8. PROPOSED ACTION IN THE KENSICO RESERVOIR STUDY AREA

8.1 KENSICO RESERVOIR PROJECT DESCRIPTION

8.1.1 BACKGROUND

As discussed in Section 1.2.3, "Emergency Authorizations for Alum Application," NYSDEC, in coordination with NYSDOH issued several emergency authorizations to DEP, which allowed for the application of alum to water in the Catskill Aqueduct upstream of Kensico Reservoir[1] to address episodic turbidity. Specifically, alum was applied to coagulate the suspended solids to improve settling and reduce turbidity in flows of water from Ashokan Reservoir.[2] Following the expiration of these emergency authorizations, DEP applied for a permit and NYSDEC issued the Catalum SPDES Permit. This permit authorizes DEP to apply alum and sodium hydroxide to reduce turbidity in the Catskill Aqueduct upon NYSDEC receipt of a copy of a notice from the NYSDOH that there is a potential imminent development of a public health hazard related to the discharge of turbid water from Kensico Reservoir. The Catalum SPDES Permit issued by NYSDEC to authorize alum application included a condition that DEP dredge accumulated alum floc from the Reservoir in a manner that minimizes adverse impacts to the environment within Kensico Reservoir. In 2011, the Catalum SPDES Permit was administratively extended.

In June 2012, DEP requested a modification to the NYSDEC Catalum SPDES Permit to incorporate measures to address episodic turbidity in water diverted from Ashokan Reservoir, and delay of dredging of alum floc from Kensico Reservoir until completion of RWBT repairs. Repairs to the RWBT are underway and are part of a broader program to ensure the continued reliability of the drinking water system: DEP's Water for the Future (WFF) Program. When the RWBT will be shut down (RWBT shutdown) to facilitate these repairs, DEP will be more heavily reliant upon the water in the Catskill System to meet its customers' daily demand as water from the Delaware System will be unavailable. More reliance on the Catskill System increases the likelihood that the City would need to apply alum and sodium hydroxide to address turbidity to water in the Catskill Aqueduct upstream of Kensico Reservoir during the RWBT shutdown. As discussed in Section 1, "Introduction," NYSDEC issued a Consent Order delaying the commencement of dredging design until the RWBT repairs are complete.

In addition, and also as part of the WFF Program, DEP has commenced a project to repair and rehabilitate the Catskill Aqueduct (CAT-RR) to restore its historic capacity. As such, DEP expects that it may also be necessary to apply alum to water in the Catskill Aqueduct upstream of Kensico Reservoir during brief periods of aqueduct start-up after shutdowns associated with the CAT-RR project. DEP evaluated the potential for the application of alum during the RWBT shutdown and the CAT-RR project in the Water for the Future: Upstate Water Supply Resiliency Final Environmental Impact Statement (FEIS) (CEQR No. 5DEP006U) issued on December 15, 2017. Pursuant to the 2018 Modification to the Catalum Administrative Order on Consent, DEP is authorized to add alum in accordance with the WFF Alum Treatment Plan (ATP) and requires that the associated alum floc be included in the Total Dredging Mass.[3]

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[1] Aluminum sulfate (alum) and sodium hydroxide are added at the Pleasantville Alum Plant to water in the Catskill Aqueduct upstream of Kensico Reservoir (alum application).

[2] Alum attaches to particles suspended in the water column that cause turbidity and causes them to sink and settle on the floor of the water body. These coagulated/flocculated particles are referred to as "alum floc."

[3] The 2018 Modification defines the Total Dredging Mass as the mass of alum floc deposited in Kensico Reservoir under two Emergency Orders in 2005, under authority of the Catalum SPDES Permit, and in accordance with the WFF ATP.

Therefore, any dredging in the future would be focused on the dredging of alum floc deposited since 2005, as well as any alum floc deposited in accordance with the WFF Alum Treatment Plan.

