughout the day with the exception of an area in the center, and another small area at the eastern edge, both of which would receive approximately between 3 and 4 hours of sun over the course of the day.

On the May 6/August 6 analysis day, 1st Street Turning Basin would receive incremental shadow in the morning from 6:27 AM to 9:25 AM and in the afternoon from 2:30 PM to 3:00 PM. The incremental shadow would block all sunlight from the resource until approximately 7:15 AM. The incremental shadow would move north and continue to get smaller until 9:25 AM when it exits the resource (see **Figures 6-32 and 6-33**). The incremental shadow would enter again in the afternoon for 30 minutes covering a very small area on the east side of the resource. All vegetation affected by incremental shadow could receive over 5 hours of direct sunlight throughout the day.

On the June 21 analysis day, 1st Street Turning Basin would receive incremental shadow from 5:57 AM to 9:45 AM. The incremental shadow would block all sunlight from the resource until approximately 7:20 AM. The incremental shadow would move quickly north and get smaller in size. By 8:30 AM it would cover less than half of the resource in shadow (see **Figures 6-37 and 6-38**). The final hour of incremental shadow would be limited to a strip along the north side of the resource. All vegetation affected by incremental shadow could receive over 6 hours of direct sunlight throughout the day.

On the December 21 analysis day, St. Mary's Park would receive incremental shadow from 8:51 AM to 2:47 PM. The incremental shadow would be small throughout this period, because most of the basin would be in existing shadows. The incremental shadow would eliminate the small remaining sunlight from the resource from 8:51 AM to 10:15 AM and in the afternoon from 12:00 PM to 12:30 PM (see **Figures 6-42 to 6-44**).

Assessment

Incremental shadows would cover portions of the 1st Street Turning Basin for varying durations and coverage on all four analysis days. Regarding shadow impacts to boating and other recreational uses, these uses would likely be heaviest in the spring, summer, and fall, and much lighter in winter. In the spring, summer, and fall, development resulting from the Proposed Actions would cast large incremental shadows on the Canal early and late in the day, but the basin would be mostly in sunlight from mid-morning through mid-afternoon in these seasons. Given these factors, the incremental shadow would not significantly impact the recreational uses of the Canal in these seasons. Adjacent areas of the Canal would be in sun during times when most of the 1st Street Turning Basin would be in shadow. In winter, most of the basin would be in existing shadow throughout the day, and incremental shadow would eliminate remaining areas of sunlight at times, but boating activities would be much lighter in winter; in addition, large sunlit areas would remain on nearby areas of the Canal for much of the day south of 3rd Street. Therefore, the impact would not be significant.

Regarding shadow impacts to fish, benthic invertebrates, and plankton habitats, the 1st Street Turning Basin and the adjacent portion of the Canal waters would be subject to tidal currents that carry phytoplankton through shaded areas of the basin. Mobile organisms, such as fish and epibenthic macroinvertebrates (e.g., crabs), would be expected to move through the areas of incremental shadows. Further, as with other waters of the Upper Harbor, suspended materials in the Canal water would limit light and shadow penetration, further limiting the volume of affected water. Therefore, project-generated shadows would not be expected to affect primary productivity of the aquatic resources (plankton, fish, and benthic invertebrates) in the future with the Proposed Actions, and any potential for a minor hindrance on fish passage within the limited and transient area of project-generated shadows cast on the basin would not be significant.

With regard to shadow effects on the vegetative shelf anticipated to contain spartina and other high marsh plants, all areas of the shelf would receive a minimum of 4 to 6 hours of direct sunlight through the May-to-August heart of the growing season represented by the May 6/August 6 and June 21 analysis days. On the March 21/September 21 analysis day, an area in the center of the shelf and another small area at the eastern end of the shelf would receive approximately 3 to 4 hours of sun. Overall, the shelf would receive adequate direct sunlight over the course of the growing season to support the intertidal vegetation, and the incremental shadow would not cause a significant adverse impact.

ST. MARY'S PARK

St. Mary's Park is a two-block-long park located along Smith Street. Portions of it are under the elevated F and G subway lines. It was recently renovated and is open to the public. The park's northern section is between Luquer and Nelson Streets and features a turf field, running track, basketball court, and seating area. The southern section is between Nelson and Huntington Streets and features a playground, spray showers, and benches. On the western perimeter of the southern section there is a planting bed with plantings and trees, nestled between the elevated train and

adjacent brownstones. The park has been designed to take advantage of the unique condition under the elevated train lines as a shade tolerant, active recreational space.

On the March 21/September 21 analysis day, St. Mary's Park would receive incremental shadow from 7:36 AM to 11:50 AM. In the morning, incremental shadow would combine with the shadow from the elevated train and cover most of the resource leaving portions of direct sunlight on each section of the park (see **Figure 6-50**). The incremental shadow would move east but continue to cover large extents of the park until around 10:00 AM (see **Figure 6-51**). After this point incremental shadow would become smaller as it moved east, but more of the park would be in the shadow from the overpass. Incremental shadow would exit completely at 11:50 AM. Incremental shadow would never eliminate sunlight from St. Mary's Park. Regarding shadow effects on vegetation, most of the park (both north and south sections) is hardscaped with little to no vegetation. Most of the vegetation that exists (in the planted strip on the southern block) that would be affected by incremental shadow would receive between 3 and 6 hours of sunlight, with one small area at the north end near Nelson Street receiving between 2 and 3 hours.

On the May 6/August 6 analysis day, St. Mary's Park would receive incremental shadow from 6:27 AM to 11:05 AM. In the morning, incremental shadow would combine with the shadow from the elevated train and cover most of the resource leaving portions of direct sunlight on the south side of the park (see **Figure 6-52**). The new shadow would move northeast (clockwise) and continue to cover fairly large extents of the park until around 9:00 AM, when it would cover less than half the park. By 9:30 AM incremental shadow would cover about a quarter of the southern section and less than a quarter of the northern section (see **Figure 6-53**). Incremental shadow would exit completely at 11:05 AM. Incremental shadow would never completely eliminate sunlight from St. Mary's Park. Regarding shadow effects on vegetation, most of the park (both north and south sections) is hardscaped with little to no vegetation. Most of the vegetation that exists (in the planted strip on the southern block) that would be affected by incremental shadow would receive between 3.5 and 9 hours of sunlight, with one small area at the north end near Nelson Street receiving between 2 and 3 hours.

On the June 21 analysis day, St. Mary's Park would receive incremental shadow from 5:57 AM to 10:55 AM. For the first 20 minutes of the day the incremental shadow would eliminate all direct sunlight from the park (see **Figure 6-54**). Incremental shadow would continue to cover large extents throughout the morning hours, including the entire north section of the park until approximately 7:45 AM. By approximately 9:00 AM incremental shadow would cover less than a quarter of the park (see **Figure 6-55**). Incremental shadow would exit at 10:55 AM. Regarding shadow effects on vegetation, most of the park (both north and south sections) is hardscaped with little to no vegetation. Most of the vegetation that exists (in the planted strip on the southern block) that would be affected by incremental shadow would receive between 4 and 9 hours of sunlight, with one small area at the north end near Nelson Street receiving between 2 and 3 hours.

