6 SHADOWS

6.1 Introduction

Per the 2021 *CEQR Technical Manual*, a shadow assessment is warranted when a proposed action would result in a new structure or an addition to an existing structure that is greater than 50 feet in height or is adjacent to, or across the street from, a sunlight-sensitive resource. "Incremental shadow" is the additional, or new, shadow that would be cast on a sunlight-sensitive resource from a project-generated structure. Sunlight-sensitive resources include: 1) publicly accessible open space; 2) historic landscapes; 3) historic resources that rely on sunlight for its architectural and historic integrity (e.g., stained glass windows); and 4) natural features. Shadows on features such as city streets, sidewalks, buildings, and non-publicly accessible privately owned open space – or shadows that occur within 1.5 hours of sunrise or sunset – are generally not considered significant for CEQR.

In the No-Action Condition, existing conditions on the Development Site would remain with a one-story, 25,265-gross-square-foot (gsf) golf clubhouse, parking lot, a portion of the practice area, and other landscaped areas.

In the With-Action Condition, Bally's would demolish the existing golf clubhouse, accessory parking lot, a portion of the practice area, and other landscaped areas to construct the 3,093,880-gsf Proposed Facility, which would contain about approximately 561,320 gross square feet (gsf) of gaming and food and beverage space, a 500-key hotel with a spa and meeting space, a 2,000-person event center, approximately 6,100 gsf of retail, and approximately 1,941,910 gsf of parking (4,660 spaces). The Proposed Facility would rise to a maximum height of 245 feet above the ground floor, or an elevation of 280 feet North American Vertical Datum 88 (NAVD88). A 40,160 gsf replacement golf clubhouse would be constructed north of the Proposed Facility and rise to a height of 40 feet (at an elevation of 75 feet NAVD88).

Both the Proposed Facility and the replacement golf clubhouse would exceed a height of 50 feet and the Development Site is adjacent to sunlight-sensitive features of Ferry Point

Park (the "Park"), including the Bally's Links at Ferry Point Park (the "Golf Course"); thus, a shadows analysis is warranted.

6.2 Principal Conclusions

The Proposed Development would result in a significant adverse shadows impact to vegetation on the Golf Course in areas near the Proposed Facility and the replacement golf clubhouse (which also has the potential to affect utilization). A detailed analysis found that incremental shadow on the existing wetland, the NYCDOT Wetland Mitigation project, the East River and areas of the Park that are west of the expressway would be limited, and incremental shadow on these would not result in a significant adverse shadows impact.

Ferry Point Park

The Park is a 413.80-acre park containing the Golf Course, barbecue areas, basketball courts, cricket fields, dog-friendly areas, football fields, handball courts, playgrounds, public restrooms, soccer fields, waterfront walking paths, and Wi-Fi hot spots. The Park's landscaping primarily includes maintained grasses, but also shrubs and trees.

A portion of the Park contains the Golf Course, which was constructed within the footprint of a former municipal waste landfill that was closed in 1970. The 222-acre Golf Course is open to the public for a fee. The 18-hole links-style golf course is typically open from late March to the beginning of December, depending on the weather. The vegetation on the Golf Course was largely planted following the closure of the former landfill and construction of the Golf Course in the early 2010s, but some has since been planted or proliferated absent human intervention. The vegetation on the Golf Course is maintained by Bally's through their concession with the New York City Department of Parks and Recreation (NYC Parks).

Outside of the Golf Course, the Park contains both active and passive recreational uses and contains surface parking lots, walking paths and the Ferry Point Park Ferry Stop. Portions of the Park that are east of the expressway include part of Ring Road, paved roadways, and the Metropolitan Transit Authority (MTA) inaccessible maintenance area along and under the Whitestone Bridge. These areas would all receive incremental shadow in the early mornings of each analysis days; however, these elements are not sunlight-sensitive because they are inaccessible to the public and devoid of vegetation.

Golf Course Users

Outside of the practice areas, golfers could experience incremental shadow for around 30 minutes under worst-case conditions. The duration that a golfer experiences shadow would likely be less depending on factors such as: 1) which tees the golfer uses; 2) whether a golfer's ball lands in a shaded area; 3) the time a golfer needs to complete a hole (which can be linked to skill); and 4) when a golfer starts a round. Relative to the Golf Course, the areas of incremental shadow are experienced non-consecutively (other than the green on hole 9 and the teeing area on hole 10), and golfers would experience incremental shadow in continuous durations of approximately 15 minutes during worst-case conditions as they move throughout the course. Incremental shadow would not preclude users from golfing but may affect comfort depending on weather conditions. Even if a golfer's comfort is affected, golfer's routinely make changes to their play or

attire; accordingly, the incremental shadow would not result in a significant adverse impact to golfers.

Golf Course Vegetation

The Golf Course primarily consists of manicured lawns that are routinely maintained. The vegetation is sensitive to sunlight (both duration and intensity) and the *CEQR Technical Manual* indicates that a significant adverse impact can occur if vegetation receives less than six hours of direct sunlight during the growing season. Shadows occurring during the cold-weather months do not affect the growing season of outdoor vegetation and therefore, project-generated shadow during the December analysis day would not result in a significant adverse impact to vegetation.

Various maintenance activities are performed throughout the winter while the Golf Course is closed to the public, and plantings and seed mixes can be changed as needed by the maintenance staff to accommodate conditions at the Golf Course. However, because the Proposed Development would reduce the amount of available sunlight to less than six hours of direct sunlight in small, discrete areas of the Golf Course on the March, May and June analysis days, the Proposed Development could result in significant adverse impacts to the Golf Course's grass in the following limited areas:

March Analysis Day

- Hole 1: The putting practice area and rough around the teeing areas;
- Hole 9: The green and surrounding fairway and rough;
- Hole 10: The southern fringe of the southernmost tee box;
- Hole 18: The fairway and rough at the southwestern edge of the hole; and
- Driving Range: The southern extent of the teeing area.

May Analysis Day

- Hole 9: The southernmost fairway and rough;
- Hole 18: The southwestern edge of the rough; and
- Driving Range: The southern edge of the teeing area.

June Analysis Day

- Hole 9: The rough near the green.

Due to the impact on vegetation at the Golf Course, the Proposed Actions also have the potential to affect utilization. Adverse utilization impacts may result on portions of holes 1, 9, 10, and 18. Measures to mitigate the significant adverse shadows impacts to the Golf Course's vegetation are discussed in Chapter 22 of this Environmental Impact Statement (EIS), "Mitigation."

6.3 Methodology

The analysis methodology follows the guidelines of the *CEQR Technical Manual*, which includes a preliminary screening assessment to determine whether shadows resulting from a proposed project could reach any sunlight-sensitive resource at any time of year. A Tier 1 screening identifies a study area based on the longest shadow a structure can

cast, which in New York City is 4.3 times the height of a building during the CEQR analysis periods. If there is a sunlight-sensitive resource within the shadow study area, a Tier 2 screening assessment is warranted.

The Tier 2 assessment rules out sunlight-sensitive features that cannot be shaded by a project. Specifically, because of the path the sun travels across the sky, no shadow can be cast in New York City within a triangular area that is between -108 and +108 degrees from true north during the CEQR analysis periods. Sunlight-sensitive elements beyond 108 degrees from true north – as measured from the southern-most location(s) of a proposed building – do not require additional analysis.

If the Tier 2 screening cannot rule out impacts to a sunlight-sensitive resource, a Tier 3 screening assessment further refines the analysis by depicting the project-generated shadows on four representative days of the year and shadow durations absent intervening buildings. The four representative days are:

1. 21 December (the "December analysis day"), the winter solstice, which is the shortest solar day of the year and when the sun is lowest in the sky;
2. 21 March (the "March analysis day"), the vernal equinox (which is the solar-equivalent to 21 September, the autumnal equinox, when the same shadow would be cast);
3. 6 May (the "May analysis day"), the midpoint between the vernal equinox and summer solstice (solar-equivalent to 6 August, the midpoint between the summer solstice and autumnal equinox, when the same shadow would be cast); and
4. 21 June (the "June analysis day"), the summer solstice, which is the longest solar day of the year and when the sky is highest in the sky.

If the Tier 3 screening analysis does not rule out the possibility of significant adverse shadows impacts, a detailed shadow analysis is warranted.

A detailed analysis uses a three-dimensional computer model to show the projected shadows from both the No-Action and With-Action conditions to identify the incremental shadow that would reach a sunlight-sensitive resource within the Study Area on each of the representative analysis days. For this project, a detailed analysis is warranted for four sun-sensitive elements: 1) the Park, 2) the East River, 3) the wetland west of the Hutchinson River Expressway, and 4) the NYCDOT Wetland Mitigation project area.

Consistent with the guidelines set forth in the *CEQR Technical Manual,* this shadows assessment does not account for daylight savings time.

Study Area

The Proposed Actions would result in the development of the Proposed Facility and replacement golf clubhouse, new structures that both would be taller than 50 feet. The Proposed Facility would rise to an elevation of up to 280 feet; therefore, consistent with CEQR guidelines, a Study Area with a radius of 1,204 feet – 4.3 times the maximum building height – was established (the replacement golf clubhouse's 323-foot study radius falls entirely within the bounds of the 1,204-foot radius around the Proposed Facility and is therefore not discussed separately). The Study Area is generally bound by the East River to the south, and Ferry Point Park to the east, north and west.

Impact Criteria

Per the *CEQR Technical Manual*, the uses and features of an open space or natural resource indicate its sensitivity to shadows. Shadows occurring during the cold-weather months generally do not affect the growing season of outdoor vegetation; however, shadow effects on other uses and activities should be assessed. Therefore, shadow sensitivity is typically assessed for:

- warm-weather-dependent features like pools, wading pools and sand boxes, or vegetation that could be affected by a loss of sunlight during the growing season; and
- features, such as benches, the use of which could be affected by a loss of winter sunlight.

