Chapter 9: Mitigation

As presented in Chapter 3 and Chapter 4, this ~~Draft~~ Final EIS evaluated the potential for significant adverse impacts due to the construction and/or operation of the Proposed Action. As part of the Proposed Action, measures were incorporated to the extent practical to address, eliminate, or reduce potential impacts and these were previously discussed within this ~~Draft~~ Final EIS. For those significant adverse impacts that could not be readily addressed through design changes, modification of the proposed construction or operation of the Proposed Action, and/or other comparable measures, specific mitigation would be required and is described in this chapter. This chapter provides a summary of the mitigation measures that have been identified as feasible to mitigate or reduce anticipated significant adverse impacts associated with the Proposed Action.

As discussed within this ~~Draft~~ Final EIS, the construction of the Proposed Action has the potential to result in significant adverse impacts to natural resources, specifically forested areas and wetlands, and temporary significant adverse traffic impacts. The CEQR guidelines stipulate that if a significant impact is identified, then measures to address these should also be identified. No other significant adverse impacts were identified for the construction and/or operation of the Proposed Action. Proposed mitigation measures are identified and discussed in more detail below.

9.1 NATURAL RESOURCES

As described in Section 3.7, "Natural Resources," the Proposed Action would result in significant adverse impacts to terrestrial communities, specifically forested areas (i.e., those areas consisting of areas spanning more than 1.2 acres with trees higher than 16 feet) and wetlands at the Kensico Campus. The sections below present the proposed mitigation measures for those impacts associated with the Proposed Action.

9.1.1 TERRESTRIAL COMMUNITIES

Forested areas encompass approximately 18.8 acres of the Kensico Campus. As noted in Section 3.7, "Natural Resources," the primary benefit of forested areas on the Kensico Campus is related to the retention and storage of water. As water supply lands, DEP maintains forested areas as an important component to support and protect clean drinking water within the Kensico Reservoir watershed, as well as reducing impacts from climate change, heat island effects, and reduction of flooding and stormwater runoff. Based on the disturbance anticipated and the location and area of the proposed planting that would be considered forested areas (and contiguous to existing forested areas at the Kensico Campus), approximately 9.3 acres of forested area would be impacted as a result of the Proposed Action.

While on-site or in-kind mitigation for the loss of forested areas would be preferable, it would not be possible as the Kensico Campus, KEC Eastview Site, and larger Kensico Reservoir watershed do not have available unforested City-owned lands to accommodate 9.3 acres of new forest. DEP would therefore provide mitigation for the loss of forested areas on the Kensico Campus by completing forest restoration work, including invasive species control and underplanting, in other areas in the Kensico Reservoir watershed.

While invasive species removal and the installation of native trees and shrubs would help to improve the quality of existing areas of mature forest, it would not replace the function of the mature forest that would be removed. Therefore, DEP proposes to perform forest restoration at a 2:1 acreage ratio in order to achieve a comparable benefit to a one for one replacement of impacted forested areas. DEP would perform forest restoration on 18.6 acres of suitable City-owned forested land in the Kensico Reservoir watershed. In the unlikely event that sufficient suitable acreage cannot be found within the Kensico Reservoir watershed, DEP would provide the balance of this mitigation within City-owned forested lands within the larger East of Hudson watershed.

Removal and control of invasive species is essential to improving forest health and maintaining the high-quality water of Kensico Reservoir. Invasive plants are a growing threat to natural areas because they outcompete and eliminate native vegetation thereby interrupting natural ecosystem processes. Invasive plants prevent native trees, shrubs, and herbaceous plants from growing, and over time can dominate a site. Federal and State laws define invasive species as non-native or alien species whose introduction is likely to cause economic or environmental harm or harm to human health. Invasive plants include non-native species that have been introduced either accidentally or for agricultural, horticultural, and medicinal purposes that have subsequently escaped cultivation. Invasive plants such as mile-a-minute vine (*Persicaria perfoliata*), Japanese barberry (*Berberis thunbergii*), and porcelain-berry (*Ampelopsis brevipedunculata*) are very prolific and can easily displace native plants, altering species composition, and ecosystem function unless management to remove these invasives and re-introduce appropriate native species is undertaken.