On the December 21 analysis day, St. Mary's Park would receive incremental shadow from 8:51 AM to 12:23 PM. In the morning, incremental shadow would cover the northern block and portions of the southern block until 10:45 AM (see **Figure 6-56**). At 11:00 AM incremental shadow would still cover most of the north section but would be exiting the south section (see **Figure 6-57**). Incremental shadow would then begin to decrease in size on the north section, exiting completely at 12:23 PM.

Assessment

The incremental shadows that could be generated by the Proposed Actions would not adversely affect St. Mary's Park. The open space would experience incremental shadows of varying duration and coverage on all four analysis days. On all four days, both the extent and duration of incremental shadows would be considerable in the morning, but the incremental shadow would exit in the late morning in the spring summer, and fall, and at 12:23 PM in winter. The additional incremental shadows from the Proposed Actions would not significantly alter the usability of the park, which was designed to take advantage of this unique condition in mind as a shade-tolerant and active recreational space. As recently reconstructed and redesigned, the park has little to no vegetation other than on the western edge of the southern block. The vast majority of the vegetation would receive a minimum of 3 to 6 hours of direct sunlight during the March/September "shoulders" of the growing season, and 3.5 to 9 hours through the May to August heart of the growing season, adequate sunlight for shade-tolerant species. Therefore, the incremental shadows that could result from the Proposed Actions are not anticipated to adversely impact St. Mary's Park.

COMMUNITY GARDENS

WARREN ST. MARKS COMMUNITY GARDEN

Warren St. Marks Community Garden is located on a narrow through-block lot that connects St. Marks Place to the north and Warren Street to the south, on the block east of 4th Avenue. Buildings abut the garden on the west and on the St. Marks side of the east, and an empty lot is adjacent on the Warren Street half of the east side. Sunlight-sensitive features within the garden include seating areas, wood-frame garden beds, planted areas, and several trees. The garden is open on Saturdays and Sundays, March through October from 10:00 AM to 4:00 PM.

On the March 21/September 21 analysis day, shadow from the Proposed Action would overlap with existing shadow from intervening buildings and therefore would not cast any new shadow on Warren St. Marks Community Garden.

On the May 6/August 6 analysis day, Warren St. Marks Community Garden would receive a small area of incremental shadow in the middle portion of the garden for approximately 35 minutes, from 3:35 PM to 4:10 PM (see **Figure 6-69**). Due to the slightly varying shapes of the massing in the No Action condition compared to the With Action, there would also be a similar-sized area of reduced shadow during this time. The incremental shadow would exit at 4:10 PM but there would continue to be a reduction of shadow in the With Action condition, compared to the No Action condition, until 4:45 PM. All vegetation affected by incremental shadow could receive over 7 hours of direct sunlight throughout the day.

On the June 21 analysis day, Warren St. Marks Community Garden would receive incremental shadow for approximately 1 hour and 35 minutes, from 3:25 PM to 5:00 PM (see **Figure 6-70**). Sunlight-sensitive features that would receive incremental shadow include plantings, garden plots, and several trees. The longest duration of incremental shadow would fall on the garden plots and trees located in the center of the garden for nearly one hour. In the No Action condition this area would receive 8 to 9 hours of direct sunlight throughout the day. Development resulting from the Proposed Actions would reduce the amount of direct sunlight in this area to between 7 and 8 hours. The incremental shadow would not eliminate sunlight from the garden at any time during the affected period.

Assessment

The community garden would experience incremental shadows on the May 6/August 6 and June 21 analysis days. During the May 6/August 6 analysis day the extent and duration of incremental shadow would be small and during the affected times the proposed development would reduce shadow in other areas, so the net effect of the With Action condition would be minimal. On the June 21 analysis day the last hour of incremental shadow would occur outside of the garden's open hours and would have no impact on the public's utilization of the resource. For both analysis days, all vegetation would continue to receive over 7 hours of direct sunlight throughout growing season, identified by the *CEQR Technical Manual* as more than the minimum requirement for healthy vegetation. Therefore, the incremental shadows that could result from the Proposed Actions are not anticipated to adversely impact Warren St. Marks Community Garden.

GREENSPACE ON 4TH

Greenspace on 4th is a community garden located at 207 4th Avenue. Sunlight-sensitive features within the resource include garden areas, planters, seating areas, and trees. The garden is open on Saturdays from 11:00 AM to 1:00 PM, Sundays from 11:00 AM to 3:00 PM, and Mondays and Wednesdays from 6:00 PM to dusk.

On the March 21/September 21 analysis day, Greenspace on 4th would receive incremental shadow for approximately 19 minutes, from 4:10 PM to 4:29 PM. Incremental shadow would be limited to the northwest corner of the garden and it would remain small for the entire duration (see **Figure 6-60**). A large area of sun would remain on the space during this time and all vegetation would continue to receive 7 hours of direct sunlight throughout the day.

On the May 6/August 6 analysis day, Greenspace on 4th would receive incremental shadow for approximately 2 hour and 3 minutes, from 3:15 PM to 5:18 PM (see **Figure 6-63**). Sunlight-sensitive features that would be cast in new shadow include garden plantings and trees. Incremental shadow would enter the northwest corner of the garden at 3:15 PM. Small at first, it would extend eastward and gradually increase in size. At 4:30 PM incremental shadow would cover the northwestern half of the space, with the southeastern half partially in sun and partially in existing/No Action shadow. By 5:00 PM the incremental shadow would cover approximately two-thirds of the space, with only a small area on the east side remaining in sun. All direct sunlight would be eliminated from the garden for the last five minutes of the analysis day. However, all vegetation affected by incremental shadow would receive over 8 hours of direct sunlight throughout the day.

On the June 21 analysis day, Greenspace on 4th would receive incremental shadow for approximately 2 hours and 46 minutes, from 3:15 PM to 6:01 PM (see **Figure 6-66**). Sunlight-sensitive features that would be cast in new shadow include garden plantings and trees. Incremental shadow would enter the northwest corner of the garden at 3:15 PM. Small at first, it would extend eastward and gradually increase in size. At 4:00 PM incremental shadow would cover approximately half of the space, with the other half partially in sun and partially in existing/No Action shadow. Beginning at 5:00 PM the incremental shadow would cover most of the park and eliminate the remaining sunlight, and would continue to do so for the final hour of the day. However, all vegetation affected by incremental shadow would receive over 8 hours of direct sunlight throughout the day.