The minimum amount of sunlight typically needed for plantings and vegetation – such as grass lawns, planted annuals or areas used for a relatively substantial amount of food production – is six to eight hours of direct sunlight per day during the growing season. However, the *CEQR Technical Manual* states that some vegetation can tolerate partial sun, with a reduced minimum requirement of four to six hours of direct sunlight.

Per the *CEQR Technical Manual*, consideration of the inventory of available open space resources within the Open Space study area may be helpful in assessing the significance of the loss of sunlight for active or passive recreational uses. For example, if many of the resources in the study area already have shadows on similar sunlight-sensitive features, the additional loss of sunlight may be more critical. Further, the significance of shadows cast on an open space should be closely examined in relation to the open space's utilization rates to determine the potential for the shadows to affect the times of day the space is commonly used. This is particularly important when shadows are cast on open spaces that fall within an area without similar sunlit resources.

6.4 Preliminary Assessment

Tier 1 and Tier 2 Screening

The Tier 1 and Tier 2 screenings identify how a proposed action could affect sunlight-sensitive resources within the Study Area. Resources that are not sunlight-sensitive are excluded from the preliminary assessment.

The sunlight-sensitive resources of concern are in the 1,204-foot radius Study Area, as shown on Figure 6-1 and described in Table 6-1.

Figure 6-1: Shadow Study Area and Resources of Concern (Tier 1 and 2 Screenings)



Table 6-1: Resources of Concern in the Study Area

RESOURCE	DESCRIPTION	SUNLIGHT-SENSITIVE FEATURES
Open Space Resources		
Ferry Point Park	413.80-acre park, bisected by the Hutchinson River Expressway, containing barbecue areas, basketball courts, cricket fields, dog-friendly areas, football fields, handball courts, playgrounds, public restrooms, soccer fields, waterfront walking paths, and Wi-Fi hot spots. A portion of the Park east of the Hutchinson River Expressway contains Bally's Links at Ferry Point Golf Course – a 222-acre regional public recreation facility with an 18-hole links-style golf course with driving range.	Golf course, vegetation, sports fields, playground, barbeque areas, walking paths.
Natural Resources		
East River	A 16-mile-long navigable tidal strait linking Upper New York Bay with the Long Island Sound.	Natural waterbody
Wetland	Freshwater Wetland[1] in the Park that is west of the Hutchinson River Expressway.	Freshwater Wetland
NYCDOT Wetland Mitigation	Proposed NYCDOT wetland mitigation project along the East River shoreline to the south of the Development Site.	Wetland Mitigation Project

The Tier 1 and 2 screening shows that project-generated shadow would have the potential for significant adverse shadows impacts and therefore a Tier 3 screening was warranted.

Tier 3 Screening

Generally, an incremental shadow is not considered significant when its duration is no longer than 10 minutes at any time of year and the resource continues to receive substantial direct sunlight. A significant adverse impact may occur if an incremental shadow falls on a resource for longer than 10 minutes and affects vegetation, historic and cultural resources, the utilization of open spaces, or any sunlight-sensitive feature of a resource.

A Tier 3 screening uses a three-dimensional modeling program to show the project-generated shadow in the absence of intervening buildings and identify how long a shadow may fall on a sunlight-sensitive resource. The results of the Tier 3 screening are presented in Table 6-2 and in Figure 6-2 through Figure 6-5.

[1] Wetlands are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions (*2021 CEQR Technical Manual)*

Figure 6-2: Tier 3 Screening - December Analysis Day

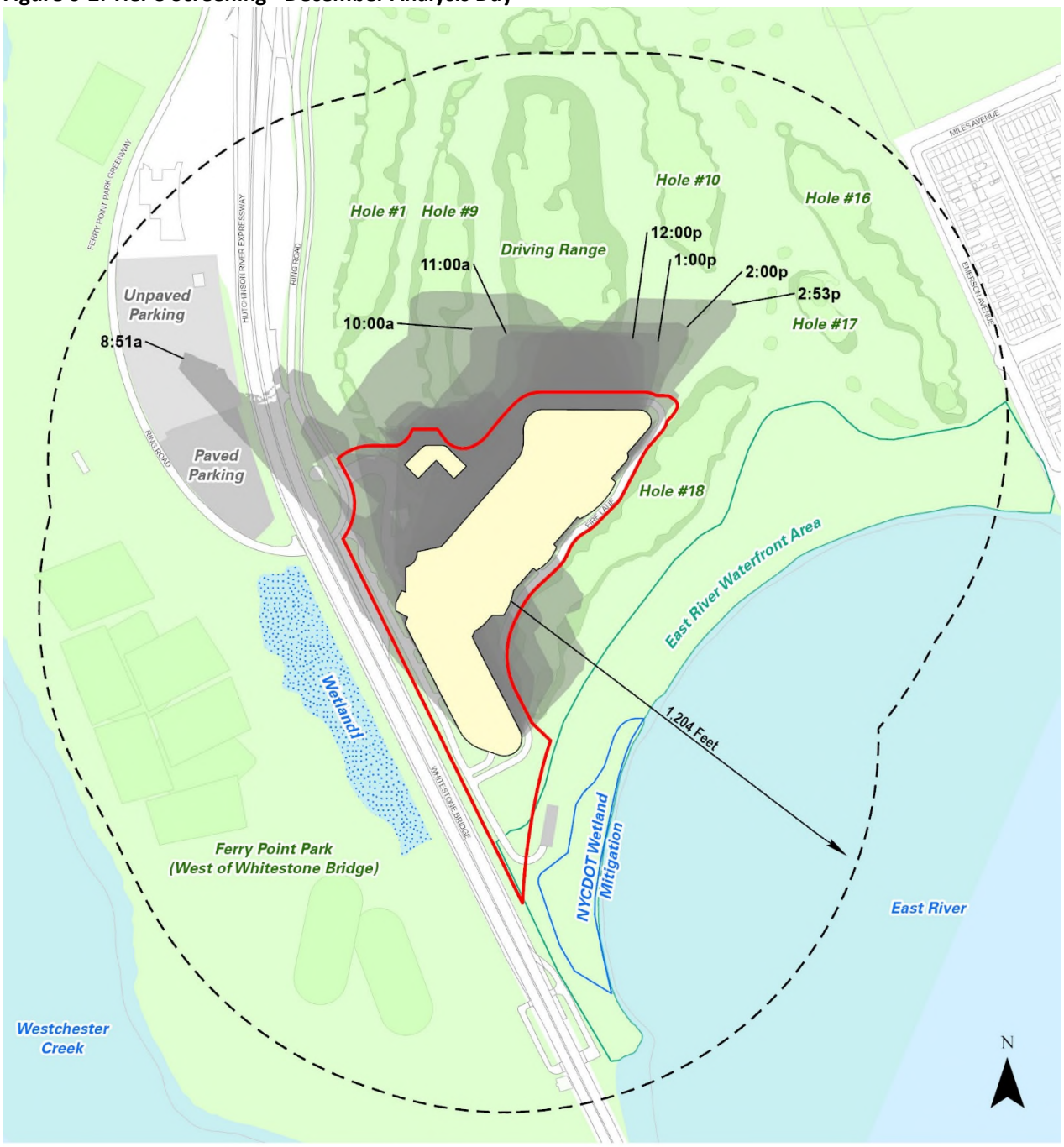


Figure 6-3: Tier 3 Screening - March Analysis Day



Figure 6-4: Tier 3 Screening - May Analysis Day



Figure 6-5: Tier 3 Screening - June Analysis Day



Table 6-2: Tier 3 Shadow Screening Results – Shadow Times and Total Durations by Analysis Day

Resource	December	March	May	June
Analysis Period[1] **Duration**	**8:51A – 2:53P** **6H 2M**	**7:36A – 4:29P** **8H 53M**	**6:27A – 5:18P** **10H 51M**	**5:57A – 6:01P** **12H 4M**
Ferry Point Park	8:51A – 2:53P 6h 2m	7:36A – 4:29A 8h 53m	6:27A – 5:18P 10h 51m	5:57A – 6:01P 12h 4m
East River	-	-	-	5:13P – 6:01P 0h 48m
Wetland	-	7:36A – 8:25A 0h 49m	6:27A – 8:31A 2h 04m	5:57A – 8:25A 2h 28m
NYCDOT Wetland Mitigation	-	-	-	5:35P-6:01P 0h 26m

1. Daylight savings time was not used.

Open Space Resources

Ferry Point Park

The Tier 3 screening shows that project-generated shadow would be cast on portions of Ferry Point Park across the entire duration of each of the four CEQR analysis days. Accordingly, a detailed analysis is warranted for this resource.

Natural Resources

East River

The East River could receive project-generated shadow during the June analysis day starting at 5:13 pm for a total of 48 minutes. Accordingly, a detailed analysis is warranted for this resource.

Wetland

The wetland to the west of the Hutchinson River Expressway could receive project-generated shadow on the March, May, and June analysis periods for up to 2 hours and 28 minutes. Accordingly, a detailed analysis is warranted for this resource.

NYCDOT Wetland Mitigation

NYCDOT is proposing a wetland mitigation project along the East River and to the south of the Development Site. The area of the wetland mitigation project could receive up to 26 minutes of shadow on the June analysis day. Accordingly, a detailed analysis is warranted for this resource.

6.5 Detailed Assessment

When a Tier 3 screening analysis cannot rule out the possibility that project-generated shadows could result in significant adverse shadows impacts, a detailed shadow analysis is warranted. For this project, a detailed analysis was warranted for the Park (including the two natural resources in the Park: the wetland and the NYCDOT-proposed Wetland Mitigation project) and the East River. A detailed analysis uses a three-dimensional computer model to show shadow in both the No-Action and With-Action conditions to identify the incremental shadow that would reach sunlight-sensitive resources on each of the representative analysis days.

