Chapter 6: SHADOWS

6.1 Introduction

The *CEQR Technical Manual* defines "shadows" as the conditions in which a building or other structure blocks the sunlight that would otherwise directly reach a particular area, space, or feature. Public open spaces, architectural resources, and natural resources may depend on sunlight and therefore be adversely affected by shadow. Per the guidance of the *CEQR Technical Manual*, projects or actions resulting in structures less than 50 feet tall generally do not warrant a shadow assessment unless the project site is located adjacent to a park, natural resource, or historic resource. However, as discussed in Chapter 1, "Project Description," the proposed action would introduce a series of new buildings on the project site, with heights ranging from approximately 50 feet (five stories) to approximately 95 feet (nine stories), thus meeting the *CEQR Technical Manual* height threshold warranting a shadows assessment. In addition, public open space and natural resources are located within the vicinity of the project site, as described in Chapter 5, "Open Space," and Chapter 9, "Natural Resources." Moreover, new public open space is anticipated in the vicinity of the project site in the future without the proposed action. Therefore, a preliminary screening assessment is prepared for the proposed action per the guidance of the *CEQR Technical Manual*, and the potential for the proposed project buildings to result in shadow impacts on parks and natural resources is discussed in this chapter.

6.2 Principal Conclusions

No significant adverse impacts associated with shadows would occur with the proposed action. Shadows cast by the proposed buildings would reach three sunlight-sensitive resources (three parks), but in no case would they result in a significant adverse shadow impact.

Shadows from the proposed buildings on Parcel A would be expected to extend into Spring Creek Park south of the project site primarily during the summer months, with the longest duration of shadow occurring on June 21 (lasting for a maximum of approximately two hours on any area). The greatest extent of shadow coverage, as represented by the longest shadow cast onto the park during any particular day, would be approximately 230 feet on June 21.

Shadows from the proposed buildings on Parcel B would be expected to extend into Spring Creek Park east of the project site throughout the year, with the longest duration of shadow occurring on June 21 (lasting for a maximum of approximately three hours on any area). The greatest extent of shadow coverage, as represented by the longest shadow cast onto the park during any particular day, would be approximately 188 feet on June 21.

As discussed in Chapter 5, "Open Space," the portions of the Spring Creek Park that would be in shadow are not publicly accessible, nor do these portions of Spring Creek Park contain or represent identified natural resources, as discussed in Chapter 9, "Natural Resources." Moreover, the duration and extent of shadow that would be cast onto these portions of Spring Creek Park would not affect the sustainability of the vegetation coverage in these areas. Therefore, no significant adverse impact from shadows on Spring Creek Park would result with the proposed action.

The third sunlight-sensitive receptor considered in this shadows assessment, in addition to the two portions of Spring Creek Park just discussed, is a planned park, currently identified as "Gateway Park," that will be in place west of Parcel B in the future without the proposed action. (Please refer to Chapter 5, "Open Space.") Shadows from the proposed buildings on Parcel B would be expected to reach only the eastern edge of the planned Gateway Park, likely to comprise a sidewalk area and perimeter landscaping; this small area of shadow would occur only just after sunrise on or about June 21. Thus, the proposed action would not result in shadow coverage over Gateway Park that would affect its use or potential landscaped conditions, and no significant adverse impact from shadow on the planned Gateway Park would result with the proposed action.

Finally, as described in Chapter 1, "Project Description," the proposed action would include new open space for residents' use on the project site in the form of pedestrian plazas and courtyard areas, which would be in shadow for some part of the day throughout most of the year. However, per the guidance of the *CEQR Technical Manual*, project-generated open space is not considered a sunlight-sensitive resource, and its assessment for shadow impacts is not required. Therefore, no significant adverse impacts with regard to shadows would occur with the proposed action, either on the project site or in the vicinity.

6.3 Methodology

TIERED ANALYSIS APPROACH

Per the guidance of the *CEQR Technical Manual,* the preliminary screening assessment consists of three tiers of analysis. The first tier determines a radius around the entire project site equivalent to the longest shadow that could be cast by the proposed development. The *CEQR Technical Manual* defines

"sunlight-sensitive" resources to include public open spaces, architectural resources, and natural resources that may depend on sunlight and therefore be adversely affected by shadow; if sunlight-sensitive resources are identified within the radius, the analysis proceeds to the second tier.

The second tier reduces the study area by excluding area that can never receive shadow in New York City (to the south of the proposed buildings), due to the path of the sun in the northern hemisphere. If the second tier of analysis concludes that new shadows could reach any identified sunlight-sensitive resource in the study area, a third tier of screening analysis is performed to consider the extent and duration of the shadows.

Per the guidance of the *CEQR Technical Manual,* the third tier considers four representative days of the year, and determines the maximum extent of shadow over the course of each representative day, and thus provides data to describe duration of time, time of day, and the season during which an area would be in shadow. For New York City, the months of interest for an open space resource encompass the growing season (i.e., March through October) and one month between November and February, representing a cold-weather month (usually December). Per the guidance of the *CEQR Technical Manual,* three particular days of the year are considered to represent the growing season: the March 21st vernal equinox, when the day and night are approximately equal (equivalent to the autumnal equinox in September), the June 21st summer solstice (the longest day of the year), and a spring or summer day halfway between the summer solstice and equinoxes, such as May 6th or August 6th. In addition, the December 21st winter solstice is included to demonstrate conditions representative of cold weather months when open space users may rely most heavily on available sunlight warmth.