The ecological impacts of invasive plant species are increasingly well-documented in the scientific literature. For example, invasive plants such as garlic mustard (*Alliaria petiolata*), Japanese barberry, and Japanese stiltgrass (*Microstegium vimineum)* can affect the growth of native forest plant species by altering soil chemistry and nutrient cycling (Ehrenfeld 2003; Ehrenfeld and Scott 2001). Invasives may also alter the species composition of the soil's microbial community by secreting toxic or growth-inhibiting compounds into the soil (Gross 2006; Stinson et al. 2006). If these compounds are new to the soil community, they may alter microbial composition and function (Wolfe and Klironomos 2005). This is a concern because many native plants, including the dominant forest canopy tree species in the NYC watersheds rely on associations with soil fungi for nutrient uptake and growth. The result of such changes may be a less diverse set of native forest species to rely on for essential ecosystem benefits, including reducing runoff volumes or intensities and the purification of drinking water. Forested ecosystem resistance to pests and pathogens and resilience to natural disturbance may also be negatively affected.

Forest restoration would improve forest health and, therefore, would provide increased benefit to water quality. Forest improvements would support ecological functions, such as regeneration, protection of soil, filtration of water, and nutrient buffering to ensure continuous, healthy, vigorous forest cover. Control of invasive species is required to ensure overall tree and ecosystem health. Healthy forests provide for ecologically diverse, vigorous, and sustainable forests that are resilient and capable of natural regeneration of desired species and can contribute to maintaining high-quality water resources while reducing impacts from climate change, heat island effects, and reduction of flooding and stormwater runoff. Maintaining a species and age/size class diverse forest cover increases that cover's resistance to disturbances (e.g., ice storms, wind events, hurricanes, droughts) and allows for faster recovery from any disturbances. Therefore, the proposed 18.6 acres of forest restoration would provide a comparable benefit to the forested resources lost as part of the Proposed Action.

9.1.2 WETLANDS

Construction of the Proposed Action would result in unavoidable impacts to approximately 2.33 acres of wetlands at Kensico Campus. No unavoidable impacts to wetlands would occur at the KEC Eastview Site. As discussed in Section 3.7, "Natural Resources," anticipated impacts to submerged aquatic vegetation (SAV) and open water habitats would occur as part of proposed shoreline stabilization work and removal of accumulated sediments in proximity to the UEC and UEC intake channel. The anticipated impacts associated with the conversion of SAV and open water habitats to upland, riprap and/or new open water and the anticipated mitigation ratios are noted in **Table 9.1-1**. Mitigation ratios are consistent with previous DEP projects in the Kensico Reservoir watershed.

Table 9.1-1. Anticipated Mitigation Ratios and Mitigation Need – Kensico Campus

Type of Disturbance	Construction Activity	Unavoidable Impact (Acres)	Anticipated Mitigation Ratio	Anticipated Mitigation Need (Acres)
SAV to Upland	Shoreline Stabilization	0.01	2:1	0.02
Open Water to Upland	Shoreline Stabilization	0.01	1:1	0.01
Open Water to Inundated Riprap	Shoreline Stabilization	1.33	1:1	1.33
SAV to Inundated Riprap	Shoreline Stabilization	0.78	1:1	0.78
SAV to Open Water	Removal of accumulated sediments	0.20	1:1	0.20
Total		2.33		2.34

While on-site mitigation within the vicinity of a disturbed area is preferred, it may also be located off-site when space is not available, or future grades, and water budgets would not support wetland systems. Mitigation can include restoration of former or degraded wetlands, enhancement to improve the functions of existing wetlands, or creation of new wetlands that provide the same functions and values as the disturbed areas, preferably within the same watershed or drainage area. Based on a review of existing and future conditions at the Kensico Campus, no opportunity for on-site mitigation is available, therefore off-site wetland mitigation within the larger Kensico Reservoir watershed would be developed to provide mitigation for wetland impacts due to the Proposed Action.