Alum applied to water in the Catskill Aqueduct upstream of Kensico Reservoir forms alum floc, which is deposited and accumulates in the vicinity of the Catskill Influent Chamber (CATIC) Cove where water from the Catskill Aqueduct discharges into Kensico Reservoir. DEP conducted extensive bathymetric and sediment sampling studies in 2006 and 2014 to determine the depth, areal distribution, and chemical make-up (total and dissolved aluminum content) of the alum floc deposition within the area of CATIC Cove and the adjacent area of the Reservoir. Analysis of the physical characteristics of collected samples included grain size, percent moisture, percent solids, and percent organic matter. In addition, DEP sampled the Kensico Reservoir benthic community in proximity to the areas of alum deposition in April and July 2007. The 2007 surveys followed a period of alum application in 2005 and 2006. In July 2014, a representative subset of the stations sampled in 2007 were selected and resampled. The 2014 sampling also followed a period of alum application in 2011 and 2012.

8.1.2 PROJECT OVERVIEW

This EIS includes an analysis of the potential effects of delay of dredging, as well as an assessment of environmental considerations associated with this dredging by comparing the future without the Proposed Action (no dredging) to the future with the Proposed Action (delay of dredging).[4] As described in Section 8.2, "Kensico Reservoir Dredging Analysis," dredging in the future would involve removal of approximately 91,000 to 98,400 cubic yards (cy) of accumulated alum floc from the bottom of Kensico Reservoir. As shown on **Figure 8.1-1**, dredging would occur within the approximate limits of historical and anticipated future floc deposition in the vicinity of the CATIC Cove. Dredging would be performed using a barge-based hydraulic dredge, with the pumping of dredged materials via temporary piping to an upland site. A separate dewatering operation to remove excess water from the dredged material would be established approximately 2.3 miles south of the CATIC site on property owned by the City and operated by DEP. The dewatering site would be located on the west side of the Reservoir off of Westlake Drive. Two adjacent temporary above-ground pipelines would be installed between the CATIC and dewatering sites. One pipeline would transport dredged material pumped from the CATIC site to the dewatering site for dewatering and off-site disposal of processed dredge materials, and the other would transport filtrate water generated from the dewatering process to the CATIC site for discharge back into the Reservoir. Descriptions of these activities are provided below.

Dredging activities within Kensico Reservoir would be further refined in the future based on the detailed plans for dredging, and supplemental environmental analysis would be conducted, as applicable.

[4] As described, the Proposed Action would modify the Catalum SPDES Permit to incorporate: (1) Turbidity control measures, including operation of Ashokan Reservoir in accordance with the IRP; and (2) Delay of dredging accumulated material (alum floc) from Kensico Reservoir until the completion of certain infrastructure projects. The Kensico Reservoir Study Area assessment focuses on delay of dredging.