Assessment

The community garden would experience incremental shadows on the March 21/September 21, May 6/August 6, and June 21 analysis days. During the affected days, the incremental shadow occurs outside of the garden's open hours and would have no impact on the public's utilization of the resource. On all three analysis days, all vegetation would continue to receive over seven hours of direct sunlight throughout growing season, identified by the *CEQR Technical Manual* as more than the minimum requirement for healthy vegetation. Therefore, the incremental shadows that could result from the Proposed Actions are not anticipated to adversely impact the community garden.

GIL HODGES COMMUNITY GARDEN

Gil Hodges Community Garden is located on the corner of Carroll Street and Denton Place. The garden contains several raised garden beds, planted areas, trees, and seating. The garden is open April through October, Monday through Friday from 9:00 AM to 2:00 PM and Saturday and Sunday from 10:00 AM to 6:00 PM.

On the March 21/September 21 analysis day, Gil Hodges Community Garden would receive incremental shadow from 7:36 AM to 1:15 PM. Incremental shadow would cover portions of the western half from 8:30 AM to 9:40 AM. Combined with the existing shadows, the garden would not receive sunlight at this time (see **Figure 6-58**). The incremental shadow would then move east (clockwise) and at 10:30 AM would cover the northern half of the garden. It would continue moving east and exit at 1:15 PM (see **Figure 6-59**). Due to the slightly varying shapes of the massing in the No Action condition compared to the With Action, there would also be some areas of reduced shadow in the With Action condition, from 10:15 AM until the end of the analysis day along the south end of the garden (see Figures **6-59 and 6-60**). With the reduced shadow in the With Action condition, an area in the southeast part of the garden would receive between 5.5 and 7.5 hours of direct sunlight over the course of the day. A portion of the northeast corner of the garden would receive between 3.5 and 4 hours and the rest of the garden would receive 4 to 6 hours or more in the With Action condition.

On the May 6/August 6 analysis day, Gil Hodges Community Garden would receive incremental shadow from 6:27 AM to 12:30 PM. Incremental shadow would cover the western part of the space starting from 7:00 AM (see **Figure 6-61**). From 8:30 AM until 9:15 AM incremental shadow would eliminate most direct sunlight from the garden except for a small area at the northwest corner. Incremental shadow would start to decrease in extent and move northeast (clockwise) until it exited the garden at 12:30 PM (see **Figure 6-62**). Starting at 10:00 AM, in the With Action Condition there would be a small reduction of shadow along the southeast side of the garden, compared with the No Action condition, continuing until the end of the analysis day (see **Figures 6-62 and 6-63**). With the reduced shadow from the With Action condition, the southeast corner of the garden would receive over 7 hours total duration of sunlight. All areas of the garden would receive 4 to 6 hours or more of sun in the With Action condition on this analysis day.

On the June 21 analysis day, Gil Hodges Community Garden would receive incremental shadow from 5:57 AM to 12:20 PM. By 8:00 AM, incremental shadow would cover most of the space, leaving only a small area of sun in the north end (see **Figure 6-64**). However, the incremental shadow would continue to move northeast (clockwise), allowing more sun to reach the south part of the garden while continuing to cover portions of the garden, until about 10:00 AM (see **Figure 6-65**). By 11:00 AM incremental shadow would be limited to a portion of the northeast section of the garden (see **Figure 6-65**) before exiting at 12:20 PM. A small reduction of shadow would

occur in the With Action Condition in the south end through much of the afternoon (see **Figure 6-66**). All vegetation affected by incremental shadow would receive 5 to 10 hours of direct sunlight throughout the day.

On the December 21 analysis day, Gil Hodges Community Garden would receive incremental shadow from 9:45 AM to 1:45 PM. However, from 8:51 AM to 9:45 AM, there would be a reduction in shadow with the With Action condition. From 9:45 AM to 10:45 AM the With Action condition would result in both some reduction in shadow and some incremental shadow, but overall a net reduction in terms of coverage, compared with the No Action condition (see **Figure 6-67**). From 10:45 AM to 11:15 AM there would be more incremental shadow than reduced shadow (see **Figure 6-8**), and from 11:45 AM to 12:25 PM incremental shadow would eliminate all sunlight from the resource. From 12:25 PM to 1:45 PM there would be both reduced and incremental shadow, and there would be only a reduction in shadow from 1:45 PM until the end of the analysis day at 2:53 PM. Overall there would be a net reduction of shadow in the With Action condition on December 21. During December, the garden would be expected to be closed to the public.

Assessment

The community garden would experience incremental shadows on all four analysis days. All the plantings and vegetation would continue to receive a minimum of 4 to 6 hours throughout the heart of the growing season, i.e., May through August, sufficient to support vegetation in the garden. All but a small area in the northeast corner would receive a minimum of 4 to 6 hours on the March 21/September 21 "shoulders" of the growing season, and that small area would receive 3.5 to 4 hours. Plantings in the northeast corner of the garden receiving 3.5 to 4 hours of sunlight during the March21/September 21 analysis days include a Japanese maple (Acer Palmatum) and White Fringetree (Chionanthus Virginicus) and other plants that are tolerant of partial sun conditions. Therefore, the development resulting from the Proposed Actions would not cause significant adverse shadow impacts to the vegetation in this garden.

The garden is closed in the winter, and therefore the incremental (and reduced) shadow resulting from the Proposed Actions would not affect any use of the garden, nor would it affect the vegetation, as it is outside the growing season. On March 21, the garden is closed as well, but on September 21 it is open from 9:00 AM to 2:00 PM (Mondays to Fridays). On that analysis day, incremental shadow would eliminate the remaining sunlight for 40 minutes. There would also be an area of reduced shadow, but this would be small until late in the afternoon, after the weekday closing time (but present during weekend hours, 10:00 AM to 6:00 PM). Since the vegetation would not be adversely impacted, the morning incremental shadow during weekday open hours is not expected to significantly affect the use and function of the garden on September 21. On the May 6/August 6 and June 21 analysis days, there would be larger areas of sunlight after 9:00 AM, and particularly after 9:30 AM, and consequently the impact of the incremental shadows would not be significant for users of the garden.

HISTORIC RESOURCES

PUBLIC BATH NO. 7

Public Bath No. 7, located on the corner of 4th Avenue and President Street, is listed on the State and National registers of historic places (S/NR) and a New York City Landmark. It was constructed in 1910 and designed in the neo-Renaissance style. The building is currently being used as a Blink Fitness. Sunlight-sensitive features include windows on the second story: three

large arched windows on the 4th Avenue façade and five large windows along President Street, three of which arched and two rectangular with decorative carvings around their upper halves.