Compensation for wetland impacts at the Kensico Campus would be achieved through a new, off-site wetland mitigation project. The wetland mitigation site, known as Big Peninsula, is located on City-owned lands southwest of SR120 on a peninsula in the northeastern portion of Kensico Reservoir in the Town of North Castle (see **Figure 9.1-1)**. This site is within the Kensico Reservoir watershed which also encompasses the location of the proposed wetland impacts due to the Proposed Action.

The Big Peninsula site would provide mitigation for all permanent impacts to open waters and SAV habitat resulting from the Proposed Action. The mitigation project would provide 2.34 acres of emergent and scrub shrub wetland habitat to meet the currently anticipated mitigation needs. The large size of the parcel provides DEP the flexibility to adjust the overall potential mitigation area, if required, due to regulatory requirements or other unforeseen needs. While the impacts of the Proposed Action are to open water and SAV, DEP would create an emergent and scrub shrub wetland. Because of the historic and widespread regional conversion of vegetated wetlands to ponds (and the creation of the reservoir itself), the acreage of open water wetlands is not limited in this basin. Additionally, a vegetated wetland directly adjacent to the reservoir would help detain sediments and nutrients and convey water quality protection functions.

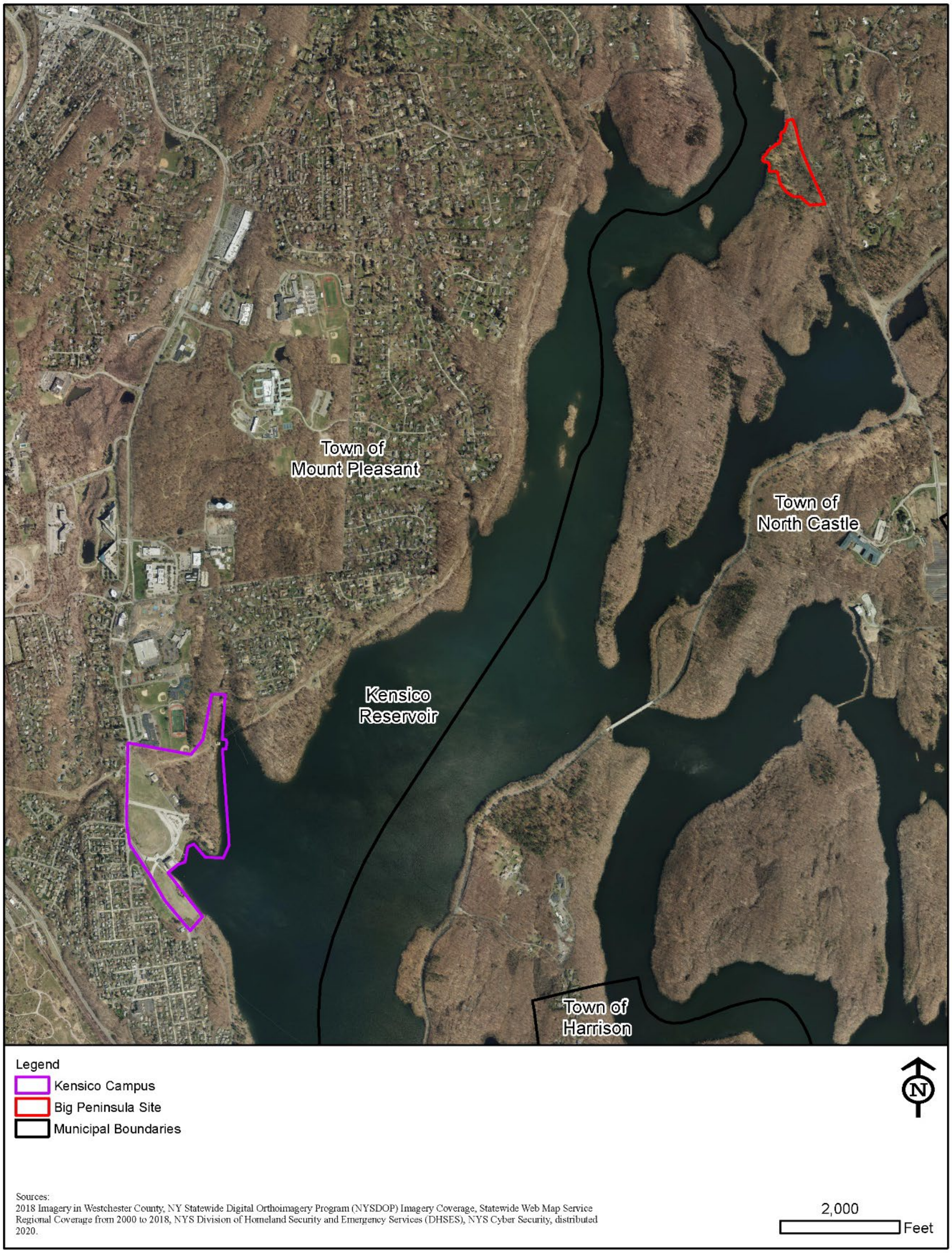

Figure 9.1-1. Big Peninsula Wetland Potential Mitigation Site Location Map

The Big Peninsula site would also provide the benefit of a single site for required mitigation. While mitigation requirements could potentially be met through a combination of wetland creation and enhancement at multiple sites, smaller fragmented sites are not ideal from an ecological-services perspective. The goals of wetland mitigation are more readily achieved through the implementation of a single, larger site rather than multiple smaller sites. As such, the use of the Big Peninsula site for required wetland mitigation would be preferred as it would increase the potential for success, represent a larger-scale mitigation opportunity and provide better ecological benefit.