Per the *CEQR Technical Manual*, the analysis period for each respective day extends from thirty minutes prior to sunrise to thirty minutes after sunset. Three-dimensional computer modeling (SketchUp 2014) is utilized to predict shadow that would result from the proposed action. In general, a significant adverse shadow impact may occur when a portion of shadow cast by the proposed action falls on a sunlight-sensitive resource that otherwise would not receive shadow and substantially reduces or completely eliminates direct sunlight exposure, thereby significantly altering the public's use of the resource or threatening the viability of vegetation or other resources.

SUNLIGHT-SENSITIVE RESOURCES OF CONCERN

The following are considered to be potential sunlight-sensitive resources per the *CEQR Technical Manual*:

- ***Public Open Space:*** Open space that is accessible to the public on a constant and regular basis, including designated daily periods, is defined as "public" and analyzed per the thresholds provided in the *CEQR Technical Manual*. Public open space may be under government or private jurisdiction, and may include, but is not limited to, the following: parks operated or

managed by the City, State, or Federal governments; open space designated through regulatory approvals (such as zoning); outdoor schoolyards, if available to the public during non-school hours; publicly-accessible institutional campuses; esplanades; designated greenways; landscaped medians with seating; housing complex grounds, if publicly accessible; nature preserves, if publicly accessible; gardens, if publicly accessible; church yards with seating or cemeteries, if publicly accessible on a regular basis for passive recreation (strolling); or waterfront piers used for passive or active recreation. Public open space does not include sidewalks.

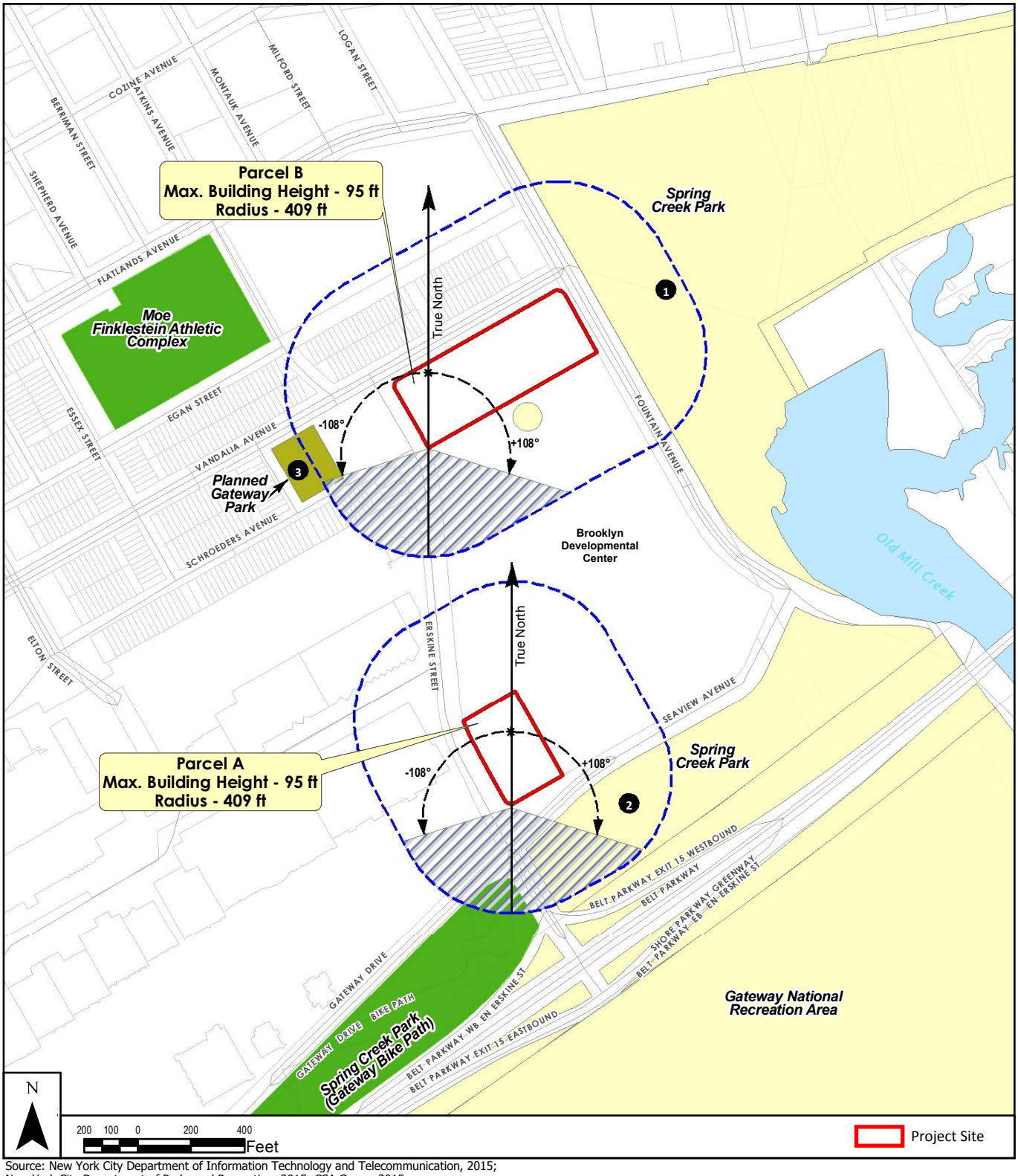
- ***Architectural Resources:*** Architectural resources that could be affected by shadow include any property designated, or calendared for consideration, as a New York City Landmark by the New York City Landmarks Preservation Commission, as well as properties listed in, or eligible for listing in, the New York State Register of Historic Places and/or the National Register of Historic Places.
- ***Natural Resources:*** A natural resource of concern is generally that physical area, such as wetlands and waterbodies, or identified habitat area, such as a "Significant Natural Community of New York State" that could be affected by new shadow.
- ***Other Resources:*** Planted areas, such as "Greenstreets."