Ferry Point Park

The Park is a 413.80-acre park that contains the Golf Course, barbecue areas, basketball courts, cricket fields, dog-friendly areas, football fields, the Golf Course, handball courts, playgrounds, public restrooms, soccer fields, waterfront walking paths, and Wi-Fi hot spots. The Park is bound by Saint Raymond's New Cemetery to the north, the East River to the south, Balcom and Emerson Avenues to the east, and Westchester Creek to the west. The Park is bisected by the Whitestone Bridge and the Hutchinson River Expressway. East of the Hutchinson River Expressway, the Park contains the Golf Course – a 222-acre public recreation facility with an 18-hole links-style golf course.

As discussed in Chapter 9 of this EIS, "Natural Resources" the Affected Area is not anticipated to serve as habitat for large populations of terrestrial wildlife. No state- or federal-listed threatened or endangered bird species, or U.S. Fish and Wildlife Service (USFWS)-listed Birds of Conservation Concern, were observed onsite during field surveys. A survey of the Whitestone Bridge concluded that the bridge is unlikely to serve as active roosting habitat for bats. The Park offers a wide range of opportunities for habitat outside of the Affected Area. This includes the majority of the Golf Course, which would remain mostly undisturbed by the Proposed Development, and landscaped parkland west of the Hutchinson River Expressway.

As shown in Photograph 6-1 through Photograph 6-3, the Park contains amenities such as the Golf Course and golf clubhouse, walking paths, and landscaping.

Photograph 6-1: Existing Golf Clubhouse



View northeast of the Development Site towards the existing golf clubhouse. Captured 05 Apr 2024.

Photograph 6-2: Ferry Point Park Walking Path



View southwest from Ferry Point Park towards the Whitestone Bridge and East River waterfront along the Park's walking path. Captured 05 Apr 2024.

Photograph 6-3: Ferry Point Park (West of the Hutchinson River Expressway)



View southwest towards the Ferry Point Park West Subarea, which includes soccer and cricket fields and walking paths. Captured 05 Apr 2024.

Some portions of the Park that are east of the expressway are not sunlight-sensitive. These include Ring Road, the paved roadway leading to the East River parking lot, and the MTA's inaccessible storage area under and along the Whitestone Bridge. These elements would also receive incremental shadow on the four CEQR analysis days, however, these elements are not sunlight-sensitive.

In the With-Action Condition, portions of the Development Site would be removed from the Park. The proposed features on the Development Site – such as the Proposed Facility, vehicular circulation areas, the replacement clubhouse, and new landscaping – would also not be considered sunlight-sensitive for CEQR purposes. New native and or non-invasive vegetation would be selected by a licensed landscape architect based on the proposed sunlight conditions.

The Golf Course is operated by Bally's and is open seasonally, generally from late March to the beginning of December. While the pace of play varies based on factors such as player skill and course conditions, the United States Golf Association recommends the following pace of play guidelines for groups of four, the largest group size typically allowed: 15 minutes for par-three holes, 17 minutes for par-four holes, and 19 minutes for par-five holes. Golfers move throughout the course to complete a round; thus, golfers only temporarily use space as they transit through the course. A typical 18-hole round may take between four and five hours, with golfers moving throughout the course during the round. Table 6-3 illustratively shows the time needed to complete a round at the Golf Course.

Table 6-3: Illustrative Playing Schedule

Hole #	Par	Time at Hole (Minutes)	Start Time (Minutes)*	End Time (Minutes)*
1	4	17	0	17
2	5	19	17	36
3	3	15	36	51
4	5	19	51	70
5	4	17	70	87
6	4	17	87	104
7	4	17	104	121
8	3	15	121	136
9	4	17	136	153
10	4	17	153	170
11	4	17	170	187
12	3	15	187	202
13	4	17	202	219
14	4	17	219	236
15	5	19	236	255
16	4	17	255	272
17	3	15	272	287
18	5	19	287	306
Total		**306**		

* Cumulative minutes from the start of the golf round. For example, if a golfer begins a round at 9 AM, the golfer would begin hole 6 approximately 87 minutes later – approximately 10:27 AM – and end the hole approximately 10:44 AM, approximately 104 minutes after 9 AM.

To start a hole, a golfer tees off in the teeing area. The Golf Course offers different tee boxes that a golfer may opt to play from, and not all golfers tee off in the same area. To

complete a hole, a golfer must hit the ball into the cup, which is located on the hole's green. For long holes, the fairway is typically a target golfers aim for on their approach to the green. Therefore, to assess the potential effect of shadow on golfers, the teeing area, fairway, and greens are areas of particular importance to golfers. However, the areas outside of the fairways, called the rough, are also areas where many golfers land in their approach to the greens. While fairways are the primary target, roughs are also areas of importance for golf play.

Golfers may adjust their style of play when there is shadow and sunlight on various parts of the golf course. Strong sun, along with wind, create dry playing surfaces. Shade can keep surfaces damp later in the day; these conditions can change the speed that a ball rolls along the fairway and putting green.[2] Golfers routinely adapt to the changes in shade and sunlight to determine their preferred line to the green. These adjustments are typical for golfers.

East River

The East River is a tidal strait in New York City that connects Upper New York Bay on its south end to the Long Island Sound on its north end. The river, shown in Photograph 6-4, runs a total of 16 miles and connects with the Hudson River via the Harlem River at the north end of the island of Manhattan. The river is classified by the New York State Department of Environmental Conservation (NYSDEC) as a "Class I" waterbody – a waterbody class that is best used for secondary contact recreation and fishing. The river is also used for in-water recreational activities, such as kayaking, fishing, and jet skiing. In the Study Area, the East River is classified by NYSDEC as "littoral zone."

[2] https://corebionics.com/the-dance-of-light-how-sun-and-shade-influence-the-roll-of-the-ball-on-the-green/

Photograph 6-4: East River



View south from Ferry Point Park west of the expressway towards the East River waterfront and Manhattan skyline. (Captured 05 Apr 2024)

The New York State Department of State Division of Coastal Resources does not identify the East River as a designated Significant Coastal Fish and Wildlife Habitat in the vicinity of the Development Site. As discussed in Chapter 9 of this EIS, "Natural Resources," in 2019 the East River Ichthyological Alliance (ERIA) conducted a survey of fish species in the East River.[3] The study divided the River into ten zones and characterized species diversity in each zone separately. The portion of the East River that is located within the Study Area is in Zone 2 of the ERIA study. None of the fish species noted in Zone 2 of the 2019 study are listed by the United States Fish and Wildife Service as having a Federal conservation rank, and none are listed by New York State as Endangered, Threatened, or Special Concern species. Incremental shadow would not preclude the use of the river for in-water recreation.

Wetland

A freshwater wetland, shown in Photograph 6-5, is located within the Park to the south of Ring Road and to west of the Whitestone Bridge.

[3] Park, P. J., Girgenti, C. D., Del Bello, I. G., Tobitsch, C. M., Gorsen, D. M., Stanner, K. C., Van Horn, D., Wilding, K. C., Gonzalez, L. F., Wu, J. R., Adams, J. J., Reeve, E. J., Bender, M. E., Bowser, C., Turrin, M. K., and Lake, T., 2020. New York City East River Fish Species Inventory and Emergence of a Unique Fish Community Science Network. *Urban Naturalist, 38*, 1-27. https://www.eaglehill.us/urna-pdfs-regular/urna-038-Park.pdf

Photograph 6-5: Wetland



View southwest from Ring Road towards the wetland within Ferry Point Park west of the Expressway. Captured 25 June 2024.

During a site visit on 25 June 2024, field scientists observed that hydrology in the wetland appeared to be driven primarily by surface water runoff from the adjacent roadway and uplands. Field scientists also observed switchgrass, cleavers, fescue, goldenrod, and elderberry on the western portion of the wetland. The eastern portion of the wetland was generally dominated by common reed, eastern baccharis, and grape species. Overall, the wetland is dominated by common reed, which displaces native species, reduces biodiversity, offers little value for wildlife, and chokes waterways.[4] Common reed is often considered an invasive wetland plant, which can reduce the water retention of a wetland and therefore cause it to become shallower. Thus, common reed wetlands provide reduced ecological value compared to a native marsh community.[5]

As discussed in Chapter 9 of this EIS, "Natural Resources," no habitat for State-listed rare odonates is mapped across the existing wetland. Additionally, consultation with the NYSDEC Environmental Resource Mapper did not identify any potential habitat for rare, threatened, or endangered species within the wetland. Further details on the wetland are discussed in Chapter 9 of this EIS, "Natural Resources."

[4] Robinson, Michelle (2002). "Common Reed: An Invasive Wetland Plant." Commonwealth of Massachusetts - Department of Conservation and Recreation - Office of Water Resources - Lakes and Ponds Program. Accessed 3 October 2024 from https://www.mass.gov/doc/phragmites-0/download

[5] Haight, Chris (2013). "Management Considerations for Restoring Phragmites australis Dominated Wetlands." Great Lakes Phragmites Collaborative. Accessed 3 October 2024 from https://www.greatlakesphragmites.net/blog/management-considerations-for-restoring-phragmites-australis-dominated-wetlands/

NYCDOT Wetland Mitigation[6]

Independent of the Proposed Actions, NYCDOT is proposing a wetland mitigation project along the East River to the south of the Development Site. The wetland mitigation project is expected to be complete after the 2030 analysis year. Bally's is coordinating with NYCDOT to ensure that the Proposed Actions would not preclude or substantially hinder NYCDOT's wetland mitigation project. While the wetlands mitigation project would not be complete until after the 2030 analysis year, it is conservatively included as part of the detailed shadows analysis.

Photograph 6-6: NYCDOT Wetland Mitigation



View south from Ferry Point Park towards the proposed NYCDOT wetland mitigation project that may be developed along the East River shoreline. Captured 04 April 2024.

Incremental Shadow by Analysis Day

Table 6-4 shows the time and duration of incremental shadow on the sunlight-sensitive resources that warranted a detailed analysis.