A critical element of a wetland mitigation is that it must be designed to be successful with minimal maintenance. Key to this is that adequate hydrology to sustain the wetland communities must be present. Initial hydrologic modeling of the Big Peninsula site was completed to verify existing conditions using a 2021 topographic survey, LiDAR data, as well as desktop land use and soil survey data. The drainage area contributing to the Big Peninsula site is approximately 73 acres. Results of the initial modeling indicate that sufficient hydrology (existing and/or as part of the proposed design) would be provided to support the wetland mitigation at this site.

The Big Peninsula site is designated as water supply lands and is currently undeveloped. Multiple waterbodies are located in close proximity to the proposed wetland creation area. The potential wetland creation area is immediately adjacent to an existing 3.2-acre wetland and a NYSDEC-regulated watercourse that runs along the eastern portion of the Big Peninsula site and discharges to Kensico Reservoir. The current existing wetland contains pockets of invasive vegetation, including common reed (*Phragmites australis*), and Japanese barberry.

The proposed wetland mitigation area has also initially been designed with the intent to create a new wetland area that would offset the anticipated impacts to wetlands associated with the Proposed Action (see **Figure 9.1-2)**. The proposed wetland mitigation would create a large, contiguous wetland system of shallow emergent and scrub wetland habitats consisting of native plants. The use of native plants would support nutrient uptake and provide a sustainable, robust wetland ecosystem. This wetland system would also provide water quality benefits, as well as other ecological functions. In addition, the created wetlands would increase vegetative habitat diversity and provide additional habitat for aquatic fauna and herptiles.

Upland areas adjacent to the constructed wetland or disturbed during construction of the proposed mitigation would be vegetated with an appropriate mix of native trees, shrubs, herbaceous plugs, and seed mixes. Forest cover currently present at the Big Peninsula site primarily consists of non-native conifer plantations installed between 1915 and 1925 following reservoir construction. Site productivity is high and, as a result, existing trees are very tall, averaging 100 or more feet. At the same time, high soil moisture has limited rooting depth, and, as a result, trees are highly susceptible to falling in higher winds. Multiple wind events have occurred over the past decade, resulting in a thinning tree canopy and substantial invasion by