For the purposes of the preliminary screening assessment for shadows, there is no separately reported consideration of the conditions in the future without the proposed action. Rather, the assessment proceeds with consideration of potentially sunlight-sensitive resources of concern expected to be present within the study area in the future without the proposed action. Information describing the No Action conditions associated with open space, historic and cultural resources (e.g., architectural resources), and natural resources are described in the respective chapters of this EIS (Chapter 5, "Open Space," Chapter 7, "Historic and Cultural Resources," and Chapter 9, "Natural Resources").

STUDY AREA

Per the guidance of the *CEQR Technical Manual*, the longest shadow a structure will cast in New York City, except for periods close to dawn or dusk, can be calculated as 4.3 times the structure's height. This calculated maximum shadow length is used as the radius delineated around the project site to comprise the Tier 1 study area. To calculate the shadow length all buildings on both parcels are assumed to be the maximum building height of 95 feet and built at the lot lines to encompass the entirety of the project site, thus allowing for the delineation of the most reasonably conservative (largest) study area for identification of sunlight-sensitive resources. As such, the Tier 1 study area includes parcels A and B and all area within a radius of 409 feet of each.

With open space resources identified within 409 feet of the project site, the initial study area is further refined (e.g., a "Tier 2 Assessment") per the guidance of the *CEQR Technical Manual* to exclude area that, given the project site latitude, would not receive shadow at any time during the year (i.e., the area between -180 degrees and +180 degrees from true north). Please refer to Figure 6-1, "Preliminary Shadow Screening Assessment: Tier 1 and Tier 2," for an illustration of the study area for the shadows assessment.



Source: New York City Department of Information Technology and Telecommunication, 2015; New York City Department of Parks and Recreation, 2015; CSA Group, 2015.

Sunlight Sensitive Resource
Tier 1: Longest Shadow Study Area Boundary
Tier 2: Area that would not be affected by shadow
Existing Open Space
Planned Open Space
Other Open Space (Not Publicly Accessible)

Figure 6-1

PRELIMINARY SHADOW SCREENING ASSESSMENT: TIER 1 AND TIER2

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6.4 Preliminary Screening Assessment Results

TIER 1 AND TIER 2

Based on the maximum development envelope, the longest shadow study area radii for parcels A and B is approximately 409 feet. As existing and proposed sunlight-sensitive resources are identified within the longest shadow study area, further screening is warranted in order to determine whether any resources have the potential to be affected by project-generated shadows.

As described in Chapter 7, "Historic and Cultural Resources," no architectural resources have been identified within ½-mile of the study area, and thus no architectural resources are present within the initial study area considered in the preliminary shadows assessment. However, as described in Chapter 5, "Open Space," parkland is present within the vicinity of the project site. (As described in Chapter 9, "Natural Resources" the portions of parkland within this shadows assessment study area are not known to include natural resources, such as wetlands, water bodies, or identified habitat area.)

The Tier 2 screening results confirm that the publicly accessible portion of Spring Creek Park located southwest of the project site, west of Erskine Street and south of Gateway Drive, would not be affected by incremental shadows cast by the proposed action. (Please refer to Figure 6-1, "Preliminary Shadow Screening Assessment: Tier 1 and Tier 2.")

However, portions of three sunlight-sensitive resources have the potential to be affected by project-generated shadows. As shown on Figure 6-1, "Preliminary Shadow Screening Assessment: Tier 1 and Tier 2," these areas include two portions of Spring Creek Park (one to the east of the project site and one to the south) and the proposed Gateway Park that will be located west of Parcel B in the future without the proposed action.

Currently, this portion of Spring Creek Park (indicated as "Sunlight Sensitive Resource #1" on figures 6-1 through 6-5) is fenced and not publicly accessible, and there are no plans to make the portion of Spring Creek Park publicly accessible in the future. However, it is a designated City park, features informative signage, and has been accessible to the public in the past. Further, although no natural resources have been identified specifically within the portion of parkland included in the shadows analysis study area, natural resources (including wetland and designated habitat areas, as described in Chapter 9, "Natural Resources") are located in the vicinity of the shadows study area. Therefore, a conservative approach is taken in this shadows analysis, as the potential effects of shadows (seasonality, as well as duration and time of day) are considered for this portion of Spring Creek Park.

As discussed in Chapter 5, "Open Space," the portion of Spring Creek Park south of Parcel A (indicated as "Sunlight Sensitive Resource #2" on figures 6-1 through 6-5), though not currently developed for public use, is expected to be redeveloped into publicly accessible open space as part of the Gateway Estates

development, which will be complete in 2018. Therefore, this publicly accessible open space will be present in the future without the proposed action, and so potential shadow effects on this open space are considered in the analysis.