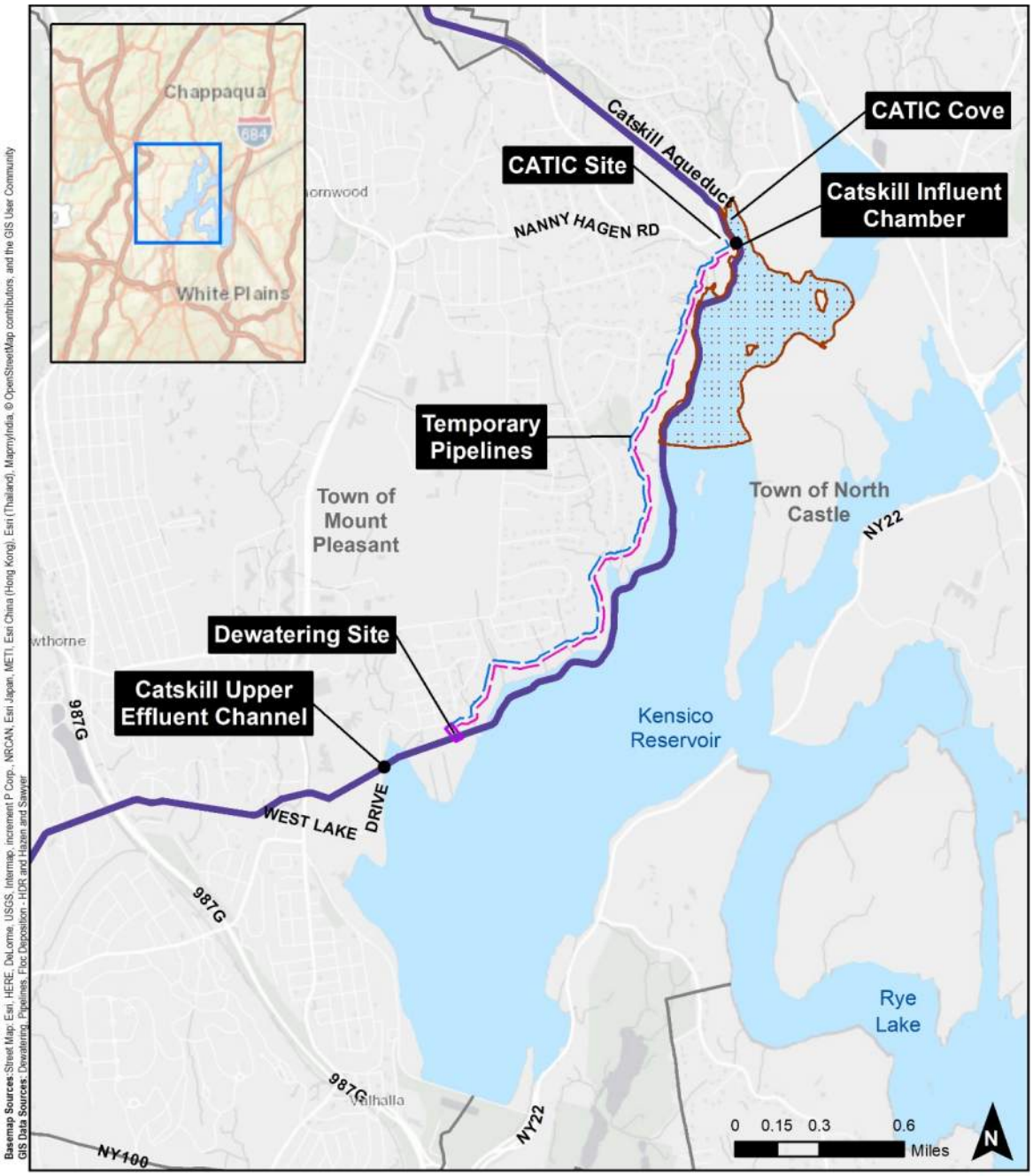


Figure 8.1-1
Kensico Reservoir Project Location

8.2 KENSICO RESERVOIR DREDGING ANALYSIS

As set forth in the Final Scope of Work, the EIS assesses the potential impacts associated with a delay of dredging until certain DEP infrastructure projects, such as the RWBT repairs, have been completed, while also evaluating potential environmental considerations for the dredging of alum floc from Kensico Reservoir.

This section analyzes the potential for significant environmental impacts associated with the delay of dredging and identifies environmental considerations associated with dredging activities. As the dredging design would be further refined in the future, DEP would review the need for additional environmental review of the potential effects of dredging that would be completed in the future, if required.

8.2.1 DELAY OF DREDGING

In the future with the Proposed Action (delay of dredging), existing alum floc would continue to remain in place and the deposition of new alum floc in Kensico would increase as a result of alum application in accordance with the WFF ATP. In the future with the Proposed Action, general compliance with water quality standards would remain unchanged. NYSDEC-designated best uses for Kensico Reservoir, including use as a drinking water supply, would continue to be achieved as has been the case for many years.

New deposition is anticipated to occur within the same lateral extent of the Kensico Reservoir CATIC Cove associated with alum floc deposition since 2005 and not beyond, as shown on **Figure 8.2-1**. The diversity and presence of existing benthic communities within previously deposited alum floc are anticipated to continue to persist, as documented from a comparison of 2007 and 2014 benthic sampling events that were completed after several larger previous alum applications. Likewise, impacts to other aquatic species, specifically fish, would also not be expected due to existing or newly deposited alum floc. No impacts to water quality or wetlands are expected to occur, as these would remain comparable to current conditions. Similarly, adverse impacts from existing floc have not been observed and potential impacts associated with aluminum within alum floc would not be expected, as the long-term water quality characteristics of Kensico Reservoir (i.e., neutral pH levels) do not support the conditions necessary for the bioavailability of aluminum that would potentially result in adverse impacts to benthos or fish.