On the March 21/September 21 analysis day, Public Bath No. 7 would receive incremental shadow for approximately 39 minutes, from 3:50 PM to 4:29 PM. The incremental shadow would fall on portions of the large arched windows on the 4th Avenue façade. The incremental shadow would not eliminate direct sunlight on these windows at any time during the affected period, and portions of the large arched windows on the President Street façade would also remain in sun during this time (see **Figure 6-71**).

On the May 6/August 6 analysis day, Public Bath No. 7 would receive incremental shadow for approximately an hour and 18 minutes, from 4:00 PM to 5:18 PM. The incremental shadow would fall on portions of the large arched windows on both the 4th Avenue and President Street façades. The incremental shadow would not eliminate direct sunlight on these windows on either façade at any time during the affected period (see **Figure 6-72**).

On the June 21 analysis day, Public Bath No. 7 would receive incremental shadow for approximately 39 minutes, from 4:15 PM to 6:01 PM. The incremental shadow would fall on portions of the large arched windows on the 4th Avenue façade. The incremental shadow would not eliminate direct sunlight on these windows at any time during the affected period, and all the large arched windows on the President Street façade would remain in sun during this time (see **Figure 6-73**).

Assessment

The landmark would experience incremental shadows on portions of the large arched second story windows of this historic building on the spring, summer, and fall analysis days. Incremental shadow durations would range between approximately 39 minutes and an hour and 46 minutes, but direct sunlight would continue to reach portions of these windows throughout the affected periods on each analysis day. Therefore, the incremental shadow would not significantly impact the public's use and enjoyment of the large arched second story windows in this historic building.

OUR LADY OF PEACE ROMAN CATHOLIC CHURCH COMPLEX

Our Lady of Peace Roman Catholic Church Complex is located along Carroll Street between Whitwell and Denton Places (two single-block streets), and includes a church at mid-block, flanked by a school to the west and a rectory and war memorial to the east. The church, built between 1902 and 1904 was constructed in the Romanesque Revival style. Sunlight-sensitive features include 11 stained glass windows on the front (north) façade of the church, six stained glass windows on the east façade, and six on the west façade. There is a rounded arched chapel at the back of the church which also has five stained glass windows that open into the main sanctuary space. A one-story circular chapel with eight stained glass windows is located on the south side of the building located at the northeast corner of 1st Street and Whitwell Place in the Our Lady of Peace Church Complex. The chapel, built sometime between 1966 and 1980, is attached to a building that was formerly a convent associated with Our Lady of Peace, which was constructed ca. 1920.

On the March 21/September 21 analysis day, Our Lady of Peace Roman Catholic Church Complex would receive incremental shadow for approximately one hour and fifteen minutes, from 7:36 AM to 8:51 AM. From 7:36 AM until approximately 8:13 AM incremental shadow would fall on the east façade and on the semi-circular chapel at the rear of the church. During this time, incremental shadow would fall on a total of four stained glass windows and would eliminate the remaining

direct sunlight (see **Figure 6-74**). At approximately 8:13 AM the shadow would begin to move off the rear chapel windows, allowing some direct sun into the main interior space, and would exit the chapel windows completely at 8:25 AM, and direct sun would light the chapel windows for the remainder of the day (see **Figure 6-75**). At 8:30 AM incremental shadow would begin moving off the east façade windows, allowing additional direct sunlight into the main space, and by 9:06 AM all incremental shadow would be off the windows. Direct sunlight would continue to reach portions of the east façade windows for the remainder of the morning and mid-day. In addition, incremental shadow would fall on the circular chapel at the south end of the complex for approximately 30 minutes from 7:55 to 8:25 AM, eliminating the small area of direct sunlight for most of that brief period (see **Figures 6-74 and 6-75**).

On the May 6/August 6 analysis day, Our Lady of Peace Roman Catholic Church Complex would receive incremental shadow for approximately 53 minutes in the morning and 7 minutes in the evening. From 7:13 AM to 8:06 AM incremental shadow would fall on the semi-circular chapel at the rear of the church and a portion of the windows on the east façade (see **Figure 6-76**). Sunlight would continue to reach some of the windows during this affected period. From 5:11 PM to 5:18 PM incremental shadow would fall on a portion on a portion of the windows of the circular chapel at the south end of the complex. The incremental shadow would be small and direct sun would continue to reach many of the chapel's windows throughout this affected periods.

On the June 21 analysis day, Our Lady of Peace Roman Catholic Church Complex would receive incremental shadow in the morning for approximately 13 minutes, from 5:57 AM to 6:10 AM, and in the late afternoon for 27 minutes, from 5:34 PM to 6:01 PM, for a daily total of 40 minutes. In the morning, incremental shadow would fall on portions of the church's lower front (north) façade windows, but most of that façade and its windows would remain in sun during the brief affected period (see **Figure 6-77**). In the late afternoon, incremental shadow would fall on a portion of the windows of the circular chapel at the south end of the complex. The incremental shadow would eliminate all the sun on the chapel's windows for approximately the final 16 minutes of the analysis day, 5:45 PM to 6:01 PM (see **Figure 6-77**).

On the December 21 analysis day, Our Lady of Peace Roman Catholic Church Complex would receive incremental shadow for approximately 2 hours and 19 minutes, from 8:51 AM to 11:10 AM. Incremental shadow would fall on up to 6 stained glass windows on the east façade and the semi-circular chapel at the rear of the church, eliminating all the direct sunlight from the chapel windows from 8:51 AM to 10:20 AM, and from the east façade windows from approximately 9:25 AM to 10:55 AM (see **Figures 6-78 and 6-79**). Consequently, all the direct sunlight would be eliminated from the main sanctuary space for 55 minutes, between 9:25 AM and 10:20 AM. Incremental shadow would also fall on the circular chapel at the rear of the complex from 8:51 AM to 9:30 AM, eliminating all the direct sunlight from 8:51 AM to 9:20 AM.

Assessment

Project-generated incremental shadows would reach a maximum of six of the church's 23 stained glass windows at any one time, but would result in the complete elimination of direct sunlight on the stained glass windows of this historic resource for approximately 37 minutes in the morning of the March 21/September analysis day and for approximately 55 minutes on the morning of the winter analysis day. These incremental shadows may have the potential to affect the enjoyment of this historic resource for a total duration of approximately 2 hours and 19 minutes, during the mornings of the winter analysis day, which is typically a time when the church holds holiday services. Therefore the incremental shadow is being considered a significant adverse shadow impact. Incremental shadow would fall on the church windows on the spring, summer, and fall

analysis days as well, but the extent and duration would be limited and not significant. With regard to the chapel at the rear of the complex, it would receive incremental shadow on all four analysis days. On the March 21/September 21 and the May 6/August 6 analysis days, the extent of incremental shadow would be minimal and the duration, short. On the winter analysis day, the incremental shadow would completely eliminate the sun for about a half-hour in the morning before exiting 10 minutes after that, and this limited duration would not be significant. On June 21, the incremental shadow would eliminate the sun for 16 minutes in the late afternoon, and this limited duration would not be significant.