December Analysis Day

The December analysis day is representative of shadow conditions around the winter solstice, the coldest time of the year, and outside the peak demand for most passive recreational uses. Most vegetation is also dormant during this representative period, and fish migration is limited. The detailed assessment provided in Figure 6-6 through Figure 6-12 shows the times of incremental shadow on the sunlight sensitive resources throughout the December analysis day.

[6] The NYCDOT Wetland Mitigation project has not been fully designed or approved; however, this potential project was included for a conservative analysis of the potential effects of the Proposed Development.

Table 6-4: Detailed Assessment Shadows Duration by Resource

ANALYSIS DAY	DECEMBER	MARCH	MAY	JUNE
Analysis Period[1]	**8:51A – 2:53P**	**7:36A – 4:29P**	**6:27A – 5:18P**	**5:57A – 6:01P**
Duration	**6H 02M**	**8H 53M**	**10H 51M**	**12H 04M**
Open Space Resources				
Ferry Point Park	**8:51A – 2:53P** **6h 02m**	**7:36A – 4:29P** **8h 53m**	**6:27A – 5:18P** **10h 51m**	**5:57A – 6:01P** **12h 04m**
West of Expressway	8:51A – 9:15A 0h 24m	7:36A – 8:52A 1h 16m	6:27A – 7:23A 0h 56m	5:57A – 7:07A 1h 10m
East River Waterfront Area	-	3:32P – 4:29P 0h 57m	3:50P – 5:18P 1h 28m	4:10P – 6:01P 1h 51m
Hole 1				
Teeing Area/ Putting Practice Area	8:51A – 2:53P 6h 02m	7:36A – 4:29P 8h 53m	6:27A – 6:39A 0h 12m	-
Rough	8:51A – 2:53P 6h 02m	7:36A – 4:29P 8h 53m	6:27A – 6:41A 0h 14m 1:30P – 3:30P 2h 00m Total: 2h 14m	-
Hole 9				
Teeing Area	-	-	-	-
Fairway	8:51A – 2:53P 6h 02m	7:36A – 10:27A 2h 51m 1:30P – 4:29P 2h 59m Total: 5h 50m	6:27A – 9:20A 2h 53m 3:30P – 4:50P 1h 20m Total: 4h 13m	5:57A – 9:15A 3h 18m
Green/Hole	8:51A – 2:53P 6h 02m	7:36A – 10:20A 2h 44m 2:55P – 4:29P 1h 34m Total: 4h 18m	6:27A – 9:10A 2h 43m	5:57A – 9:00A 3h 03m
Rough	8:51A – 2:53P 6h 02m	7:36A – 11:10A 3h 34m 12:20P – 4:29P 4h 09m Total: 7h 43m	6:27A – 10:10A 3h 43m 1:30P – 5:18P 3h 48m Total: 7h 31m	5:57A – 10:10A 4h 13m 3:00P – 5:00P 2h 00m Total: 6h 13m
Hole 10				
Teeing Area	1:00 – 2:53P 1h 53m	1:15P – 4:29P 3h 14m	-	-
Hole 18				
Teeing Area	-	-	-	-
Fairway	11:15A – 2:53P 3h 38m	12:30P – 4:29P 3h 59m	1:00P – 5:18P 4h 18m	1:20P – 6:01P 4h 41m
Green/Hole	12:50 – 2:53P 2h 03m	1:45P – 4:29P 2h 44m	2:43P – 5:18P 2h 35m	3:15P – 6:01P 2h 46m
Rough	10:40A – 2:53P 4h 13m	11:50A – 4:29P 4h 39m	12:10P – 5:18P 5h 08m	12:20P – 6:01P 5h 41m
Driving Range				
Teeing Area	8:51A – 2:53P 6h 02m	7:36A – 4:29P 8h 53m	9:00A – 2:00P 5h 00m	-
Natural Resources				
East River	-	-	-	5:13P – 6:01P 0h 48m
Wetland	-	7:36A – 8:25A 0h 49m	6:27A – 8:30A 2h 03m	5:57A – 8:25A 2h 28m
NYCDOT Wetland Mitigation	-	-	-	5:35P-6:01P 0h 26m

1. Daylight savings time was not used.

Figure 6-6: December Analysis Day - 8:51 AM



Figure 6-7: December Analysis Day – 10:00 AM



Figure 6-8: December Analysis Day – 11:00 AM



Figure 6-9: December Analysis Day- 12:00 PM



Figure 6-10: December Analysis Day – 1:00 PM



Figure 6-11: December Analysis Day – 2:00 PM



Figure 6-12: December Analysis Day – 2:53 PM



At 8:51AM – the start of the analysis day – Figure 6-6 shows that incremental shadow would be cast on the Park; specifically, on the teeing area and rough of hole 1, the putting practice area near hole 1, and the fairway, green, and rough of hole 9. Portions of the driving range's teeing area, fairway and rough, would also receive incremental shadow. To the west of the Hutchinson River Expressway, incremental shadow would be cast on an area that is used for parking. By 9:15AM, incremental shadow would move wholly off the portions of the Park that are west of the expressway. No incremental shadow would be cast on the East River, wetland, or NYCDOT Wetland Mitigation project area.

By 10AM, Figure 6-7 shows that incremental shadow would continue to shade the putting practice area near hole 1, the southern area of hole 9, and the teeing area of the driving range. Hole 1 would only be wholly in sunlight. The end of the fairway and rough, along with the green of hole 9 would be shaded.

By 11AM, Figure 6-8 shows that incremental shadow would just begin to shade the edge of the rough in areas west of hole 18's green. By 11:15AM, incremental shadow would begin to shade the southwestern part of the fairway on hole 18. Shadow would continue to be cast on southernmost tee box on hole 1, the putting practice area near hole 1, the green, fairway, and rough on hole 9, and the entirety of the driving range's teeing area.

By 12PM, Figure 6-9 shows that incremental shadow would move further east and the teeing area on hole 1 would be in direct sunlight. The putting practice area near hole 1 would be partially in incremental shadow. On hole 9, the green and parts of the surrounding fairway, and rough would be shaded. The driving range's teeing area would be wholly in shadow. On hole 18, incremental shadow would be cast on the southwest portions of the fairway.

By 1PM, Figure 6-10 shows that the western portions of the putting practice area near hole 1 would be wholly in direct sunlight. On hole 9, the most of the green and the surrounding fairway and rough would be shaded. Incremental shadow would fall only on the southernmost tee box of hole 10. At hole 18, incremental shadow would travel across the fairway and just begin to be cast on and around the green. Incremental shadow would continue to partially shade the green, rough, and fairway on hole 9. Only the westernmost portions of the driving range's teeing area would be in direct sunlight.

By 2PM, Figure 6-11 shows that incremental shadow would only fall on the easternmost areas of the putting practice area near hole 1. As the angle of the sun decreases, shade from the replacement golf clubhouse would be cast across the fairway, green, and rough at hole 9. The westernmost portions of the driving range's teeing area would have more areas of direct sunlight. At hole 10, incremental shadow would shade the two southernmost teeing areas. At hole 18, incremental shadow would be cast along the southwestern part of the hole, including the majority of the green.

At 2:53PM – the end of the December analysis day – Figure 6-12 shows that incremental shadow would only be on the easternmost fringe of the putting practice area near hole 1. At hole 9, the entirety of the green and areas of the surrounding fairway and rough would be shaded by incremental shadow from the replacement golf clubhouse. At the driving range, areas of direct sunlight would continue to increase as the shadows continue to move east. At hole 10, the teeing areas would be nearly shaded, except the teeing area at the southern edge of the fairway. Incremental shadow from the Proposed Facility would also be cast across approximately the southernmost third of the fairway on hole 18, including the entirety of the green.

December Analysis Day Shading by Resource

The East River, wetland, and NYCDOT Wetland Mitigation project area would not receive incremental shadow during the December analysis period. Thus, the Proposed Development would not result in a significant adverse shadows impact on these resources during the December analysis day.

The Park

As set forth above, incremental shadow would be cast on the Park for 6 hours and 2 minutes, the entirety of the analysis period. To the west of the Hutchinson River Expressway, the parking lots – a use that is not sunlight-sensitive – would receive incremental shadow for approximately 24 minutes. No other areas of the Park that are west of the expressway would receive incremental shadow.

The remainder of the incremental shadow on the December analysis day would be confined to the area of the Golf Course immediately around the Proposed Facility, specifically holes 1, 9, 10, and 18 and the driving range. However, during the winter months (typically the beginning of December through late March), the Golf Course is closed an inaccessible to users. The December analysis day represents cold-weather conditions and when vegetation is dormant. Thus, the incremental shadow on the Golf Course would not create a significant adverse shadows impact to the Park on the December analysis day.

December Analysis Day Conclusion

The December analysis day is representative of the cold-weather months when demand for open spaces is generally lowest, and vegetation is dormant.

Incremental shadow on the Park would be cast either on parking lots or the Golf Course, which is closed during in winter months. Accordingly, the Proposed Development would not result in a significant adverse shadows impact on the December analysis day.

March Analysis Day

The March analysis day (also the solar-equivalent of September 21) is representative of shadow conditions in early spring and autumn, when both direct sunlight and areas of shade would likely be in demand depending on weather conditions. Figure 6-13 through Figure 6-22 show the detailed shadow assessment on the March analysis day from 7:36AM.