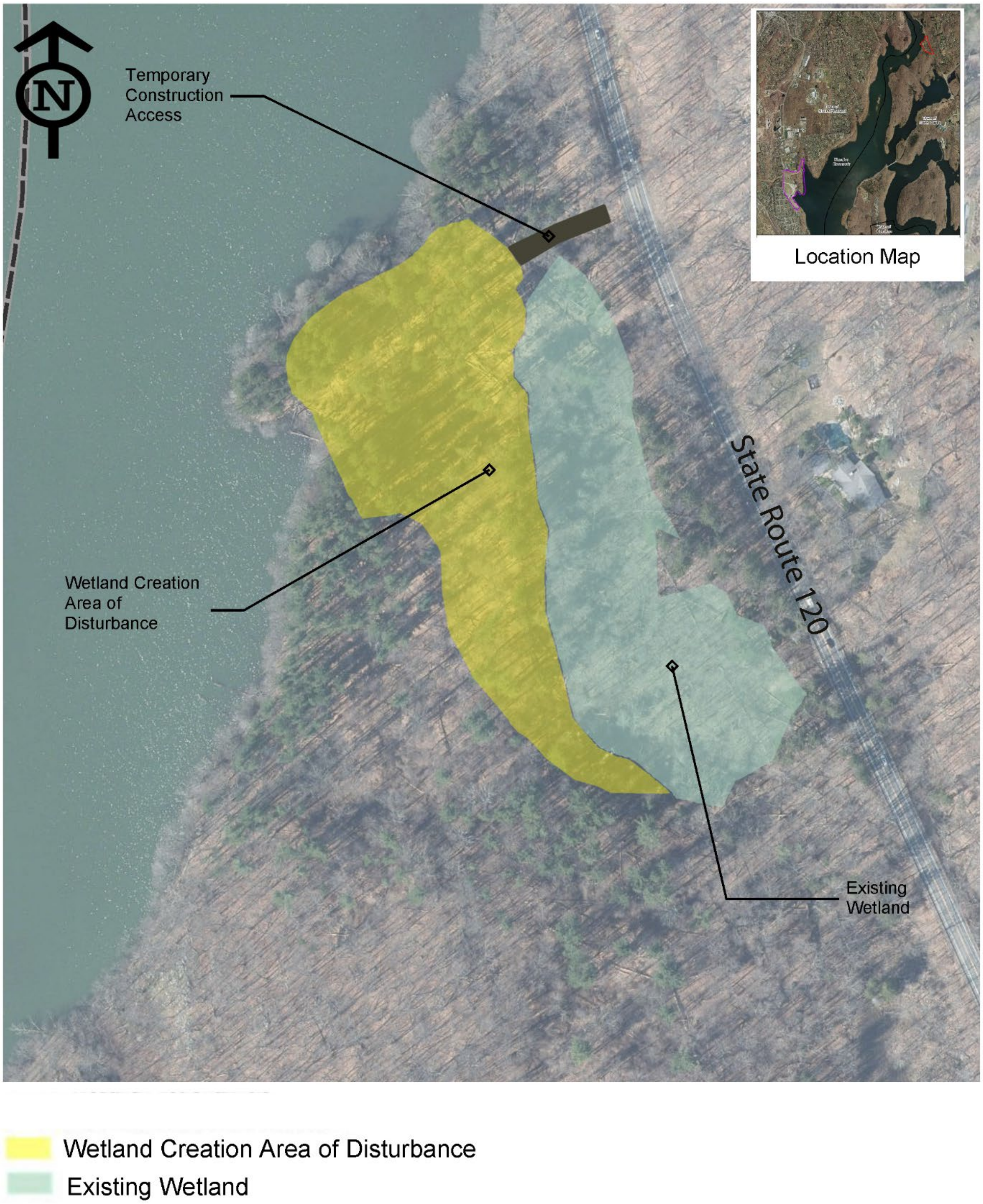

Figure 9.1-2. Conceptual Big Peninsula Wetland Mitigation Layout

non-native noxious weeds including Japanese stiltgrass, mile-a-minute vine, Japanese barberry, and common reed. Wind events adjacent to a water supply reservoir is particularly undesirable because of the erosion potential of exposed, loose soil present on the root mounds created when a tree falls. Construction of a wetland at the Big Peninsula site would improve these conditions by removing the unstable, non-native forest canopy and invasive noxious weeds and replacing them with a site-appropriate wetland ecosystem populated with native plants, These native plants would not be prone to erosion, would provide habitat for native wildlife, and would assist with filtration of runoff before it enters Kensico Reservoir.