ST. MARY STAR OF THE SEA CHURCH COMPLEX

The St. Mary Star of the Sea Church Complex, consisting of the church, hall, school, and rectory, is located at 467-469 Court Street, occupying the east side of Court Street between Luquer and Nelson Streets in Carroll Gardens. The church is a brick building designed in the Gothic Revival style, and built ca. 1853. Sunlight-sensitive features include the stained glass windows along the all four sides of the church, although the front (west) façade windows face away from all project sites and could not be affected by project-generated shadow.

On the March 21/September 21 analysis day, portions of the stained glass windows on the south façade would receive incremental shadow for approximately 5 minutes, from 8:10 AM to 8:15 AM. The extent of incremental shadow would be small and most of the windows on the south and east facades would remain in direct sun.

On the May 6/August 6 analysis day, shadows fall to the southwest in the early morning, and the stained glass windows on the east façade would receive incremental shadow for approximately 33 minutes, from 6:27 AM to 7:00 AM, and some of the windows on the north facades would receive incremental shadow from 6:27 AM until 7:20 AM. On the east façade windows, the incremental shadow would eliminate all the sun from 6:27 AM to 6:50 AM, but sun would continue to reach some of the windows on the north façade throughout this period. The extent of incremental shadow would be small after 7:00 AM (see **Figure 6-80**).

On the June 21 analysis day, shadows fall to the southwest in the early morning, and a portion of the stained glass windows on the east façade would receive incremental shadow for approximately 4 minutes, from 6:27 AM to 6:31 AM. The extent of incremental shadow would be small and most of the windows on the north and east façades would remain in direct sun.

On the December 21 analysis day, shadows fall to the northwest in the morning, and portions of the stained glass windows on the south and east façades would receive incremental shadow for approximately an hour and 4 minutes, from 8:51 AM to 9:55 AM. Incremental shadow would eliminate all sunlight on the windows for approximately the first 10 minutes of the analysis day, but after that the project-generated shadow would gradually move eastward and off the complex, allowing more and more stained glass windows to receive sunlight (see **Figure 6-81**).

Assessment

Incremental shadows would cover portions of the stained glass windows of this church on all four analysis days. However, on March 21/September 21 and June 21, the incremental shadow would be limited to a duration of 4 to 5 minutes, and most of the windows would remain in direct sun during this brief affected period. On the May 6/August 6 analysis day, incremental shadow would last for about a half-hour on the east façade and nearly an hour on portions of the north façade, but after 7:00 AM all the east façade windows and most of the north façade windows would be in sun. On December 21, incremental shadow would eliminate the sun on the windows for 10 minutes in

the morning, but after approximately 9:00 AM sun would reach more and more of the windows, and by approximately 9:55 AM incremental shadow would exit completely. Given the limited extent and duration throughout the year, and the fact that the incremental shadow would not totally eliminate direct sun except for 10 minutes on one of the four analysis days, the incremental shadow would not significantly impact the use and enjoyment of the stained glass windows.

PROJECT-GENERATED OPEN SPACES[5]

GOWANUS GREEN DEVELOPMENT OPEN SPACE

The Proposed Actions would result in a new publicly accessible open space including a new approximately 1.62-acre parkland at Public Place. Gowanus Green Development Open Space ("Canal Park") will be located between 4th Street and the Gowanus Canal. Preliminary plans for the public open space include rain gardens, a children's play area, a dog park, and lawn areas.

On the March 21/September 21 analysis day, Canal Park would receive incremental shadow for approximately 1 hour and 59 minutes, from 2:30 PM to 4:29 PM. Incremental shadow would start small at the northwest and southwest corners of the space, and would increase in size over the course of the two-hour duration (see **Figure 6-82**). By the end of the analysis day, it would cover most of the park, leaving some portions near the canal in direct sunlight. The northwest corner of the park, which receives the most incremental shadow, would receive between 6 and 8 hours of direct sunlight. The rest of the park would receive 8 to over 10 hours of direct sunlight throughout the day.

On the May 6/August 6 analysis day, Canal Park would receive incremental shadow for a total of approximately 3 hours and 21 minutes, from 6:27 AM to 8:00 AM, and in the afternoon from 2:30 PM to 5:18 PM. Incremental shadow in the morning would come from the buildings north of the park. Incremental shadow would start in the northwest area of the park and would decrease in size until it exited at 8:00 AM (see **Figure 6-83**). In the afternoon, incremental shadow would enter the park at 2:30 PM along the west side and gradually extend eastward (see **Figure 6-84**). Around 4:00 PM approximately 40% of the park would be cast in shadow, and the incremental shadow would continue to extend eastward (see **Figure 6-85**), leaving only small slivers left in direct sunlight by the end of the analysis day at 5:18 PM. All affected areas of the park would receive between 7 and 10.5 hours of direct sunlight throughout the day.

On the June 21 analysis day, Canal Park would receive incremental shadow for a total of approximately 5 hours and 44 minutes, from 5:57 AM to 8:15 AM, and in the afternoon from 2:35 PM to 6:01 PM. Incremental shadow in the morning would come from the buildings to the north of the park. Incremental shadow would start in the northwest area of the park and would decrease in size until it exited at 8:15 AM (see **Figures 6-86**). In the afternoon, incremental shadow would enter the park along the west side. By 5:00 PM, and to the end of the analysis day at 6:01 PM, most of the park would be cast in new shadow leaving only small slivers left in direct sunlight (see **Figure 6-87 and 6-88)**. All affected areas of the park would receive 7 to over 11 hours of direct sunlight throughout the day.

[5] According to *CEQR Technical Manual* methodology, project-generated open space cannot experience a significant adverse impact from the project because without the project, the open space would not exist. However, a discussion of how shadows would affect the new space is included for informational purposes.

On the December 21 analysis day, Canal Park would receive incremental shadow for approximately 1 minute, from 2:52 PM to 2:53 PM. Incremental shadow would enter the northwest corner of the park, and would be quite small for that 1 minute duration.

In conclusion, Canal Park would receive minimal shadow in the winter, and during the spring, summer, and fall there would be large areas of sunlight throughout the day, until approximately the final hour of the day when it would be mostly in shadow. The area of the park with the longest durations of sunlight would be near the waterfront. All areas of the park would receive more than adequate sunlight to support vegetation.

GOWANUS CANAL ESPLANADE

As noted in Chapter 5, "Open Space," the Proposed Actions include the establishment of the Gowanus Waterfront Access Plan (WAP), which would result in the development of a continuous public walkway. The WAP would cover the waterfront projected development sites within the Project Area. As discussed in Chapter 1, "Project Description," the WAP guidelines generally require a minimum 40-foot shore public walkway on typical sites and a minimum of 30-foot shore public walkway on certain constrained sites, and on larger sites supplemental public access areas that ensure that 20 percent of the zoning lot is devoted to waterfront public access.