Figure 6-13: March Analysis Day – 7:36 AM



Figure 6-14: March Analysis Day – 8:30 AM



Figure 6-15: March Analysis Day – 9:30 AM



Figure 6-16: March Analysis Day – 10:30 AM



Figure 6-17: March Analysis Day – 11:30 AM



Figure 6-18: March Analysis Day – 12:30 PM



Figure 6-19: March Analysis Day – 1:30 PM



Figure 6-20: March Analysis Day – 2:30 PM



Figure 6-21: March Analysis Day – 3:30 PM



Figure 6-22: March Analysis Day – 4:29 PM



At 7:36AM – the start of the analysis period – Figure 6-13 shows that incremental shadow would occur on the very northern fringe of the wetland west of the Hutchinson River Expressway and open areas to the west of the wetland. No shadow would be cast on the playing fields. At hole 1 on the Golf Course, the southernmost tee box and the putting practice area would be mostly shaded. Incremental shadow would also be cast across the entirety of green on hole 9 and the southwestern edge of the driving range's teeing area.

By 8:30AM, Figure 6-14 shows that incremental shadow would no longer be cast in areas on the wetland. In other areas west of the Hutchinson River Expressway, incremental shadow would be limited to areas around Ring Road and between the wetland and the paved parking area. At hole 1 on the Golf Course, the teeing area would be in direct sunlight, although the putting practice area would be about half shaded. At hole 9, the entirety of the green and the surrounding portions of the fairway and rough would be shaded. The southwestern edge of the driving range's teeing area would also be shaded.

By 9:30AM, Figure 6-15 shows that only the easternmost portion of the putting practice area and rough of hole 1 would be shaded. At hole 9, about half of the green would be in direct sunlight. The southern edge of the driving range would also receive incremental shadow.

Figure 6-16 through Figure 6-18 show that incremental shadow would continue to be cast on the putting practice area near hole 1, the southernmost extents of hole 9, and the southern fringe of the driving range through 12:30PM. The green on hole 9 would be in direct sunlight. As the sun moves west, shadow on the driving range would move towards the eastern edges of the teeing area, and the southwestern edge of the driving range would move into direct sunlight. Beginning at 11:50AM, incremental shadow would begin to fall onto the very southwestern edge of hole 18's fairway.

By 1:30PM, Figure 6-19 shows that incremental shadow would be cast on only a small area of the putting practice area near hole 1. On hole 9, the southwestern edge of the green would be in shadow. The southern edge of the driving range's teeing area would be in shadow. At hole 10, the southernmost teeing area would receive incremental shadow beginning at 1:15PM. Incremental shadow on hole 18 would continue to grow in area at the hole's southwestern edge, including on the fairway and rough. Incremental shadow would begin to fall onto hole 18's green at 1:45PM.

By 2:30PM, Figure 6-20 shows that incremental shadow would continue to be cast on small portions of the putting practice area near hole 1, the southwestern corner of the green on hole 9, and the southernmost teeing area of hole 10. Incremental shadow would continue to grow in area on hole 18. At the driving range, only the southernmost portions of the teeing area would be in shadow.

By 3:30PM, Figure 6-21 shows that incremental shadow would continue to be cast on very small portions of holes 9 and 10 and the driving range. Additional incremental shadow would be cast on hole 18 that would cover the middle of the fairway and the southwest portion of the hole, including most of the green.

At 4:29PM – the end of the March analysis day – Figure 6-22 shows that incremental shadow would be wholly off the putting practice area near hole 1. At hole 9, incremental shadow would be cast on the southern part of the green and the surrounding fairway and rough. Only the southeastern corner of the driving range's teeing area would be shaded. On hole 10, the southernmost teeing area would be about half shaded. At hole

18, nearly all of fairway and green would be covered by incremental shadow, but the teeing area would remain wholly in sunlight.

March Analysis Day Shading by Resource

During the March analysis day, the wetland would receive incremental shadow for 49 minutes and would be in direct sunlight for more than six hours during the analysis day; thus, the Proposed Development would not result in a significant adverse impact to the wetland. The East River and NYCDOT Wetland Mitigation project area would not experience any incremental shadow during the March analysis day.

The Park

The detailed analysis shows that the Golf Course and the area immediately around the Proposed Facility would receive incremental shadow throughout the analysis day, a duration of 8 hours and 53 minutes. Areas of the Park that are west of the expressway would be shaded by incremental shadow during the early morning hours for about an hour but would remain in direct sunlight thereafter. Incremental shadow on the Golf Course would be confined to sections of holes 1, 9, 10, and 18 and the driving range.

- Hole 1 and the driving range would receive the longest duration of incremental shadow throughout the analysis period; however, after about 8:30AM, incremental shadow would only affect the putting practice area near hole 1. The fairway and green of hole 1 would not receive incremental shadow. After teeing at hole 1, golfers would not experience incremental shadow until hole 9, an estimated duration of about 150 minutes (about 2 hours and 30 minutes) of direct sunlight (see Table 6-3).
- At hole 9, incremental shadow would be confined to the southernmost portions of the hole, including the green and surrounding fairway and rough. Hole 9 would be wholly in sunlight for up to 1 hour and 10 minutes in the afternoon. Most of the green would be in direct sunlight from about 10AM until about 3PM. During times of incremental shadow on hole 9, golfers would be expected to experience shadow for around 10 minutes under worst-case conditions.
- At hole 10, incremental shadow would only fall on the southernmost teeing area during the afternoon. Golfers using the affected tee box would typically experience shadow for less than 10 minutes. The remaining tee boxes and the remainder of the hole would be in direct sunlight throughout the analysis day. Thus, golfers who experience about 10 minutes of shade on hole 9 and use the southernmost tee box on hole 10 could be in shadow for a continuous period of approximately 15 minutes under worst-case conditions, although this duration can vary depending on a variety of factors. Golfers would be in continuous areas of sunlight until hole 18, an estimated duration of about 135 minutes (about 2 hours and 15 minutes) of direct sunlight (see Table 6-3).
- At hole 18 the green, fairway, and rough would be shaded starting in the early afternoon, and most of hole 18 would be covered by incremental shadow at the end of the analysis day. Golfers would typically be impacted by the shadow for less than 10 minutes for most of the day, and up to 15 minutes at the end of the day.
- The driving range's teeing area would receive incremental shadow along the southern edge throughout the day, but the northern part of the teeing area would remain in direct sunlight throughout the day. Incremental shadow would begin

around 7:36AM and continue until the end of the analysis period at 4:29PM, a duration of 8 hours and 53 minutes.

Incremental shadow would not preclude users from golfing but may affect golfers' comfort in discrete locations depending on weather conditions. Golfers may adjust their play when there is shadow and sunlight on various parts of the golf course and related changes in moisture level. These adjustments are typical for golfers.

The Proposed Actions would reduce the amount of direct sunlight on portions of the Golf Course, including for vegetation. On the March analysis day, the Proposed Development could result in significant adverse impacts to the vegetation at:

- Hole 1: The putting practice area and rough around the teeing areas;
- Hole 9: The green and surrounding fairway and rough;
- Hole 10: The southern fringe of the southernmost tee box;
- Hole 18: The fairway and rough at southwestern edge of the hole; and
- Driving Range: The southern edge of the teeing area.

Wetland

The wetland west of the Hutchinson River Expressway would receive 49 minutes of incremental shadow during the early morning hours. Incremental shadow would move off the wetland by 8:25AM, and the wetland would not receive incremental shadow through the end of the analysis period. The wetland would be wholly in sunlight from 8:25AM until the end of the analysis period, a duration of more than eight hours; thus, the wetland would continue to receive the CEQR minimum amount of sunlight for vegetation. The wetland could continue to serve as habitat for existing local populations of plants and animals. Additionally, NYSDEC does not map rare, threatened, or endangered species within the wetland. For species present in the wetland that rely on sunlight for predation, project-generated shadow may reduce the access to sunlight in the discrete areas of incremental shadow; however, the incremental shadow would be limited in geographical extent and duration. Therefore, incremental shadow would not result in a significant adverse impact on the March analysis day.

March Analysis Day Conclusion

On the March analysis day, incremental shadow on the Park would be cast throughout the analysis period. However, prolonged durations of incremental shadow on the Park would be almost entirely confined to the Golf Course and in the area surrounding the Proposed Facility. Small portions of holes 1, 9, and 10 and the driving range would receive incremental shadow at certain points on the March analysis day. By the end of the analysis day, much of hole 18's fairway and the entirety of the green would be shaded.

The incremental shadow but would not preclude golfing but may temporarily affect comfort levels of golfers. Golfers may experience a few minutes of shading while teeing at hole 1 and about 15 minutes of continuous shading near the green of hole 9 and the start of hole 10. Golfers would then not experience incremental shadow until hole 18. Overall, golfers would be expected to experience about 30 minutes of shadow during a round of golf, all of which would be incremental shadow. These 30 minutes represents about ten percent of a five-hour (300-minute) round of golf.

However, because the Proposed Development would reduce the amount of available sunlight to less than six hours of direct sunlight on portions of the Golf Course, the Proposed Development could result in significant adverse impacts to the vegetation on or around holes 1, 9, 10 and 18 and the driving range on the March analysis day. Accordingly, the Proposed Development would result in a significant adverse impact to vegetation on these holes and the driving range. Additionally, due to the impact on vegetation at the Golf Course, the Proposed Actions also have the potential to affect utilization. Measures to mitigate the significant adverse impacts to the Golf Course on the March analysis day are discussed in Chapter 22 of this EIS, "Mitigation."

May Analysis Day

The May analysis day (halfway between the vernal equinox and the summer solstice, and equivalent to the corresponding August halfway point between the summer solstice and the autumnal equinox) is representative of conditions in late spring and late summer, when both direct sunlight and areas of shade would likely be in demand depending on weather conditions. Figure 6-23 through Figure 6-34 show the detailed shadow assessment on the May analysis day from 6:27AM.