In addition to the potential use of the Big Peninsula site, DEP is also exploring the option of wetland mitigation banking to offset unavoidable impacts associated with the Proposed Action. Wetland mitigation banking is a form of third party, off-site mitigation that involves the restoration, creation, enhancement, or preservation of wetlands to compensate for permitted impacts to wetlands and waters. Bank sponsors construct wetland areas and sell credits to satisfy the mitigation needs of permittees. Banking is an accepted form of mitigation under Section 404 of the Clean Water Act and Sections 9 and 10 of the Rivers and Harbors Act, with standards established under the federal mitigation rule (33 CFR 332). Mitigation banking is the preferred form of compensation under the federal mitigation rule, as it consolidates mitigation for multiple authorized impacts into larger sites with stringent performance standards whose success is highly monitored. While mitigation banking is a form of off-site mitigation, credits can only be sold to offset impacts within the same watershed, a pre-defined area known as the bank's service area. There is currently no wetland mitigation banking site in the region. DEP may, however, seek authorization to use banking credits to offset impacts associated with the Proposed Action should a site be established and credits released in the future.

9.1.3 CONCLUSION

DEP's proposed mitigation plan would address anticipated significant adverse impacts to natural resources. The Proposed Action would provide mitigation for the loss of 9.3 acres of forested area at the Kensico Campus. This would include off-site forest restoration within an area of approximately 18.6 acres (a 2:1 mitigation ratio). This would occur within City-owned parcels within the Kensico Reservoir watershed drainage area if possible and/or other DEP East of Hudson watershed drainage areas if necessary. Similarly, off-site wetland mitigation at the Big Peninsula site by DEP or through a future approved wetland mitigation bank would fully address the loss of 2.33 acres of SAV and open water habitats due to the Proposed Action.

9.2 CONSTRUCTION TRAFFIC AND TRANSPORTATION

As detailed in Section 3.10, "Traffic and Transportation," the future with the Proposed Action has the potential to result in significant adverse traffic impacts at three intersections during the PM construction traffic peak hour (3 to 4 PM). This section identifies and evaluates the measures that would mitigate the significant impacts identified in Chapter 3, “Potential Impacts from Construction of Proposed Action.”

9.2.1 TRAFFIC ANALYSIS

As discussed in Section 3.10, “Traffic and Transportation,” the future with the Proposed Action would result in significant adverse traffic impacts at three of the 18 intersections analyzed (4 of the 93 individual traffic movements analyzed) during the PM construction traffic peak hour. No significant adverse traffic impacts are expected during the AM construction traffic peak hour. All intersections with significant traffic impacts could be fully mitigated with standard traffic capacity improvements such as signal timing modifications and restriping of travel lanes. As discussed in Section 3.10, “Traffic and Transportation,” these significant impacts would be expected during specific periods of construction and are temporary in nature; these intersections would no longer be significantly impacted once construction is complete and the project is operational. Construction traffic activities during the remaining hours of the construction workday would be substantially lower than during the construction traffic peak hours; therefore, the potential for impacts would be similar or less than during the construction traffic peak hours. The impacted movements are listed below:

- Intersection #7, Grasslands Road (SR100C) and Walker Road / Clearbrook Road (signalized) – Northbound Clearbrook Road left-through turn movement and southbound Walker Road left-through turn movement
- Intersection #13, Grasslands Road (SR100C/SR100) and Bradhurst Avenue (SR100) / Knollwood Road (SR100A) (signalized) – Southbound Bradhurst Avenue through-right turn movement
- Intersection #15, Hillside Avenue (SR100) and Virginia Road (CR51) (unsignalized) – Westbound Virginia Road approach

Details of the intersection capacity analyses, and all traffic mitigation measures are presented for the weekday PM construction traffic peak hour in **Table 9.2-1**.