The WAP would include shore public walkways (i.e., linear public access areas running alongside the Canal) and supplemental public access areas (i.e., additional public space provided to fulfill waterfront requirements on large sites). Street end features with stormwater retention functionality are anticipated to be incorporated at certain street end locations.

On the March 21/September 21 analysis day, much of the esplanade on the east side of the Canal would be in project-generated shadow from early to late morning, while on the west side, much of the esplanade would be in project-generated shadow briefly from 7:36 AM to around 8:00 AM, after which most of the west side would be in sun. All areas of the esplanade would be in sun in the middle of the day, from approximately 12:30 PM to 2:00 PM. Later in the afternoon, most of the west side of the esplanade would be in project-generated shadow. On the east side, large sunlit areas would remain until approximately 4:00 PM. At no time would sun be eliminated from either the west or the east side of the esplanade on this analysis day.

On the May 6/August 6 analysis day, much of the esplanade on the east side of the Canal would be in project-generated shadow from early to late morning, while on the west side, much of the esplanade would be in project-generated shadow briefly from 6:27 AM to around 7:00 AM, after which most of the west side would be in sun. The west side would be entirely in sun from 9:30 AM until 1:30 PM, while the east side would be entirely in sun from approximately noon to 3:15 PM. The west side would be mostly in shadow in the middle and late afternoon. The east side would remain mostly in sun from 3:15 PM to 4:15 PM, and would be mostly in project-generated shadow for the final hour of the analysis day, 4:15 PM to 5:18 PM.

On the June 21 analysis day, most of the esplanade on the east side of the Canal would be in project-generated shadow from early into late morning, while on the west side, much of the esplanade would be in project-generated shadow briefly until around 7:00 AM, after which most of the west side would be in sun. The west side would be entirely in sun from 9:15 AM until 1:30 PM. The east side would be mostly in sun by 11:00 AM, and entirely in sun from approximately noon to 3:15 PM. The west side would be mostly in project-generated shadow after 2:30 PM, while the east side would remain entirely or mostly in sun until about 5:00 PM. Between 5:00 PM

and the end of the analysis day at 6:01 PM the east side would be mostly in project-generated shadow, but some areas of sun would remain.

In the morning of the December 21 analysis day, most of the esplanade north of 3rd Street on both sides of the Canal would be in project-generated or existing shadow, with a few small areas of sun remaining, while south of 3rd Street most of the esplanade would be in sun. However, shadows move more quickly in winter, and by 11:30 AM nearly the entire west side of the esplanade would be in sun, while most of the east side would remain in project-generated shadow. Incremental shadow would become smaller on the east side and by 1:00 PM more than half the east side would be in sun, as would all of the west side. From 1:30 PM to 2:00 PM virtually the entire esplanade on both sides would be in sun. From 2:00 PM to the end of the analysis day at 2:53 PM most of the west side would be in project-generated shadow and most of the east side would be in sun.

In summary, project-generated shadow would fall on the esplanade throughout the year. The esplanade would be shady in the early morning, particularly on the east side of the Canal, and in the late afternoons, particularly on the west side of the Canal, but substantial areas of the esplanade would be in sun from mid-morning to late afternoon in the spring, summer, and fall, when usage would likely be heavier, and from late morning to mid-afternoon in winter, when usage would likely be lighter. Given its linear and interconnected nature, there would always be accessible sunlit sections of this future waterfront esplanade for users seeking sun.

NYCHA OPEN SPACES[6]

GOWANUS HOUSES OPEN SPACE

Gowanus Houses Open Space are the open spaces within the NYCHA Gowanus Houses, located between Hoyt and Bond Streets from Wyckoff to Douglass Streets. Sunlight-sensitive features located within the resource include benches, playgrounds, and several mature trees. Due to ongoing repairs at the NYCHA Gowanus Houses, many open spaces and recreational resources are currently closed and being utilized as staging areas for construction.

On the March 21/September 21 analysis day, Gowanus Houses Open Space would receive incremental shadow for approximately 1 hours and 24 minutes, from 7:36 AM to 9:00 AM. Incremental shadow could be cast on small portions of the open space along Bond Street on both the north side, between Wyckoff and Baltic Streets, and the south side between Baltic and Douglass Streets (see **Figure 6-89**). Sunlight-sensitive features that would be affected by incremental shadow include benches and playgrounds. Incremental shadow on the north section would be minimal in extent and duration. On the south side, in the No Action condition the affected area would receive between 5 and 7 hours of direct sunlight throughout the day whereas in the With Action condition it would receive between 4 and 5 hours.

On the May 6/August 6 analysis day, Gowanus Houses Open Space would receive incremental shadow for approximately 6 minutes, from 6:27 AM to 6:43 AM. Incremental shadow could be cast on a small portion of the open space along Bond Street on the south side between Baltic and Douglass Streets. Sunlight-sensitive features that would be affected by incremental shadow include benches and playgrounds. Incremental shadow would be short in duration and minimal in extent.

[6] These open spaces are intended for use by NYCHA residents and are not open to the general public.

On the June 21 analysis day, Gowanus Houses Open Space would receive incremental shadow for a total of approximately 48 minutes, from 5:57 AM to 6:45 AM. Incremental shadow would fall on a small portion of the open space along Bond Street on the south side between Baltic and Douglass Streets (see **Figure 6-90**). Sunlight-sensitive features that would be affected by incremental shadow include benches and playgrounds. Incremental shadow would be short in duration and minimal and extent. All affected areas would receive from 5 to over 10 hours of direct sunlight throughout the day in the With Action condition.

On the December 21 analysis day, Gowanus Houses Open Space would receive incremental shadow for approximately 2 hours and 49 minutes, from 8:51 AM to 11:40 AM (see **Figures 6-91 and 6-92**). Incremental shadow would fall on small portions of the open space along Bond Street on both the north side, between Wyckoff and Baltic Streets, and the south side between Baltic and Douglass Streets. Sunlight-sensitive features that would be affected by incremental shadow include benches and playgrounds. On the north side, incremental shadow would move steadily across the area and the playgrounds would be in incremental shadow for approximately the first 1.5 hours of the analysis day. On the south side, two of the playgrounds are cast in shadow throughout the morning. From 10:00 AM to 11:00 AM the playground on the east side would be almost fully in shadow leaving only small slivers of direct sunlight. Other open spaces in the Gowanus Houses complex would be in sun during these times for NYCHA residents seeking sunlight.

In all seasons, incremental shadow would fall on a small proportion of available open space in the complex. There would always be sunlit areas in the complex near the area affected by incremental shadow for NYCHA residents seeking sunlight, and users of these open spaces would therefore not be substantially affected by the development resulting from the Proposed Actions. All affected areas would receive a minimum of 5 to 6 hours of sunlight over the course of the day, adequate to support vegetation.