Figure 6-23: May Analysis Day – 6:27 AM



Figure 6-24: May Analysis Day – 7:30 AM



Figure 6-25: May Analysis Day – 8:30 AM



Figure 6-26: May Analysis Day – 9:30 AM



Figure 6-27: May Analysis Day – 10:30 AM



Figure 6-28: May Analysis Day – 11:30 AM



Figure 6-29: May Analysis Day – 12:30 PM



Figure 6-30: May Analysis Day – 1:30 PM



Figure 6-31: May Analysis Day – 2:30 PM



Figure 6-32: May Analysis Day – 3:30 PM



Figure 6-33: May Analysis Day – 4:30 PM



Figure 6-34: May Analysis Day – 5:18 PM



Figure 6-23 shows the beginning of the analysis period – 6:27AM – where portions of the wetland west of the Hutchinson River Expressway would receive incremental shadow. The incremental shadow would be in addition to shadow cast on the wetland by the Whitestone Bridge. To the west of the Expressway and bridge, one playing field would receive incremental shadow for approximately 56 minutes. On the Golf Course, the eastern edge of the putting practice area near hole 1 would receive incremental shadow. At hole 9, the entirety of the green and surrounding areas of the fairway and rough would be shaded by incremental shadow.

By 7:30AM, Figure 6-24 shows that only a small portion of the wetland would remain in incremental shadow and the eastern edge of the wetland would continue to be shaded by the Whitestone Bridge; the remaining areas of the wetland would be in direct sunlight. The putting practice area near hole 1 would be wholly in sunlight. At hole 9, the entirety of the green would continue to be shaded along with surrounding areas of the fairway and rough.

By 8:30AM, Figure 6-25 shows that only a small portion of the northeast corner of the wetland would receive incremental shadow; incremental shadow would move off the wetland starting at approximately 8:31AM. At hole 9, only the east half of the green and the surrounding fairway and rough would remain in incremental shadow.

By 9:30AM, Figure 6-26 shows that hole 9 would also be wholly in sunlight except for a sliver of rough to the east of the green. The southernmost edge of driving range's teeing area would begin to receive incremental shadow.

By 10:30AM, Figure 6-27 shows that holes 1, 9, 10, and 18 would be wholly in sunlight, except for the rough at the very southern edge of hole 9. The driving range would continue to receive incremental along its southern edge.

Through 12:30PM, Figure 6-28 through Figure 6-29 show that holes 1, 9, and 10 would be wholly in sunlight and the southernmost edge of the driving range's teeing area would be shaded. Beginning at 12:10PM, hole 18 would begin to receive incremental shadow at its southwestern edge; by 12:30PM, Figure 6-29 shows that incremental shadow would begin to approach the fairway.

By 1:30PM, Figure 6-30 shows that the westernmost edges of the fairway and additional portions of the rough in the southwest of hole 18 would be shaded. The southernmost edge of hole 9 would receive incremental shadow from the replacement golf clubhouse. The putting practice area near hole 1 would be wholly in direct sunlight except for a small area of shadow at the southern edge. The southern edge of the driving range's teeing area would continue to receive incremental shadow.

By 2:30PM, Figure 6-31 shows that incremental shadow would move off the driving range. The putting practice area near hole 1 would continue to be wholly in sunlight, except for a small portion of the rough that would be shaded. At hole 9, the green would be wholly in direct sunlight, and only a small area would be shaded in the southwest corner of the fairway and rough. At hole 18, the green would continue to be wholly in direct sunlight, but incremental shadow would move further across the fairway and rough in the southwest corner of the hole.

By 3:30PM, Figure 6-32 shows that incremental shadow would move wholly off the putting practice area near hole 1. At hole 9, the green would be wholly in direct sunlight and only the fairway and rough behind the green would continue to receive incremental shadow. At hole 18, the western edge of the green would be shaded, along with

portions of the fairway and rough. Beginning at 3:50PM, incremental shadow would begin to encroach on the Park's East River Waterfront Area south of the Development Site.

By 4:30PM, Figure 6-33 shows that only the southern edge of hole 9 would be shaded, and the green would continue to be in direct sunlight. At hole 18, additional areas of the green, fairway, and rough would receive incremental shadow; the green would be nearly wholly shaded, and the fairway would be about two-thirds shaded. A small area of vegetation in the East River Waterfront Area would receive incremental shadow.

At 5:18PM – the end of the May analysis day – Figure 6-34 shows that the green on hole 9 would be wholly in direct sunlight, but a very small area of the fairway and rough south of the green would be shaded by incremental shadow. At hole 18, the entirety of the hole would be shaded except for the teeing areas and the northernmost extents of the fairway and rough. A more pronounced shadow would also encroach on the East River Waterfront Area, which would have the potential to shade two of the area's ten benches for about 10 minutes; the remaining 8 benches in the East River Waterfront Area would continue to remain wholly in direct sunlight.

May Analysis Day Shading by Resource

The Proposed Development would generate incremental shadow on the Park for the entire analysis day. The wetland would receive incremental shadow for up to 2 hours and 3 minutes, but only at the beginning of the analysis period and would not cause the wetland to receive fewer than eight hours of direct sunlight. The East River and NYCDOT Wetland Mitigation project area would not receive incremental shadow; therefore, a significant adverse shadows impact would not occur to the wetland, the East River, or the NYCDOT Wetland Mitigation project area on the May analysis day.

The Park

The detailed analysis shows that the Park would receive incremental shadow throughout the analysis day, a duration of 8 hours and 53 minutes. To the west of the expressway, one playing field has the potential to be shaded by incremental shadow from the start of analysis period, but this shadow would move off the playing field around 7AM. The East River Waterfront Area would receive incremental shadow for 1 hour and 28 minutes towards the end of the analysis day. These two portions of the Park would continue to receive direct sunlight for over seven hours throughout the rest of the analysis day. Incremental shadow would not preclude use of the fields or Waterfront Area and would result in vegetation receiving less than six hours of direct sunlight. While the incremental shadow on the East River Waterfront Area would have the potential to shade two benches, the shading would occur at the very end of the analysis period, have a duration of around 10 minutes, the benches would be in direct sunlight for the remainder of the analysis period, and other benches would be available in the area that would continue to be in direct sunlight.

The remainder of the incremental shadow on the May analysis day would be confined to small sections of holes 1, 9, and 18 and the driving range.

- Small portions of the putting practice area near hole 1 would be shaded in the early morning hours; however, the incremental shadow would not fully shade this area at any time and shadow would be limited to small areas of the southern and southeastern extents. Thus, the incremental shadow on the putting practice area near hole 1 would not rise to the level of a significant adverse impact.

- At hole 9, incremental shadow would only occur in the southernmost areas of the hole. The entirety of the green would be wholly shaded for approximately two hours during the morning. At the very southwestern edge, areas of the rough and fairway behind the green would receive incremental shadow throughout the day. Incremental shadow would not shade the teeing area of this hole, and the green and fairway would receive at least six hours of direct sunlight throughout the analysis day. Golfers could be subjected to shade during play if their ball lands in areas of incremental shadow. However, golfers would likely experience incremental shadow for less than 10 minutes on this hole because shadow would be limited to the very southwestern extents. Thus, incremental shadow cast on hole 9 would not result in a significant adverse impact to golfers on the May analysis day, however, vegetation in the rough in the southwest of the hole may experience a significant adverse impact from the reduction of direct sunlight.
- Hole 18 would begin to receive incremental shadow at about 12:10PM and shadow would last until the end of the analysis day. Significant encroachment onto the hole would not begin until about 3:00PM. The fairway would begin to receive incremental shadow around 1PM, after the hole has received about six hours and 30 minutes of direct sunlight. For most of the day, golfers would typically be affected by the shadow on hole 18 for less than 10 minutes, and only if their ball lands in the shadowed areas. For the last hour of the day a golfer would be primarily in shadow for the entirety of the hole, an approximate duration of 15 minutes as golfers play the hole. Thus, incremental shadow cast on hole 18 would not result in a significant adverse impact to golfers on the May analysis day. However, vegetation in the rough in the southwest of the hole would experience fewer than six hours of direct sunlight.
- The driving range would receive incremental shadow on the very southern edge of the teeing area from approximately 9:00AM to 2:00PM. This shadow would not be significant for golfers because the area where golfers tee would continue to have access to direct sunlight throughout the day. Thus, incremental shadow cast on the driving range would not result in a significant adverse impact to golfers.

Incremental shadow would not preclude users from golfing. Golfers adjust their play when there is shadow and sunlight on various parts of the golf course and related changes in moisture level. These adjustments are typical for golfers and would not preclude golfers from golfing.

Golf courses typically contain well-maintained vegetation that is routinely monitored, maintained, and manicured. Various maintenance activities can be performed to accommodate additional shading on vegetation. However, because the Proposed Actions would reduce the amount of available sunlight on portions of the Golf Course and limit the vegetation's amount of direct sunlight to less than six hours per day – the minimum requisite duration specified in the *CEQR Technical Manual* – the Proposed Actions could result in limited significant adverse impacts to the vegetation (grass) at:

- Hole 9: The southernmost fairway and rough;
- Hole 18: The southwestern edge of the rough; and
- Driving Range: The southern edge of the teeing area.

Measures to mitigate the significant adverse impacts to vegetation on the Golf Course are discussed in Chapter 22 of this EIS, "Mitigation."

Wetland

The wetland west of the Hutchinson River Expressway would receive about two hours of incremental shadow during the early morning hours. Incremental shadow would move off the wetland after 8:30AM, and the wetland would not receive incremental shadow from 8:31AM through the end of the analysis period. The wetland would be wholly in sunlight from about 9:30AM until the end of the analysis period, a duration of more than eight hours; thus, the wetland would continue to receive the CEQR minimum amount of sunlight for vegetation. The wetland could continue to serve as habitat for existing local populations of plants and animals. Additionally, NYSDEC does not map rare, threatened, or endangered species within the wetland. For species present in the wetland that rely on sunlight for predation, project-generated shadow may reduce the access to sunlight in the discrete areas of incremental shadow; however, the incremental shadow would be limited in geographical extent and duration. Therefore, incremental shadow would not result in a significant adverse impact on the May analysis day.