The delay of dredging would not result in potential impacts to the surrounding community. No active site preparation or construction activities would occur during the period of delay and therefore potential impacts to transportation, air quality, and noise would not be expected with the delay of dredging. Likewise, potential impacts to historic resources, open space and recreation, aesthetics, or upland habitat potentially anticipated with dredging or required site preparation, such as clearing and site access road construction, are not expected to occur with the delay of dredging.

Therefore, the delay of dredging is not anticipated to result in significant adverse environmental impacts.

Figure 8.2-1
Kensico Reservoir Study Area
Modeled Range of Average Settled Thickness of Alum Floc during WFF Program

8.2.2 ENVIRONMENTAL CONSIDERATIONS OF DREDGING

The area for environmental considerations of dredging at Kensico Reservoir, shown on **Figure 8.1-1**, includes a staging and support area near the CATIC (CATIC site), a potential location for a facility near Westlake Drive to support dewatering of dredged material (dewatering site), an area for two temporary pipelines between the CATIC and dewatering sites, and the potential dredging area that is anticipated to occur within the limits of the approximate area of floc deposition within the Reservoir in the vicinity of CATIC Cove. These sites and project components are further described in the sections below.

Implementation of dredging in the future would require careful consideration of potential effects that could be associated with these activities. While a more detailed assessment would need to consider the potential design, duration, and extent of dredging that would be further refined in the future, resource areas that would warrant environmental consideration were identified. As discussed in Section 5.3, "Impact Assessment Methodology," any dredging is not anticipated to result in significant effects to: land use, zoning and public policy; socioeconomic conditions; community facilities and services; shadows; solid waste and sanitation services; greenhouse gas emissions and climate change; solid waste or hazardous materials; or environmental justice.

The dredging would potentially overlap with DEP's upcoming Kensico Eastview Connection (KEC) Project. The KEC Project will construct a new tunnel between Kensico Reservoir and the Catskill/Delaware Ultraviolet (UV) Disinfection Facility. Completion of the KEC Project is included as a required predecessor project in a separate May 2019 Hillview Reservoir Consent Decree and Judgment among the City, United States, and New York State, which requires DEP to cover Hillview Reservoir in compliance with the Long Term 2 Enhanced Surface Water Treatment Rule. The KEC Project would be the subject of a separate environmental review.

Potential effects that may be associated with dredging and that would be reasonably anticipated are summarized in **Table 8.2-1** below, including cumulative effects from potential overlap with the KEC Project. The potential effects are further assessed in Section 8.3, "Potential Impacts and Benefits of the Proposed Action on the Kensico Reservoir Study Area."

Table 8.2-1. Potential Environmental Considerations by Resource Area for Activities Associated with Dredging

Resource Area	Activity	Environmental Considerations
Water Resources and Water Quality	Site Preparation; Dredging and Dewatering	• Sediment resuspension in the water column during dredging • Potential sedimentation and erosion • Stormwater runoff • Potential pipeline discharges
Aquatic Resources	Dredging	• Physical removal of existing benthic community and habitat in CATIC Cove with full benthic re-colonization anticipated to take several years • Physical alteration of existing habitat (e.g., deeper, altered substrate) o Disturbance of fish foraging and nursery habitat o Altered fish habitat value • Effects on early fish life stages and impaired feeding ability within active dredging areas

Table 8.2-1. Potential Environmental Considerations by Resource Area for Activities Associated with Dredging

Resource Area	Activity	Environmental Considerations
Wetlands	Site Preparation; Dredging and Dewatering	• Potential sedimentation and erosion • Stormwater runoff • Temporary stream crossings • Potential pipeline discharges
Terrestrial and Wildlife Resources	Site Preparation; Dredging and Dewatering	• Clearing of trees and vegetation • Potential noise effects to wildlife during dredging and dewatering • Temporary stream crossings
Open Space and Recreation	Dredging	• Dredging activities would occur for up to three years • Placement of turbidity curtains across the dredge area from shore to shore during dredging would limit recreational access to these areas
Critical Environmental Areas	Construction, Dredging and Dewatering	• Mobile (vehicular) noise from activities for site preparation and dewatering operations • New stationary noise from dewatering, dredging, and temporary generators
Historic and Cultural Resources	Site Preparation	• Soil disturbance for staging, dewatering, pipeline placement, and access roads could affect historic resources
Aesthetics (Visual) Resources	Dredging and Dewatering	• Dredging activities would be visible from existing public view corridors for the duration of construction
Transportation	Construction, Dredging and Dewatering	• Increased traffic associated with construction, chemical delivery for dewatering, and dredged material transport
Air Quality	Construction, Dredging and Dewatering	• Mobile (vehicular) air emissions from activities for site preparation and dewatering operations • New stationary air emissions from dewatering, dredging, and temporary generators
Noise	Construction, Dredging and Dewatering	• Mobile (vehicular) noise from activities for site preparation and dewatering operations • New stationary noise from dewatering, dredging, and temporary generators