WYCKOFF GARDENS OPEN SPACE

Wyckoff Gardens Open Space are the open spaces within the NYCHA Wyckoff Gardens located between Nevins Street and 3rd Avenue from Wyckoff to Baltic Streets. Sunlight-sensitive features within the resource include a community garden, seating, a playground, a basketball court, and several landscaped areas.

On the March 21/September 21 analysis day, Wyckoff Gardens Open Space would receive incremental shadow for approximately 4 hours and 44 minutes, from 11:45 AM to 4:29 PM (see **Figures 6-93 to 6-95**). Incremental shadow would be contained to the portion of the open space along Baltic Street where the basketball court and playground are located. Incremental shadow would be at its largest extent at approximately 1:30 PM and decrease for the rest of the analysis day. Large sunlit areas would remain on this open space throughout this period.

On the May 6/August 6 analysis day, Wyckoff Gardens Open Space would receive incremental shadow for approximately 20 minutes, from 2:45 PM to 3:05 PM. Incremental shadow would be minimal in size and duration only touching a small area of the southeast corner of the resource (see **Figure 6-96**).

On the December 21 analysis day, Wyckoff Gardens Open Space would receive incremental shadow for approximately 6 hours and 2 minutes, from 8:51 AM to 2:52 PM. Incremental shadow would enter the resource in the southern area where the basketball court is located, and would be limited to the southern portion of the open space until approximately 12:00 PM (see **Figures 6-98**

and 6-99) when the shadow begins to move north where the community garden and a playground are located. Incremental shadow would be at its largest extent from approximately 1:30 PM to 2:00 PM and would decrease for the rest of the analysis day. Sunlit areas would remain on this open space throughout this period. Incremental shadow would not impact the health of the vegetation or the community garden on this analysis day, which occurs outside the growing season.

In the spring, summer, and fall, incremental shadow would be small to minimal in extent, and sunlit areas would be available in adjacent parts of the complex at any given time for NYCHA residents. In winter, shadows would move across portions of the space throughout the day. The extent of the incremental shadow would be small in the morning but larger in the afternoon. However, there would continue to be substantial sunlit areas adjacent to the shaded areas for use by NYCHA residents seeking sun at that time, and therefore the development resulting from the Proposed Actions would not significantly impact the usability of the space.

WARREN STREET PLAYGROUND

Warren Street Playground is the open space within the NYCHA Warren Street Houses located between 3rd and 4th Avenues on the western half of the block, from Warren and Baltic Streets. The playground is intended for NYCHA residents. Sunlight-sensitive resources include a playground and benches on the south portion and a community garden, lawn areas, benches, and trees on the north portion.

On the March 21/September 21 analysis day, Warren Street Playground would receive incremental shadow for approximately 3 hours and 44 minutes, from 12:45 PM to 4:29 PM. Incremental shadow would be contained to the south portion of the open space along Baltic Street where the playground is located. Incremental shadow would enter the space at 12:45 PM and would remain small until about 3:00 PM when approximately half of the playground would be cast in shadow (see **Figures 6-93 and 6-94**). From approximately 4:00 PM to 4:29 PM, development resulting from the Proposed Actions would prevent any direct sunlight from reaching the resource (see **Figure 6-95**).

On the May 6/August 6 analysis day, Warren Street Playground would receive incremental shadow for approximately 1 hour and 58 minutes, from 3:20 PM to 5:18 PM. Incremental shadow would be contained to the south portion of the open space along Baltic Street where the playground is located. Incremental shadow would begin at 3:20 PM as a small area along on the southwest side of the playground and would increase until the end of the analysis day when it would block almost all direct sunlight from the resource (see **Figures 6-96 and 6-97**).

On the December 21 analysis day, Warren Street Playground would receive incremental shadow for approximately 6 hours and 2 minutes, from 8:51 AM to 2:53 PM. Incremental shadow would be contained to the south portion of the open space along Baltic Street where the playground is located. Incremental shadow would cover over half of the playground throughout the morning hours (see **Figure 6-98**). From approximately 1:30 PM to 2:53 PM, development resulting from the Proposed Actions would prevent any direct sunlight from reaching the resource (see **Figure 6-99**).

The south side of the Warren Street Playground would receive incremental shadow on three of the four analysis days. Incremental shadow would never reach the north side, which contains the community garden, lawn areas, benches, and trees. On the March 21/September 21 analysis days, incremental shadow would occur in the afternoon and on the winter analysis day, it would occur throughout the day. In the late spring and summer (May 6/August 6), incremental shadow would

enter in the mid-afternoon and remain small until the end of the day, and would not significantly impact the use of the playground. On the March 21/September 21 analysis day incremental shadow would enter in the early afternoon and become large toward the end of the day, eliminating the remaining sunlight for the final half-hour. However, the Wyckoff Gardens open spaces across 3rd Avenue would contain large sunlit areas at this time for NYCHA residents seeking sun. Similarly, in winter, the Wyckoff Gardens open spaces across 3rd Avenue would provide sunlit open space when the Wyckoff Street Playground has no sunlit areas between 1:30 PM and 2:53 PM. Therefore the development resulting from the Proposed Actions would not significantly impact the usability of the playground.

NATURAL RESOURCES

GOWNAUS CANAL

The Gowanus Canal is an approximately 1.8-mile-long, tidally influenced, man-made channel. It was built in the 1860s on a site previously occupied by the Gowanus Creek, local tributaries, and lowland marshes. For the purposes of this analysis, the Canal is considered a sunlight-sensitive resource both for its use as a recreational open space (supporting such activities as boating) and as a natural feature that supports fish, benthic invertebrates, and plankton, as described in Chapter 9, "Natural Resources."

Incremental shadows would cover portions of the Canal on all four analysis days. Due to the orientation of the manmade Canal, development along the east side of the Canal, north of 3rd Street, would cast incremental shadow in the mornings, and development on the west side of the Canal would cast incremental shadow in the afternoons.

On the March 21/September 21 analysis day, shadows would cover areas of the Canal throughout the day with varying degrees of duration and coverage (see **Figures 6-2 to 6-6** showing the northern section, **Figures 6-26 to 6-31** showing the central section, and **Figure 6-82** showing the southern section). The Canal would be completely or mostly in the sun for most of the day until around 3:00 PM, when the section north of 3rd Street would be mostly in incremental shadow for the final hour and a half of the day. South of 3rd Street, the Canal would still be mostly in sun. Over the course of the day, all areas of the Canal would receive a minimum of 5 to 6 hours of direct sun, except for one small area on the east side of the Canal between Degraw and Sackett Streets that would receive approximately 4.5 hours.