May Analysis Day Conclusion

On the May analysis day, incremental shadow on limited portions of the Park would be cast throughout the analysis period. However, prolonged durations of incremental shadow on the Park would be almost entirely confined to the Golf Course area immediately adjacent to the Proposed Facility, specifically, small areas of the putting practice area near hole 1, the driving range, and holes 9 and 18. Only portions of these features would receive incremental shadow, and at no point would incremental shadow shade the entirety of these resources. Incremental shadow would not preclude users from golfing, and golfers would make common adjustments to their play when portions of each hole are shaded. For golfers playing a round of golf, shadow would largely be limited to hole 18, and golfers would experience an estimated 15 minutes of incremental shadow during a round.

A small section of the Park's active playing fields in areas west of the expressway would receive incremental shadow for less than one hour at the start of the analysis day but would be in direct sunlight for the remainder of the analysis day. The more sunlight-sensitive elements on the west side of the expressway such as the barbeque areas, playing fields and playgrounds would receive direct sunlight for over nine hours.

Incremental shadow would be cast on the wetland located west of the expressway for about two hours during the early morning. The wetland would be unaffected by incremental shadow from 8:31AM until the end of the analysis day and would remain in direct sunlight from about 9:30AM through the end of the analysis period.

A small portion of the East River Waterfront Area south of the Development Site would receive incremental shadow for about 1.5 hours. This incremental shadow would not rise to a significant adverse impact because the area would have more than nine hours of direct sunlight.

However, on the May analysis day, the Proposed Actions would reduce the availability of sunlight to less than six hours on discrete vegetated areas of the Golf Course, specifically on holes 9 and 18, and the edge southern edge of the teeing area of the driving range. Accordingly, the Proposed Development would result in limited significant adverse shadows impact to the grass of holes 9 and 18, and the teeing area of the driving range on the May analysis day. Additionally, due to the impact on vegetation at the Golf

Course, the Proposed Actions also have the potential to affect utilization. Measures to mitigate these impacts will be outlined in Chapter 22 of this EIS, "Mitigation.

June Analysis Day

The June analysis day – the summer solstice – is the longest solar day of the year. The conditions during this analysis day are representative of warm weather conditions, and both direct sunlight and shaded areas would likely be in highest demand depending on specific weather conditions. Figure 6-35 through Figure 6-47 show the detailed shadow assessment on the June analysis day from 5:57AM.

Figure 6-35: June Analysis Day – 5:57 AM



Figure 6-36: June Analysis Day – 7:00 AM



Figure 6-37: June Analysis Day – 8:00 AM



Figure 6-38: June Analysis Day – 9:00 AM



Figure 6-39 June Analysis Day – 10:00 AM



Figure 6-40: June Analysis Day – 11:00 AM



Figure 6-41: June Analysis Day – 12:00 PM



Figure 6-42: June Analysis Day – 1:00 PM



Figure 6-43: June Analysis Day – 2:00 PM



Figure 6-44: June Analysis Day – 3:00 PM



Figure 6-45: June Analysis Day – 4:00 PM



Figure 6-46: June Analysis Day – 5:00 PM



Figure 6-47: June Analysis Day – 6:01 PM



Figure 6-35 shows that at 5:57AM – the start of the analysis day – a small portion of the wetland west of the Hutchinson River Expressway would receive incremental shadow; however, the Whitestone Bridge would also cast an existing shadow over a portion of the wetland at this time. A portion of the Park's playing fields that are west of the Expressway would receive incremental shadow at this time for about an hour. At hole 9, the southern end of the rough and fairway, and part of the green would receive incremental shadow. All other resources in the Study Area would be in direct sunlight during this time.

By 7:00AM, Figure 6-36 shows that active recreational uses west of the Expressway would be wholly in direct sunlight. Incremental shadow would continue to be cast on the wetland and across the entirety of the green on hole 9.

By 8:00AM, Figure 6-37 shows that a small portion of the wetland would continue to receive a small area incremental shadow. Incremental shadow would move off the wetland after 8:25AM. At hole 9 on the Golf Course, the eastern half of the green of hole 9 and the adjacent fairway and rough would continue to be shaded.

By 9:00AM, Figure 6-38 shows that the wetland would be wholly in sunlight. Hole 9's green would be wholly in direct sunlight. Rough to the east of the green on hole 9 would continue to be shaded until incremental shadow moves wholly off hole 9 after 10:10AM.

Through 1:00PM, Figure 6-39 through Figure 6-42 show that incremental shadow would be limited to *de minimis* areas of the rough on holes 9 and 18.

By 2:00PM, Figure 6-43 shows that incremental shadow would continue to fall on the rough of hole 18 and begin to be cast along the southwestern edge of the hole's fairway. A small sliver of the rough in the southwest of hole 9 would receive incremental shadow from the replacement golf clubhouse.

By 3:00PM, Figure 6-44 shows that incremental shadow would continue to fall on the rough and fairway in the southwest corner of hole 9. Hole 18 would continue to receive incremental shadow along its northwestern and southwestern edges nearest the Proposed Facility. Incremental shadow would begin to fall on hole 18's green beginning around 3:15PM.

By 4:00PM, Figure 6-45 shows that incremental shadow would continue to fall on the small area of fairway and rough west of the green on hole 9. Hole 18 would receive incremental shadow across a larger portion of the hole including the middle of the fairway and on the western edge of the green. Beginning at 4:10PM, the East River Waterfront Area would begin to receive incremental shadow from the Proposed Facility in vegetated areas.

By 5:00PM, Figure 6-46 shows that much of the fairway, green, and rough of hole 18 would be shaded by the Proposed Facility. At hole 9, shadow would continue to be cast on areas of the fairway and rough to the southwest of the green. Shadow would continue to encroach farther into the East River Waterfront Area.

At 6:01PM – the end of the June analysis day – Figure 6-47 shows that nearly all of hole 18 – except for the teeing area and northernmost extents of the fairway and green – would be shaded by incremental shadow. Incremental shadow would continue to encroach farther into the East River Waterfront Area, shading two of the area's ten benches for about 30 minutes. A small sliver of the NYCDOT Wetland Mitigation project area would receive incremental shadow from 5:35PM until the end of the analysis day (up to 26 minutes). Finally, the East River would receive incremental shadow on the

littoral zone from 5:13PM until the end of the analysis day, a duration of approximately 48 minutes.

June Analysis Day Shading by Resource

On the June analysis day, the Proposed Development would result in incremental shadow across all four of the Study Area's sunlight-sensitive resources.

The Park

On the June analysis day, incremental shadow would be cast on the Park throughout the analysis day, a duration of 12 hours and 4 minutes. Prolonged durations of incremental shadow would be limited to the Golf Course and the area immediately around the Proposed Facility.

At the beginning of the June analysis day, a narrow slice of incremental shadow would shade areas west of the Hutchinson River Expressway – including an area of sports fields and vegetation. These areas would be shaded by incremental shadow for about one hour and the incremental shadow would move off these uses by about 7:00AM, allowing the fields and vegetation would be in direct sunlight throughout the remainder of the analysis day. The East River Waterfront Area would receive incremental shadow for about the last two hours of the day. The East River Waterfront Area and areas west of the Expressway and would continue to receive direct sunlight for over seven hours throughout the rest of the analysis day. Use of these areas by park goers would not be precluded, and vegetation in these areas would continue to receive the requisite six-to-eight hours of direct sunlight.

The remainder of the incremental shadow would be confined to the Golf Course, specifically small sections of holes 9 and 18.

- Hole 9 would receive incremental shadow from the beginning of the analysis day on the green, fairway, and rough until 10:10AM, when incremental shadow would move off the hole except for areas of rough at the edge of the hole. The green and fairway would receive over six hours of direct sunlight throughout the analysis day. A small area of rough nearest the proposed replacement golf clubhouse would receive fewer than six hours of direct sunlight on the June analysis day. Golfers may experience shaded conditions if their ball lands in areas of shadow; however, golfers would typically be in areas of shade for less than 10 minutes on hole 9. Thus, incremental shadow cast on hole 9 would not be significant to golfers on the June analysis day, but a significant adverse shadows impact would occur to a small area of rough in the southwest corner of the hole.
- In the southwest corner of hole 18, the rough would receive incremental shadow beginning at 12:20PM. This area would remain shaded through the end of the analysis day. Incremental shadow would begin to be cast on the fairway around 1:20PM. Shadow would continue to encroach onto the northern and southwestern edges of the hole, which would be mostly in shadow by 5:00PM and remain covered until the end of the analysis day. While hole 18 would receive incremental shadow throughout the June analysis day, the green, fairway, and rough would all receive at least six hours of direct sunlight throughout the June analysis day. For most of the day, golfers would typically be in shadow for less than 10 minutes on hole 18, but only if their ball lands in the shaded areas. Golfers using hole 18 after 4PM could be in shadow after their tee shot, an estimated duration of about 15 minutes. Thus,

incremental shadow cast on hole 18 would not be a significant impact to golfers on the June analysis day.

Incremental shadow would not preclude users from golfing. Golfers would adjust their play when there is shadow and sunlight on various parts of the golf course and related changes in moisture level. These adjustments are typical for golfers and would not preclude the use of the golf course. Under worst-case conditions, incremental shadow would reduce golfers' access to sunlight for about 10 minutes on hole 9 and about 15 minutes on hole 18, a non-continuous, cumulative duration of about 25 minutes, or approximately eight percent of a 5-hour (300-minute) round of golf.

The Golf Course is a link-style course with few opportunities for shade from trees or other nearby structures. Thus, golfers would experience minimal areas of shade on the Golf Course, except around the Proposed Development. The June analysis day is representative of warm weather months when Golf Course users may prefer areas of shade for relief from the sun; thus, on hot and sunny days that are typical around the June analysis day, the Proposed Development may provide new opportunities for golfers to have relief from the sun.