Note:
Potential overlap with the KEC Project may result in cumulative impacts for selected technical resource areas as discussed in Section 8.3, "Potential Impacts and Benefits of the Proposed Action on the Kensico Reservoir Study Area."

CATSKILL INFLUENT CHAMBER (CATIC) SITE

The CATIC site is located in the northern portion of Kensico Reservoir, in the Town of Mount Pleasant and would be accessed by an existing DEP access road off of Nanny Hagen Road (**Figure 8.1-1**). The CATIC site would be used for access to the Reservoir during potential dredging and for temporary equipment laydown and storage during dredging activities. Access road improvements would involve minor clearing and grading, possible tree removal, and the placement of gravel. Stormwater runoff would be managed in accordance with applicable requirements and a Soil Erosion and Sediment Control Plan would be prepared.

Site security and protection would include the installation of a temporary ten-foot perimeter fence around an approximate 20,000 square-feet upland work site with a gate to limit access. In addition, silt fencing would be installed along the access road, as needed, for erosion and sediment control, and a temporary security guard booth would be installed on DEP property, adjacent to the access road. A temporary trailer would be located along the access road and provisions for temporary utilities for the guard booth and equipment would be needed. In addition, temporary potable water (i.e., portable water container) and sanitary facilities (i.e., portable toilets) would also be provided. The site would be restored to baseline conditions and areas that did not involve the placement of gravel would be reseeded, as necessary, following project completion.

In addition, a temporary turbidity curtain would be placed across the dredge area in order to minimize potential sediment or alum floc resuspension and migration in the water column during dredging.

TEMPORARY PIPELINES

Due to limited available upland staging area at the CATIC site, the proposed dewatering operation would be located approximately 2.3 miles to the southwest of the CATIC site. Dredged material would be pumped by feed pumps through a proposed temporary above-grade 2.3-mile pipeline from the dredging area to the dewatering site. A second parallel pipeline would transport filtrate generated from the dewatering process for discharge into the Reservoir within the area encompassed by the turbidity curtain at the CATIC site. Discharges to the Reservoir would occur when dredging is underway and the dewatering facility is operating (e.g., approximately eight hours per day). The pipelines would be assembled on site and installed along an existing Consolidated Edison easement access road. The pipelines would be anchored and secured by stakes on the ground surface. Prefabricated structures for air vents and drainage valves would be installed along the pipelines. Some minor grading and clearing would be required to install the temporary pipelines within the easement. In addition, placement of the two pipelines during construction would require watercourse (e.g., stream) crossings. Crushed stone would be placed at crossings to support the pipelines. The crushed stone would be placed at a far enough distance from the edge of the watercourses to avoid placing fill in these features. In addition, silt fencing would be installed along the temporary pipelines, as needed, for erosion and sediment control. The pipelines and supporting materials would be removed at project completion. The site would be restored to baseline conditions and reseeded, as needed, following project completion.

DEWATERING SITE

As shown on **Figure 8.1-1**, the dewatering site would be located in the northwestern portion of Kensico Reservoir, in the Town of Mount Pleasant and is bordered by the Reservoir to the east, south, and west. The site would be accessed from Westlake Drive and then by an existing DEP access road located in the northern portion the site. The site is located within a larger approximately 124-acre parcel that is owned by the City and managed by DEP.

As part of dredging, the staging area for the dewatering facility would be approximately one acre. Temporary activities to prepare the work area would include minor grading and stabilization for

equipment laydown and storage, placement of gravel, and installation of a perimeter fence around the work area. Stormwater runoff would be managed in accordance with applicable requirements, including through the development of a Soil Erosion and Sediment Control Plan that would be prepared as part of the project. The site would be restored to baseline conditions and, as needed, areas that did not involve placement of gravel would be reseeded following project completion.