At the start of the May 6/August 6 analysis day at 6:27 AM, portions of the Canal would be in incremental shadow and other portions would not. By 7:30 AM, the Canal below 3rd Street and two large areas north of 3rd Street would be in sun, with the incremental shadow mainly falling on portions of the Canal between 1st and Degraw Streets (see **Figures 6-7 to 6-14** showing the northern section, **Figures 6-32 to 6-36** showing the central section, and **Figures 6-83 to 6-85** showing the southern section). From around 9:00 AM until late afternoon, most of the Canal would be completely or mostly in sun. Incremental shadow would generally extend eastward and by 4:00 PM most of the Canal north of Carroll Street would be in incremental shadow, while south of Carroll Street much of the Canal would remain in sun. Portions of Canal (between Douglass and Carroll Streets, 2nd and 3rd Streets, and 5th and Huntington Streets) would be in incremental shadow for the final hour or so of the analysis day. Over the course of the day, all areas of the Canal would receive a minimum of 7 or 8 hours of direct sun.

While a large portion of the Canal would be in incremental shadow at the start of the June 21 analysis day (see **Figures 6-15 to 6-21** showing the northern section, **Figures 6-37 to 6-41**

showing the central section, and **Figures 6-86 to 6-88** showing the southern section), the incremental shadows would gradually decrease and by 9:00 AM the Canal below 3rd Street would be completely in sun, and mostly in sun north of 3rd Street. The Canal would be completely in sun from 11:00 AM to 2:10 PM. Incremental shadow would extend eastward after that and by 4:00 PM a little more than half of the Canal north of Carroll Street would be in incremental shadow, while south of Carroll Street much of the Canal would remain in sun. From 4:30 PM to the end of the analysis day most, although not all, of the Canal would be in incremental shadow. Over the course of the day, all areas of the Canal would receive a minimum of 7 or 8 hours of direct sun.

On the December 21 analysis day, most of the Canal north of 3rd Street would be in incremental shadow in the morning, while south of 3rd Street it would be in sun (see **Figures 6-22 to 6-25** showing the northern section, and **Figures 6-42 to 6-44** showing the central section). After 11:00 AM the incremental shadows would decrease substantially as they moved off the Canal, and would exit completely at 1:10 PM. Most of the Canal would be completely in sun until 2:20 PM when incremental shadow from the west side would move onto the Canal. At the end of the analysis day most of the Canal north of Union Street would be in incremental shadow while south of Union Street the Canal would not receive substantial incremental shadows. Over the course of the day, most of the Canal south of 3rd Street would receive 6 or more hours of direct sun. North of 3rd Street, most of the Canal would receive between 3 and 6 hours of sun, with a few small areas receiving between 2 and 3 hours of sun.

Assessment

Incremental shadows would cover portions of the Canal for varying durations and coverage on all four analysis days. Regarding shadow impacts to recreational uses on the Canal, such as fishing and boating, these uses would likely be heaviest in the spring, summer, and fall, and much lighter in winter. In the spring, summer, and fall, development resulting from the Proposed Actions would cast large incremental shadows on the Canal early and late in the day, but there would continue to be some areas receiving sunlight during these times for users seeking sunlit areas. From mid-morning to mid-afternoon most or all of the Canal would be in sun. Given these factors, the incremental shadow would not significantly impact the recreational uses of the Canal in these seasons. In winter, shadows north of 3rd Street would be larger through more of the day, but fishing and boating activities would be much lighter in winter, and in addition large sunlit areas would remain for much of the day south of 3rd Street, and therefore the impact would not be significant.

Regarding shadow impacts to fish, benthic invertebrates, and plankton habitats the portions of the Canal adjacent to the Project Area are currently designated Use Class SD. The SD classification is generally given to waters that, because of natural or man-made conditions, cannot meet the requirements for primary or secondary contact or fish propagation. The best use for Class SD waters is fishing. The Canal contains contaminated sediments, limited transparency, and a poor benthic community structure as a result of a history of heavy industrial uses. The Canal has provided commercial shipping access for a variety of industries, including oil refineries, machine shops, manufactured gas plants (MGP), chemical plants, soap makers, and tanneries. Industries with the greatest effects on the Canal, as indicated by sediment sampling, included MGP facilities, petroleum bulk-storage facilities, chemical manufacturers, metal smelters, and coal yards. As a result, these documented activities have created an environmentally stressed condition in the Canal.

However, while existing water quality standards are already being met in the Canal, the EPA Record of Decision for the Gowanus Canal Superfund Site directs the City to construct CSO controls that would serve to further improve water quality by reducing CSOs from being discharged to the Canal thereby helping to improve the aquatic habitat for migratory species that occur in the area (see Chapter 9, "Natural Resources"). Other enhancements to water quality, associated with the Superfund remediation as well as other programs and initiatives resulting from the area's general transformation from industrial activity to residential and commercial uses, are expected by the 2034 build year.

The movement of the Canal waters due to both the natural tidal cycle and the operation of the Flushing Tunnel carry phytoplankton through shaded areas of the Canal. Mobile organisms, such as fish and epibenthic macroinvertebrates (e.g., crabs), would be expected to move through the areas of incremental shadows. The portion of the Canal receiving project-generated shadows is small for most of each day relative to the Canal's overall size, so the volume of water affected by the incremental shadows would be small. Similar to the other waters of the Upper Harbor, suspended materials in the Canal water would limit light and shadow penetration, further limiting the volume of affected water.

Project-generated shadows would not be expected to affect primary productivity of the aquatic resources (plankton, fish, and benthic invertebrates) in the future with the Proposed Actions, and any potential for a minor hindrance on fish passage within the limited and transient area of project-generated shadows cast across the Canal would not be significant.

E. CONCLUSIONS

The projected and potential development sites identified in the RWCDS would cast new shadow in the vicinity of the Project Area. Most of this new shadow would not reach sunlight-sensitive resources due to existing buildings, future buildings being developed irrespective of the Proposed Actions, and the developments identified in the No Action condition. However, the detailed analysis found that 23 sunlight-sensitive resources could receive new shadows in one or more seasons from development resulting from the Proposed Actions. These 23 resources comprise: 11 public open spaces, three community gardens, three historic resources with sunlight-dependent architectural features, three NYCHA open spaces, one natural resource (the Canal), and two project-generated open spaces.

As explained above, most of the affected sunlight-sensitive resources would experience only short durations of new shadow. Some resources would experience longer durations but the detailed analysis found that the new shadow would not significantly alter the utilization of the open space, the vitality of plant life within the resources, or the public's enjoyment of architectural features on historic resources.

The detailed shadow analysis concludes that development resulting from the Proposed Actions would result in significant adverse shadow impacts to two sunlight-sensitive resources: Our Lady of Peace Roman Catholic Church and the Douglass and Degraw Pool in Thomas Greene Playground. ✶