Similarly, Gateway Park (indicated as "Sunlight Sensitive Resource #3" on figures 6-1 through 6-5) is not yet developed but will be in place in the future without the proposed action, upon the completion of the Gateway Estates development (refer to Chapter 2, "Land Use, Zoning and Public Policy"). This publicly-accessible open space will be situated approximately 330 feet west of the project site, south of Vandalia Avenue and west of Erskine Street. (Please refer to Figure 6-1, "Preliminary Shadow Screening Assessment: Tier 1 and Tier 2.")

TIER 3

The Tier 3 screening determines whether shadows resulting from the proposed action would have the potential to reach the three sunlight-sensitive resources identified in the Tier 2 assessment (Spring Creek Park and Gateway Park). Figure 6-2, "Tier 3 Screening Assessment: December 21," Figure 6-3, "Tier 3 Screening Assessment: March 21/ September 21," Figure 6-4, "Tier 3 Screening Assessment: May 6/ August 6," and Figure 6-5, "Tier 3 Screening Assessment: June 21," illustrate the results of three-dimensional computer modeling of the shadows that would be cast by the proposed action. These illustrations represent the estimated physical extent of shadow, for a series of time periods, and the relationship of shadow area and duration to the nearby sunlight-sensitive resources of concern, as predicted by computer modeling and detailed in Table 6-1, "Tier 3 Summary."

As shown in Table 6-1, "Tier 3 Summary," shadows would vary through the day and throughout the year. Because the sun rises in the east and travels across the southern part of the sky to set in the west, a project's earliest shadows would be cast almost directly westward. Throughout the day, the shadows would shift clockwise (moving northwest, then north, then northeast) until sunset, when they would fall east. Duration of shadow cast by Parcel B buildings onto the portion of Spring Creek Park east would range from approximately two hours to three hours each day throughout the year. For the portion of Spring Creek Park south of Parcel A, daily shadow duration would vary from less than 30 minutes up to two hours, but only during the summer months. Shadow maximum duration over the Gateway Park is expected to be less than 30 minutes, and only just after sunrise during the peak of summer. The physical extent and duration of shadow onto sunlight-sensitive resources are described following for each of the key analysis days.

Table 6-1: Tier 3 Summary

Analysis Day	December 21	March 21 / September 21	May 6 / August 6	June 21
Time Frame Window	8:51 a.m. – 2:53 p.m.	7:36 a.m. – 4:29 p.m.	6:27 a.m. – 5:18 p.m.	5:57 a.m. – 6:01 p.m.
Spring Creek Park East of Project Site (Parcel B)				
Shadow enter – exit times	12:00 p.m. – 2:23 p.m.	1:30 p.m. – 4:29 p.m.	2:30 p.m. – 5:18 p.m.	3:00 p.m. – 6:01 p.m.
Maximum duration	2 hours 23 minutes	2 hours 59 minutes	2 hours 48 minutes	3 hours 1 minute
Spring Creek Park South of Project Site (Parcel A)				
Shadow enter – exit times	No shadow cast	4:29 p.m.	4:20 p.m. – 5:18 p.m.	4:00 p.m. – 6:01 p.m.
Maximum duration	---	Approximately less than 30 minutes	58 minutes	2 hour 1 minute
Planned Gateway Park Northwest of Project Site (Parcel B)				
Shadow enter – exit times	No shadow cast	No shadow cast	No shadow cast	5:57 am
Maximum duration	---	---	---	Less than approximately 30 minutes

Source: CSA Group, 2015

December 21st

As shown on Figure 6-2, "Tier 3 Screening Assessment: December 21," and detailed previously in Table 6-1, "Tier 3 Summary," no shadow cast by buildings on Parcel A would reach any resource of concern on December 21st. However, the buildings on Parcel B would cast shadow over a portion of Spring Creek Park to the east of the project site, entering Spring Creek Park at approximately 12:00 p.m. and lasting for approximately 2 hours and 20 minutes.

March 21st / September 21st

As described in Table 6-1, "Tier 3 Summary," and shown on Figure 6-3, "Tier 3 Screening Assessment: March 21/ September 21," shadow cast by buildings on Parcel A would reach the edge of Spring Creek Park to the south of the project site at the end of the analysis day at approximately at 4:30 p.m. and last less than approximately 30 minutes. Shadow cast by Parcel B buildings would reach Spring Creek Park to the east of the project site at approximately 1:30 p.m., and remain on the resource before completely exiting the park at approximately 4:30 p.m., lasting for approximately 3 hours.

May 6th / August 6th

As shown on Figure 6-4, "Tier 3 Screening Assessment: May 6/ August 6," and detailed in Table 6-1, "Tier 3 Summary," Parcel A buildings would cast shadow over a portion of Spring Creek Park to the south of the project site on the analysis day, beginning at approximately 4:20 p.m. and lasting for approximately one hour. Shadow cast by buildings from Parcel B would reach a portion of the Spring Creek Park to the east of the project site at approximately 2:30 p.m. and last for approximately 2 hours and 45 minutes.