One temporary trailer would be located adjacent to the work area and provisions for utility connections to an office trailer and other equipment would be provided. Equipment to be located on site would include trucks, mixing tanks, mechanical dewatering equipment, feed pumps, air compressors, and filters. In addition, a temporary potable water container and sanitary facilities would also be provided.

DREDGING

DREDGING EXTENT AND VOLUME

The dredge area would be within the approximate limits of historical and anticipated future floc deposition near the CATIC Cove (shown on **Figure 8.1-1**) and would involve the removal of approximately 91,000 to 98,400 cy of dredged material. The Consent Order requires the removal of the "Total Dredging Mass," which is the mass of alum floc that the City deposited in the Reservoir under two Emergency Orders issued in 2005 and all subsequent deposits.

The areal extent and depth of alum floc deposition to be dredged would be determined upon further advancement of the design and development of a detailed plan for dredging. It is anticipated that the determination would be based on the results of bathymetric and analytical sediment sampling conducted in 2006 and 2014 that identified the areas of maximum alum floc deposition, as well as an updated Bathymetric/Benthic Report pursuant to the Consent Order as part of the required dredging design contract.

When added to water, alum reacts with the natural alkalinity in water to form aluminum hydroxide, an insoluble gelatinous floc that settles slowly, clearing naturally-occurring sediment suspended in the water column as it settles. The total amount of dry solids deposited in Kensico Reservoir due to historical application of alum since the 2005 events is approximately 28.99 million pounds, as shown in **Table 8.2-2.** This mass accounts for both the aluminum hydroxide solids and entrained suspended solids from the water column.

Table 8.2-2. Summary of Historical Alum Application Events from April 5, 2005 to Present

Alum Application Event	Total Solids (Million Pounds)
April 5, 2005 – June 20, 2005	4.15
October 13, 2005 – November 23, 2005	1.58
December 1, 2005 – April 10, 2006	6.84
May 15, 2006 – May 24, 2006	0.32
June 28, 2006 – August 2, 2006	2.48
January 31, 2011 – February 11, 2011	0.29
March 2, 2011 – May 20, 2011	1.94
August 29, 2011 – May 15, 2012	11.21
January 25, 2020 – January 28, 2020	0.18
Total	**28.99**

Determining the average solids concentration of the alum floc *in-situ* is necessary to identify the total *in-situ* sediment volume that would need to be dredged to remove alum floc deposited in Kensico Reservoir. To estimate the total sediment volume that may be deposited in Kensico Reservoir between now and completion of repairs to the RWBT, alum application was estimated for the time period leading up to the RWBT shutdown and added to the amount of alum application anticipated to be necessary to address turbidity that may occur in the Catskill Aqueduct during completion of DEP's WFF Program.

As disclosed in Section 7.1.2, "Summary of Effects of The Proposed Action on DEP Water Supply Reliability," DEP can use the Catskill/Delaware Interconnection at Shaft 4 and Catskill Aqueduct Stop Shutters to reduce flow of turbid water from Ashokan Reservoir to Kensico Reservoir. Therefore, with both the Catskill and Delaware Systems online, alum application is anticipated to occur about 0.3 percent of the days over the OST model simulation period. The occurrence of alum application prior to the RWBT shutdown as a result of an episodic turbidity event due to a storm would therefore be rare, and no alum application is anticipated between now and the RWBT shutdown. However, if a storm event that requires alum application occurs during this time period this infrastructure would reduce the amount and length of time of required alum application. The total amount of potential alum floc deposition associated with a storm event in the time period leading up to the RWBT shutdown is anticipated to be relatively small in volume in comparison to the existing alum floc deposited since the 2005 events.

As noted previously, increased reliance on the Catskill Aqueduct would be required during the RWBT shutdown, increasing the likelihood of alum application. During periods of elevated turbidity that occur in the Catskill System during the RWBT shutdown, DEP will not be able to curtail diversions from Ashokan Reservoir to Kensico Reservoir. DEP would pursue an objective of maintaining flows of water leaving Kensico Reservoir at turbidity levels of 1.5 nephelometric turbidity units (NTU) or less during the RWBT shutdown. In order to achieve this objective, DEP will advance a proactive approach to safeguarding the system from a turbidity event and maintain compliance with the Surface Water Treatment Rule (SWTR) and Filtration Avoidance Determination (FAD) during the RWBT shutdown. Therefore, alum will be applied during the RWBT shutdown to sufficiently address turbidity, as necessary, for the full capacity of Catskill Aqueduct flow.