Golf courses typically contain well-maintained vegetation that is routinely monitored, maintained, and manicured. Various maintenance activities can be performed to accommodate additional shading on vegetation. However, because the Proposed Actions would reduce the amount of available sunlight on portions of the Golf Course and limit the vegetation's amount of direct sunlight to less than the six hours per day – the amount specified in the *CEQR Technical Manual* as typically necessarily – the Proposed Actions could result in significant adverse impacts to the vegetation (grass) on the southernmost rough of hole 9. Measures to mitigate the significant adverse impacts to the Golf Course are discussed in Chapter 22 of this EIS, "Mitigation."

Wetland

The wetland west of the Hutchinson River Expressway would receive up to 2 hours and 28 minutes of incremental shadow during the early morning hours on the June analysis day. Incremental shadow would move off the wetland by 8:25AM. The wetland would be wholly in sunlight for more than nine hours on the June analysis day; thus, the wetland would continue to receive the CEQR minimum amount of sunlight for vegetation. The wetland could continue to serve as habitat for existing local populations of plants and animals. Additionally, NYSDEC does not map rare, threatened, or endangered species within the wetland. For species present in the wetland that rely on sunlight for predation, project-generated shadow may reduce the access to sunlight in the discrete areas of incremental shadow; however, the incremental shadow would be limited in geographical extent and duration. Therefore, incremental shadow would not result in a significant adverse impact on the June analysis day.

East River

During the June analysis day, the East River would receive incremental shadow for up to 48 minutes. Incremental shadow would begin to fall on a small area of the East River beginning at 5:13PM and lasting through the end of the analysis day. This portion of the East River is tidal and is classified as littoral zone. The area of the East River that would be shaded in the late afternoon on the June analysis day would continue to receive direct sunlight for over 11 hours; therefore, incremental shadow would not result in a significant adverse impact to the East River on the June analysis day.

NYCDOT Wetland Mitigation

During the June analysis day, a small area of the proposed NYCDOT Wetland Mitigation project south of the Proposed Development would receive incremental shadow for 26 minutes at the end of the analysis day. This portion of the Park would continue to receive sunlight for over 11 hours on the June analysis day before incremental shadow begins to fall on this area; thus, the wetland would continue to receive the CEQR minimum amount of sunlight for vegetation. The wetland could continue to serve as habitat for existing local populations of plants and animals. Additionally, NYSDEC does not map rare, threatened, or endangered species within the wetland. For species that may populate the future wetland that rely on sunlight for predation, project-generated shadow may reduce the access to sunlight in the discrete areas of incremental shadow; however, the incremental shadow would be limited in geographical extent and duration. Therefore, the Proposed Actions would not result in a significant adverse shadows impact to the proposed NYCDOT Wetland Mitigation project on the June analysis day.

June Analysis Day Conclusion

On the June analysis day, incremental shadow would be cast on the Park would be cast for the entire analysis period, a duration of 12 hours and 4 minutes. However, prolonged durations of incremental shadow would be mostly confined to the area immediately around the Proposed Facility, specifically, small areas of hole 9 and areas of hole 18.

The Proposed Development would reduce the amount of available sunlight to less than six hours of direct sunlight on the southernmost area of hole 9. Areas on hole 18 would receive incremental shadow for more than five hours, however, the hole would be unshaded between 5:57AM and 12:20PM, a duration of 6 hours and 23 minutes. Thus, vegetation on hole 18 would continue to receive the requisite six-to-eight hours of direct sunlight on the June analysis day.

Portions of holes 9 and 18 would receive incremental shadow, but incremental shadow would not preclude golfers from golfing. Incremental shadow has the potential to affect conditions on the course, such as moisture. Golfers would make common adjustments to their play when portions of each hole are shaded. The incremental shadow also has the potential to affect golfers' comfort levels depending on the weather conditions. The June analysis day is representative of warm-weather conditions when golfers may seek shade for refuse from the warmth of the sun.

The East River Waterfront Area to the south of the Development Site would also receive incremental shadow for about 2 hours beginning around 4:10PM. This area would not be shaded before 4:10PM and would be in direct sunlight for more than ten hours on the June analysis day. Thus, the Proposed Development would not result in a significant adverse shadows impact to the East River Waterfront Area.

A small area of the East River's littoral zone would receive incremental shadow from 5:13PM until the end of the analysis day, an approximate duration of 48 minutes. This portion of the East River would continue to receive sunlight for over 11 hours on the June analysis day.

The NYCDOT Wetland Mitigation project area would receive incremental shadow from 5:35PM until the end of the analysis day, an approximate duration of 26 minutes. The area of the NYCDOT Wetland Mitigation project would be wholly in sunlight for over 11 hours, allowing vegetation to receive the requisite six-to-eight hours of direct sunlight. Thus, the Proposed Development would not result in a significant adverse shadows

impact to the East River or the NYCDOT Wetland Mitigation area on the June analysis day.

Accordingly, the Proposed Development would only result in significant adverse shadows impact to the vegetation (grass) of hole 9 on the June analysis day. Additionally, due to the impact on vegetation at the Golf Course, the Proposed Actions also have the potential to affect utilization. Measures to mitigate these impacts will be outlined in Chapter 22 of this EIS, "Mitigation."

Detailed Analysis Conclusion

Based on the Tier 1 – 3 screenings, a detailed assessment was warranted for four resources: the Park, the East River, a wetland west of the Hutchinson River Expressway, and the proposed NYCDOT Wetland Mitigation project. Incremental shadow on the wetland, the NYCDOT Wetland Mitigation project, and areas of the Park that are west of the expressway would be limited and would not rise to the level of a significant adverse impact.

The Proposed Development would result in significant adverse shadows impacts in small areas of vegetation (grass) on the Golf Course on the March, May, and June analysis days.

Golf Course Users

Incremental shadow would be cast on portions of the Golf Course in areas around the Proposed Facility on all four CEQR analysis days. During the December analysis day, the Golf Course is closed, and vegetation is dormant. In the other three analysis days, prolonged durations of incremental shadow would be confined to very small portions of holes 1 (including the putting practice area near hole 1), 9, 10, and 18 and the driving range to various degrees on each day.

Throughout the March, May, and June analysis days, portions of holes 1, 9, 10, and 18 and the driving range would receive incremental shadow. The incremental shadow would not preclude golfers from golfing and golfers would make regular and typical adjustments to their play when portions of each hole are shaded. Golfers would experience an estimated 30 minutes of incremental shadow during the March analysis day, an estimated 15 minutes on the May analysis day, and an estimated 25 minutes of incremental shadow during the June analysis day (based on an overall golf round of approximately four to five hours). Because the course is a links-style course (little-to-no trees), the new shadow can provide golfers the opportunity for relief from the heat of the sun during warmer days.

With the incremental shadow from the Proposed Facility, users would experience new shadow in the following limited areas:

- Hole 1: Putting practice area, teeing areas, and rough;
- Hole 9: The green and surrounding fairway and rough;
- Hole 10: The southernmost tee box;
- Hole 18: The green, fairway, and rough; and
- Driving Range: The southern extents of the teeing area.

Golfers could experience incremental shadow for about 30 minutes, but would likely be less depending on factors such as: 1) which tees the golfer is using; 2) whether a golfer's ball lands in a shaded area; 3) the time a golfer needs to complete a hole (which can be linked to skill); and 4) what time a golfer starts a round and the delays encountered on the course. Relative to the Golf Course, the areas of incremental shadow are discrete, and golfers would experience incremental shadow in continuous durations of approximately 15 minutes during worst-case conditions as they move throughout the course before moving back into areas of direct sunlight. Thus, the incremental shadow would not be a significant impact to the golfers.

Golf Course Vegetation

The Golf Course primarily consists of manicured grasses that are routinely maintained. The vegetation is sensitive to sunlight (both duration and intensity) and the *CEQR Technical Manual* indicates that a significant adverse impact can occur if vegetation would receive less than six hours of direct sunlight during the growing season. Shadows occurring during the cold-weather months do not affect the growing season of outdoor vegetation and therefore, project-generated shadow during the December analysis day would not result in a significant adverse impact to vegetation.

Vegetation on the Golf Course is maintained to support the activity of golfers. Based on field surveys and consultations with NYSDEC and USFWS, the Affected Area is not anticipated to serve as habitat for large populations of terrestrial wildlife. Rare, threatened, and endangered species are not mapped within the Golf Course in the Affected Area; however, portions of the Golf Course could serve as habitat for local populations of wildlife and continue to act as a potential site for breeding and foraging with the Proposed Actions. While wildlife populations could experience additional shadow from the Proposed Development and replacement golf clubhouse, wildlife would continue to have access to additional acreage of the Park that could serve as a similar habitat.

Various maintenance activities are performed throughout the winter while the Golf Course is closed to the public, and plantings and seed mixes can be changed as needed to accommodate conditions at the Golf Course by the maintenance staff. However, because the Proposed Development would reduce the amount of available sunlight to less than six hours of direct sunlight on small areas of the Golf Course throughout the March, May and June analysis days, the Proposed Development could result in significant adverse impacts to the Golf Course grass in the following limited areas:

<u>March Analysis Day</u>

- Hole 1: The putting practice area and rough around the teeing areas;
- Hole 9: The green and surrounding fairway and rough;
- Hole 10: The southern fringe of the southernmost tee box;
- Hole 18: The fairway and rough at southwestern edge of the hole; and
- Driving Range: The southern extent of the teeing area.

<u>May Analysis Day</u>

- Hole 9: The southernmost fairway and rough;
- Hole 18: The southwestern edge of the rough; and

- Driving Range: The southern edge of the teeing area.

June Analysis Day

- Hole 9: The rough near the green of hole 9.

Due to the impact on vegetation at the Golf Course, the Proposed Actions also have the potential to affect utilization. Adverse utilization impacts may result on portions of holes 1, 9, 10, and 18. Measures to mitigate the significant adverse shadows impacts to the Golf Course's vegetation are discussed in Chapter 22 of this EIS, "Mitigation."