June 21st

As presented in Table 6-1, "Tier 3 Summary," and in Figure 6-5, "Tier 3 Screening Assessment: June 21," shadow cast by buildings on Parcel A would enter the Spring Creek Park to the south of the project site at approximately 4:00 pm on June 21 and last approximately 2 hours before exiting the park at about 6:00 p.m. Shadow from Parcel B buildings would reach a portion of Spring Creek Park to the east of the project site at approximately 3:00 pm and last approximately 3 hours, exiting the park at approximately 6:00 p.m. Parcel B buildings would also cast shadow over the eastern edge of the proposed Gateway Park to the west of the project site for less than 30 minutes just after sunrise.

Conclusions

The shadows cast by the proposed buildings onto the three sunlight-sensitive resources would not result in any significant adverse shadow impact.

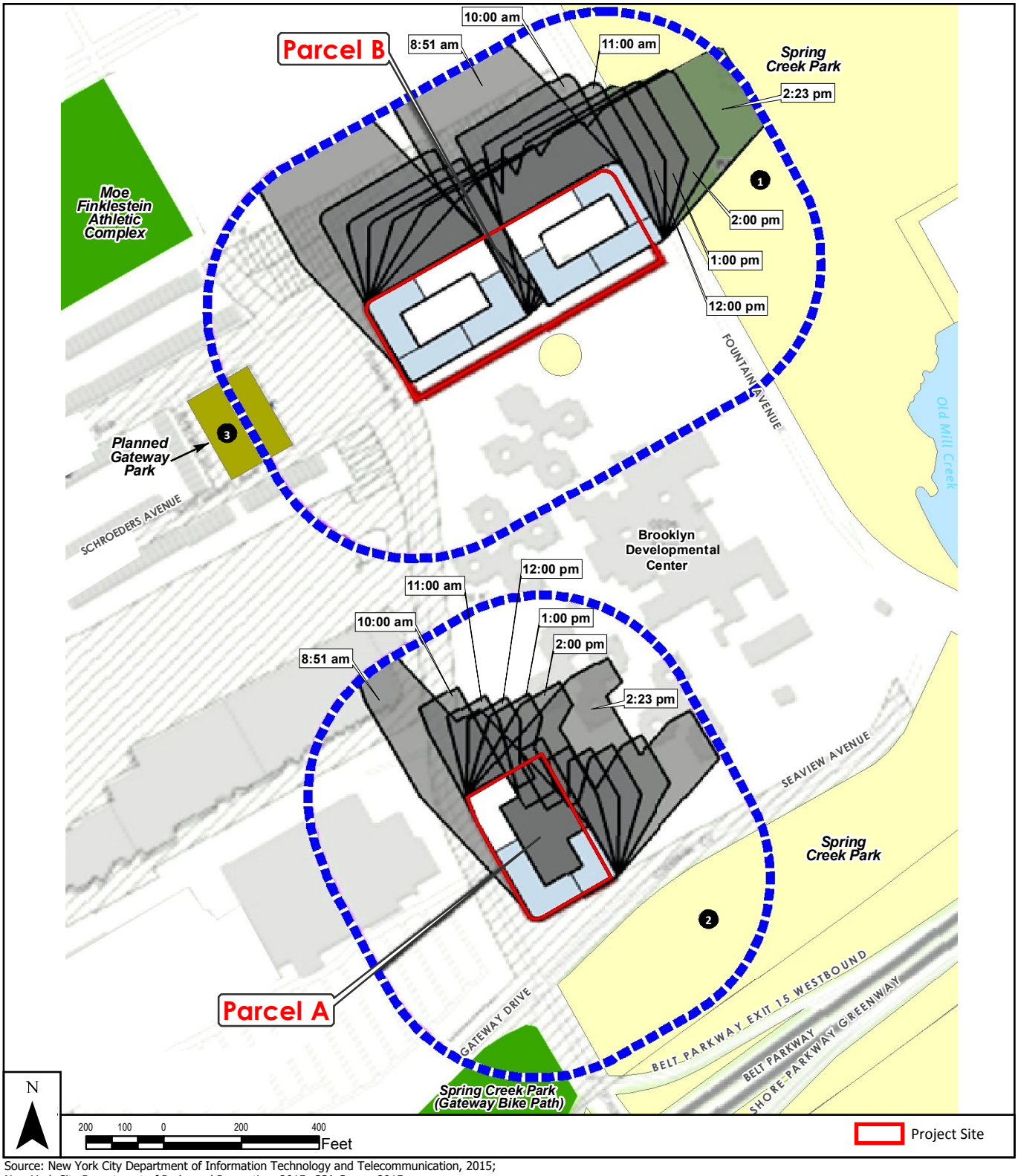
Shadows from the proposed buildings on Parcel A would be expected to extend into Spring Creek Park south of the project site primarily during the summer months, with the longest duration of shadow occurring on June 21 (lasting for a maximum of approximately 2 hours on any area). The greatest extent of shadow coverage, as represented by the longest shadow cast onto the park during any particular day, would be approximately 230 feet on June 21. This portion of parkland, as discussed in Chapter 5, "Open Space," is not publicly accessible, nor does it contain or represent identified natural resources, as discussed in Chapter 9, "Natural Resources." Moreover, the duration and extent of shadow that would be cast onto these portions of Spring Creek Park would not affect the sustainability of the vegetation coverage in these areas, and thus would not lead to indirect effects to natural resources, such as wetlands and habitat, in the vicinity. Therefore, no significant adverse impact from shadows on this portion of Spring Creek Park would occur with the proposed action.