DEP's Operation Support Tool (OST) was used to estimate potential alum application to water in the Catskill Aqueduct upstream of Kensico Reservoir to maintain baseline turbidity effluent levels of 1.5 NTU or less in water leaving Kensico Reservoir during the RWBT shutdown. Modeling used a reasonable worst-case range of turbidity levels in flow within the Catskill Aqueduct between 2.0 and 3.0 NTU. Results of OST modeling, included as part of the Water for the Future Program: Upstate Water Supply Resiliency EIS, indicated that the median value of the total mass of alum application required during the RWBT shutdown could range between five and seven million pounds, for alum application triggers of 3.0 and 2.0 NTU in Catskill Aqueduct flows, respectively.[5] Additional alum application will also be required during brief periods of aqueduct start-up after shutdowns associated with the CAT-RR project, a component of the WFF Program.

As shown in **Table 8.2-2,** there have been approximately 29 million pounds of dry solids deposited in Kensico Reservoir due to historical application of alum to water in the Catskill Aqueduct upstream of Kensico Reservoir since 2005. As discussed previously, the application of alum creates a settleable floc consisting of naturally-occurring suspended solids in water from Ashokan Reservoir and aluminum hydroxide. DEP completed sediment sampling immediately following the April 2005 alum application event that initially determined the ratio of alum floc solids to naturally-occurring sediment was approximately four percent. Additional samples collected in September 2005 determined a solids

[5] The alum trigger in OST is the turbidity level at which DEP decides to apply alum. The range of potential alum triggers used during the RWBT shutdown was determined by prior laboratory analyses.

concentration of alum floc between 7 to 12 percent. As shown in **Table 8.2-3,** assuming an *in-situ* average solids concentration of 10 percent, the total *in-situ* sediment volume that would need to be dredged to remove alum floc deposited in Kensico Reservoir since the 2005 events through completion of repairs to the RWBT would be approximately 91,000 to 98,400 cy.

Table 8.2-3. Estimated Total Sediment Volume

Alum Application	Total Sediment Volume (Cubic Yards)
April 2005 through May 2012 Events	71,600
Potential Application due to a storm event prior to the RWBT Shutdown[1]	0 to 700
In accordance with the WFF Alum Treatment Plan (ATP)[2]	19,400 to 26,100
Total	**91,000 to 98,400**

Notes:

[1] The occurrence of alum application due to a storm event leading up to the RWBT shutdown would be rare, with alum application potentially necessary to address episodic turbidity. Removal of an additional 700 cy of sediment from the CATIC Cove was evaluated as part of the discussion of environmental considerations of dredging in this EIS.

[2] The sediment volume from application of alum in accordance of the WFF ATP includes application of alum during the RWBT shutdown and during brief periods of aqueduct start-up after shutdowns associated with the CAT-RR project. Total potential sediment volume was estimated using OST.

DREDGING TECHNOLOGY

Dredging is the removal of sediments and/or debris from the bottom of lakes, rivers, harbors, and other waterbodies. It is a routine practice in many waterways around the world to address naturally-occurring sedimentation – the natural process of sand and silt washing downstream that can gradually fill channels, harbors, and other waterbodies. Dredging often is focused on maintaining or increasing the depth of navigation channels, anchorages, or berthing areas to ensure the safe passage of boats and ships, as vessels require a certain amount of water in order to operate.