Table 9.2-1. Future Without the Proposed Action vs. Future With the Proposed Action vs. Future With the Proposed Action (Mitigated) Traffic Levels of Service – PM Construction Traffic Peak Hour(1) (2)

Intersection No./Approach	Lane Group	Future without the Proposed Action V/C Ratio	Future without the Proposed Action Delay (sec)	Future without the Proposed Action LOS	Future with the Proposed Action V/C Ratio	Future with the Proposed Action Delay (sec)	Future with the Proposed Action LOS	Future with the Proposed Action (Mitigated) V/C Ratio	Future with the Proposed Action (Mitigated) Delay (sec)	Future with the Proposed Action (Mitigated) LOS	Proposed Mitigation Measures
7. Grasslands Road (SR100C) and Walker Road / Clearbrook Road – signalized											
Grasslands Rd – EB	L	0.03	23.7	C	0.05	29.3	C	0.06	34.3	C	Modify signal timing: Shift 3 seconds of green time from EB-TR/WB-TR phase and 4 seconds of green time from EB-L/WB-L phase to NB/SB phase.
	TR	0.55	24.3	C	0.58	28.0	C	0.62	30.0	C	
Grasslands Rd – WB	L	0.30	24.2	C	0.32	29.0	C	0.39	35.1	D	
	T	0.75	30.6	C	0.81	37.5	D	0.86	42.7	D	
	R	0.06	17.1	B	0.06	19.5	B	0.06	20.5	C	
Clearbrook Rd – NB	LT	0.71	44.6	D	1.05	159.8	F	0.74	51.6	D	
	R	0.00	0.0	A	0.00	0.0	A	0.00	0.0	A	
Walker Rd – SB	LT	0.74	38.9	D	0.94	67.7	E	0.81	40.3	D	
	R	0.00	26.9	C	0.02	25.6	C	0.02	21.3	C	
Overall Intersection			**28.8**	**C**		**42.8**	**D**		**36.4**	**D**	
13. Grasslands Road (SR100C/SR100) and Bradhurst Avenue (SR100) / Knollwood Road (SR100A) – signalized											
Grasslands Rd – EB	UL	0.69	26.1	C	0.69	26.1	C	0.75	33.3	C	Modify signal timing: Shift 3 seconds of green time from EB-L/WB-L phase to NB-TR/SB-TR phase.
	T	0.53	27.1	C	0.56	27.8	C	0.58	30.4	C	
	R	0.29	2.4	A	0.29	2.4	A	0.30	2.6	A	
Grasslands Rd – WB	L	0.19	14.3	B	0.20	14.4	B	0.21	15.7	B	
	TR	0.88	51.2	D	0.88	51.2	D	0.88	52.5	D	
Knollwood Rd – NB	L	0.73	40.1	D	0.83	52.0	D	0.78	43.1	D	
	TR	0.52	37.1	D	0.53	37.3	D	0.49	34.3	C	
Bradhurst Ave – SB	L	0.22	23.7	C	0.22	23.7	C	0.20	22.1	C	
	TR	0.98	75.6	E	1.09	103.7	F	0.99	74.5	E	
Overall Intersection			**38.8**	**D**		**45.7**	**D**		**40.6**	**D**	

Table 9.2-1. Future Without the Proposed Action vs. Future With the Proposed Action vs. Future With the Proposed Action (Mitigated) Traffic Levels of Service – PM Construction Traffic Peak Hour(1) (2)

		Future without the Proposed Action			Future with the Proposed Action			Future with the Proposed Action (Mitigated)			Proposed Mitigation Measures
Intersection No./Approach	Lane Group	V/C Ratio	Delay (sec)	LOS	V/C Ratio	Delay (sec)	LOS	V/C Ratio	Delay (sec)	LOS	
15. Hillside Avenue (SR100) and Virginia Road (CR51) – unsignalized											
Virginia Rd – WB	LR	0.92	52.4	F	0.99	67.8	F	0.58	47.9	E	Reconfigure WB approach from one 16-foot wide lane to one 11-foot wide right turn lane and one 15-foot wide left turn lane for 30 feet. Separate these lanes with a painted triangular island.
		-	-	-	-	-	-	0.41	12.0	B	
Hillside Ave – NB	TR	0.00	0.0	A	0.00	0.0	A	0.00	0.0	A	
Hillside Ave – SB	LT	0.19	5.9	A	0.21	6.1	A	0.21	6.1	A	
Overall Intersection			**21.4**	**C**		**26.5**	**C**		**9.9**	**A**	