Shadows from the proposed buildings on Parcel B would be expected to extend into Spring Creek Park east of the project site throughout the year, with the longest duration of shadow occurring on June 21 (lasting for a maximum of approximately 3 hours on any area). The greatest extent of shadow coverage, as represented by the longest shadow cast onto the park during any particular day, would be approximately 188 feet on June 21. This portion of parkland, as discussed in Chapter 5, "Open Space," is

not currently publicly accessible, nor does it contain or represent identified natural resources, as discussed in Chapter 9, "Natural Resources." However, this open space would be expected to be developed as publicly accessible parkland in the future without the proposed action. The shadows cast by buildings on Parcel A would reach this open space only during the summer months and would last for a brief period in the evening (entering the park at approximately 4:00 p.m. or later). As shown on figures 6-4 and 6-5, the duration and extent of shadow that would be cast onto this portion of Spring Creek Park would be limited and would not to affect the sustainability of lawn or other landscaping vegetation that could be planted in this area in the future. Therefore, no significant adverse impact from shadows on this portion of Spring Creek Park would occur with the proposed action.

Shadows from the proposed buildings on Parcel B would be expected to reach only the eastern edge of the planned Gateway Park west of the project site, likely to comprise sidewalk area and perimeter landscaping; this small area of shadow would occur only just after sunrise on or about June 21 and last for less than one-half hour. Thus, the proposed action would not result in any substantial shadow coverage over Gateway Park that would affect its use or significantly reduce sunlight on potential vegetation, and so no significant adverse impact from shadow on the planned Gateway Park would be expected with the proposed action.

Finally, as described in Chapter 1, "Project Description," the proposed action would include new open space for residents' use on the project site in the form of pedestrian plazas (e.g., the proposed Schroeders Walk along the southern edge of Parcel B) and courtyard areas internal to each building group. It is noted that these private courtyard areas created as part of the proposed action would be in shadow for some part of the day throughout most of the year. However, per the guidance of the *CEQR Technical Manual*, project-generated open space is not considered a sunlight-sensitive resource, and its assessment for shadow impacts is not required. The open space provided with the proposed action for residents' use can be appropriately designed, planted and/or landscaped with respect to shadow conditions. Therefore, no significant adverse impacts with regard to shadows would be expected with the proposed action, either on the project site or in the vicinity.



Source: New York City Department of Information Technology and Telecommunication, 2015; New York City Department of Parks and Recreation, 2015; CSA Group, 2015.

Figure 6-2

TIER 3 SCREENING ASSESSMENT: DECEMBER 21

Sunlight Sensitive Resource

Tier 1: Longest Shadow Study Area Boundary

Existing Open Space

Planned Open Space

Other Open Space (Not Publicly Accessible)

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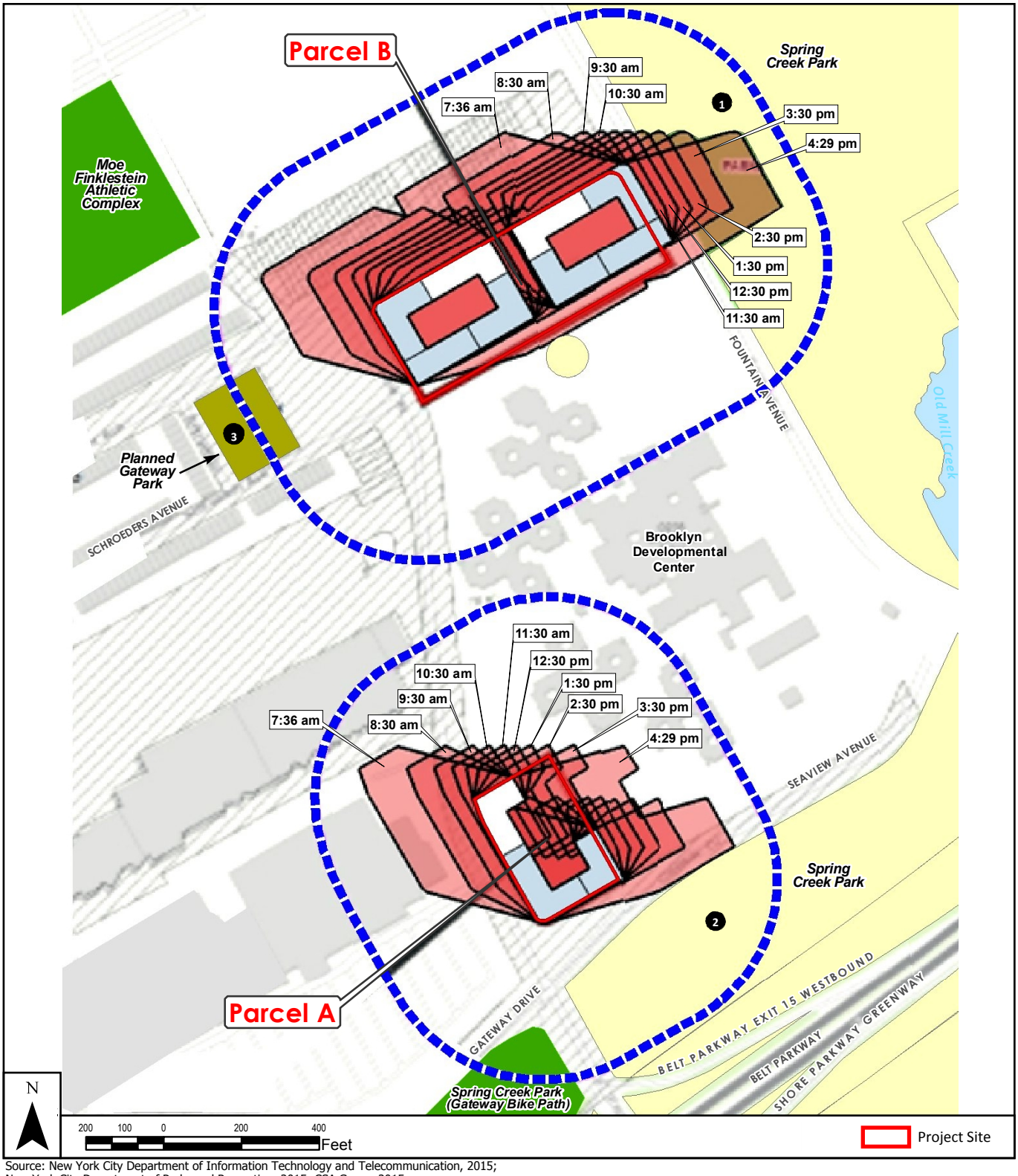

Source: New York City Department of Information Technology and Telecommunication, 2015; New York City Department of Parks and Recreation, 2015; CSA Group, 2015.

Figure 6-3

TIER 3 SCREENING ASSESSMENT: MARCH 21/SEPTEMBER 21

Sunlight Sensitive Resource

Tier 1: Longest Shadow Study Area Boundary

Existing Open Space

Planned Open Space

Other Open Space (Not Publicly Accessible)

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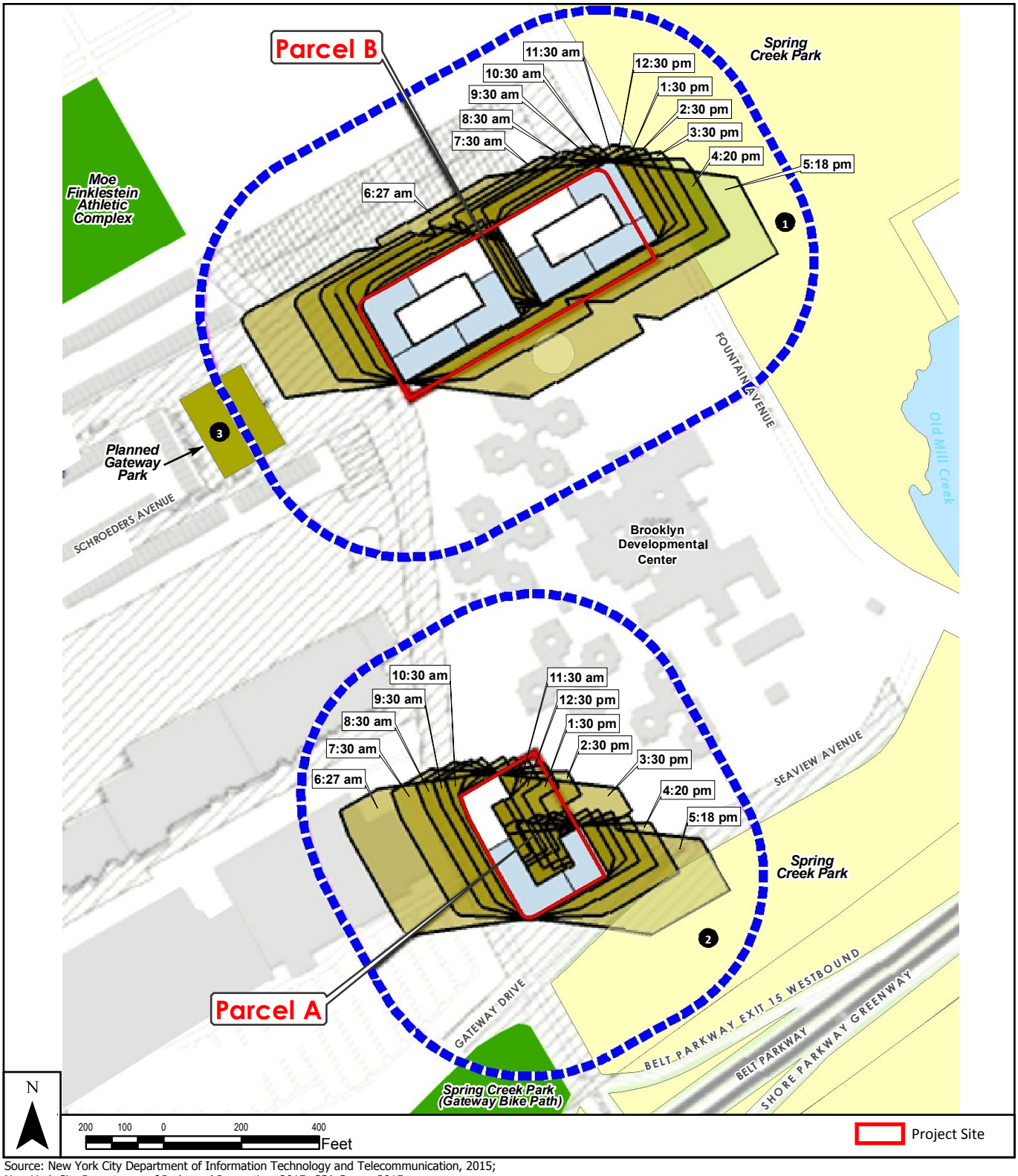

Source: New York City Department of Information Technology and Telecommunication, 2015; New York City Department of Parks and Recreation, 2015; CSA Group, 2015.