Notes:
(1) Includes the three impacted analysis intersections (two signalized; one unsignalized).
(2) Traffic impacts were identified at selected movements for the intersections shown. The effect of traffic mitigation measures were analyzed for all traffic movements of the intersection to determine changes in V/C ratios and delays that would result from the proposed mitigation measures and confirm that no new traffic impacts would occur.
Gray highlighted cell denotes movement(s) that would be significantly impacted.
MVT = Movement
V/C Ratio = volume-to-capacity ratio
Sec = seconds
NB = Northbound; SB = Southbound; EB = Eastbound; WB = Westbound.
L = Left; T = Thru; R = Right; U = U-turns
Dr = Drive; Ave = Avenue; St = Street; Rd = Road; Pkwy = Parkway

9.2.1.1 Intersection #7, Grasslands Road (SR100C) and Walker Road / Clearbrook Road (signalized)

This intersection would be impacted by the Proposed Action during the PM construction traffic peak hour with traffic impacts anticipated along the northbound Clearbrook Road shared left-through movement and southbound Walker Road shared left-through movement. In the future without the Proposed Action, these movements would operate at LOS D, which is at the limit of what is considered acceptable traffic level of service, and a moderate increase in traffic along these movements or opposing movements would cause an increase in delay exceeding the thresholds for a significant traffic impact. These impacts could be mitigated by modifying the signal timing, shifting three seconds from the eastbound and westbound through-right turn phase and four seconds from the eastbound and westbound left turn phase to the northbound and southbound phase. The green time for the eastbound and westbound through-right turn phase would shift from 40 seconds to 37 seconds, the green time for the eastbound and westbound left turn phase would shift from 15 seconds to 11 seconds, and the green time for the northbound and southbound phase would shift from 30 seconds to 37 seconds.

9.2.1.2 Intersection #13, Grasslands Road (SR100C/SR100) and Bradhurst Avenue (SR100) / Knollwood Road (SR100A) (signalized)

This intersection would be significantly impacted by the Proposed Action during the PM construction traffic peak hour with impacts anticipated along the southbound Bradhurst Avenue shared through-right turn movement. In the future without the Proposed Action, this movement would be expected to operate at unacceptable LOS E, and a minimal increase in traffic would cause an increase in delay exceeding the thresholds for a significant traffic impact. This impact could be mitigated by modifying the signal timing, shifting three seconds from the eastbound and westbound left turn phase to the northbound and southbound through-right turn phase. The green time for the eastbound and westbound left turn phase would shift from 15 seconds to 12 seconds, and the green time for the northbound and southbound through-right turn phases would shift from 20 seconds to 23 seconds.

9.2.1.3 Intersection #15, Hillside Avenue (SR100) and Virginia Road (CR51) (unsignalized)

This intersection would be significantly impacted by the Proposed Action during the PM construction traffic peak hour with impacts anticipated along the westbound Virginia Road approach which is stop controlled and yields to free-flowing traffic along Hillside Avenue. In the future without the Proposed Action, this movement would be expected to operate at unacceptable LOS F, and a minimal increase in traffic would cause an increase in delay exceeding the thresholds for a significant traffic impact. Impacts to this intersection could be mitigated by restriping the westbound approach from one 16-foot wide travel lane to one 11-foot wide right turn lane and one 15-foot wide left turn lane for 30 feet from the stop bar. A painted triangular island would be provided to separate the left turn lane from the right turn lane and would provide left turning vehicles with a better sight angle for finding gaps to complete the left turn movement. The intersection was found to not be significantly impacted in the AM construction traffic peak hour, and the proposed mitigation described above would not result in a significant impact in the AM construction traffic peak hour.

9.2.2 CONCLUSION

DEP's proposed mitigation plan would address anticipated temporary significant adverse impacts to traffic and transportation as noted above. DEP would work with the appropriate entity (e.g., NYSDOT, Westchester County) for review and approval of the proposed mitigation measures.

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