Figure 6-4

TIER 3 SCREENING ASSESSMENT: MAY 6/AUGUST 6

❶ Sunlight Sensitive Resource	Existing Open Space
Tier 1: Longest Shadow Study Area Boundary	Planned Open Space
	Other Open Space (Not Publicly Accessible)

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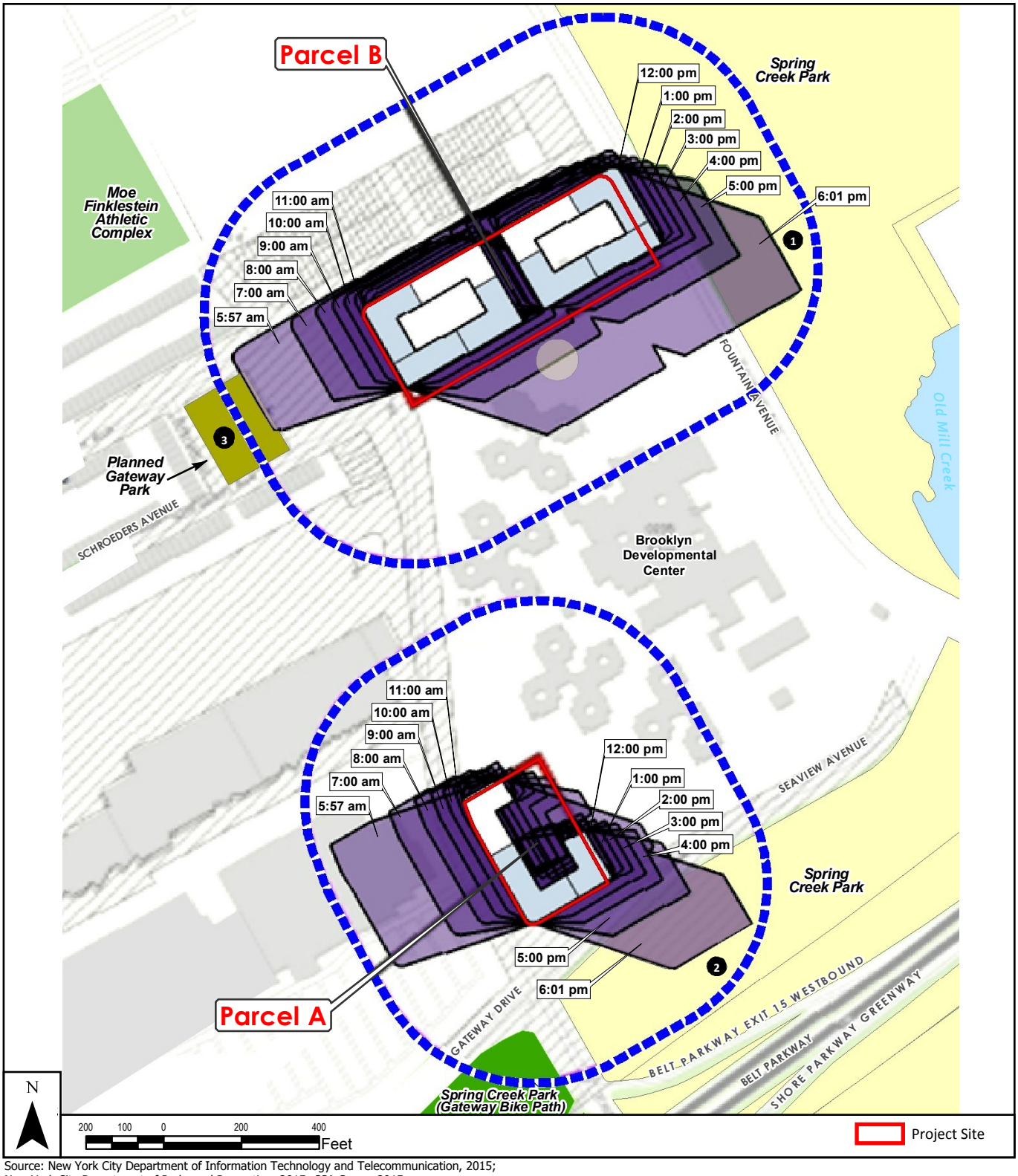

Source: New York City Department of Information Technology and Telecommunication, 2015; New York City Department of Parks and Recreation, 2015; CSA Group, 2015.

Figure 6-5

TIER 3 SCREENING ASSESSMENT: JUNE 21

Sunlight Sensitive Resource

Tier 1: Longest Shadow Study Area Boundary

Existing Open Space

Planned Open Space

Other Open Space (Not Publicly Accessible)

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