Dredging may be conducted through the use of a range of technologies which can be broadly categorized as mechanical or hydraulic dredging. Mechanical dredging typically involves the use of heavy equipment located at the shoreline or on a barge to remove sediment and/or debris through the use of a clamshell bucket or a hydraulic excavator. Mechanical dredging is preferred when dredging may encounter a range of materials from silt and sand to rocks and debris. However, mechanical dredging can result in more sediment resuspension during dredging as the bucket "digs" the material to be removed or when the material is being lifted through the water column unless a water-tight environmental bucket is used. Mechanical dredging also requires additional equipment (e.g., excavators, work boat, trucks) thereby resulting in more emissions and a larger upland footprint to allow for placement of equipment within the waterbody, unloading of materials and truck queuing areas. Dredged material is typically placed in barges

that must be transported to a shoreline location where the material can be offloaded from the barge by excavators for treatment and/or transported to a beneficial reuse or disposal location.[6]

In contrast, hydraulic dredging does not involve the use of a bucket, but instead typically removes materials through suction, similar to a vacuum. Hydraulic dredges are often self-propelled and can be moved easily from one area to another, as opposed to barge-mounted mechanical dredges that require a work boat to move. Hydraulic dredging generally results in less resuspension of sediments and is more suited for the removal of fine silt and sediment. Hydraulic dredging also allows for the use of temporary hoses or pipelines that pump a mixture of dredged material and water to an upland area for processing and/or disposal, thereby eliminating the need to load and unload barges and trucks.

While all forms of dredging would resuspend particles into the water column, use of a self-propelled hydraulic dredge would reduce potential resuspension as compared to mechanical dredging. Other hydraulic dredges, such as a cable and/or spud driven cutterhead dredge or an anchor and cable-driven horizontal auger dredge, would result in disturbance of the Reservoir bottom during dredge repositioning and/or dragging of spuds and anchors. Mechanical dredging would be more difficult to effectively dredge the low density and fine alum floc material, resulting in increased turbidity and sediment resuspension. Likewise, mechanical dredging would require the use of additional equipment in the Reservoir, including a work barge, several dredged material barges and a work boat. Mechanical dredging would therefore result in increased emissions, as well as the double and triple handling of dredged materials. As such, use of a self-propelled hydraulic dredge has been identified as the preferred method and is discussed in more detail below.

Hydraulic Dredging

The proposed alum floc removal would be performed through the use of a hydraulic dredge. The hydraulic dredge would be a floating dredge that uses a diesel-powered pump to draw sediment into a hose or pipe, similar to a large vacuum (see **Photograph 8.2-1**). The dredge would likely be a small or medium class portable dredge that would require an on-board operator. The dredge would have a cutter head, which is a rotating blade that sits on a horizontal axis perpendicular to the suction intake to dislodge the sediment while simultaneously suctioning the material into a pipe or hose. The cutter head can be raised or lowered to allow for dredging to a specific depth. The suctioned sediment/water mixture, referred to as slurry, would then be pumped through a hose that would connect to the proposed upland temporary pipelines for transport to the dewatering facility at the dewatering site. The dredged material slurry would be comprised of alum floc, naturally-occurring sediment, and reservoir water.

This type of dredge has a production rate for the removal of dredge material of up to 5,000 gallons per minute (gpm) and can reach up to approximately 30 feet below the water surface.

Assuming an *in-situ* average solids concentration of ten percent, the dredged flow would have a solids concentration of approximately two percent (5:1 water to solids ratio). At a flow rate of 0.5 million gallons per day (MGD) the dry solids dredging rate would be approximately 3,500 pounds per hour, or approximately 28,000 pounds per day based on a ten-hour operating shift. The amount of dredged material that is produced per day would depend on the method of dewatering and the dredge selected by the contractor. A total of approximately 540 to 600 working days would be needed to dredge the estimated 91,000 to 98,400 cubic yards of material or approximately 27 to 30 months in total.

[6] J. Herbich. *Handbook of Dredging Engineering,* 2000*;* USACE. *Dredging and Dredged Material Management,* EM 1110-2-5025, July 31, 2015.

Photograph 8.2-1. Example of a Hydraulic Dredge

A temporary turbidity curtain would be installed with a boat prior to dredging activities. The curtain would be located at the limits of the proposed future dredge area and would limit potential impacts within the Reservoir from the resuspension of sediments during dredging. The curtain would enclose and isolate the work area and extend from shore to shore and from the water surface to the bottom of the Reservoir. The turbidity curtain would be anchored by steel boat anchors positioned on the Reservoir bottom approximately every 50 feet to secure the curtain and maintain its position in the Reservoir. The turbidity curtain would remain in place until all dredging activities (e.g., dredging, dewatering) are fully completed and would then be removed.

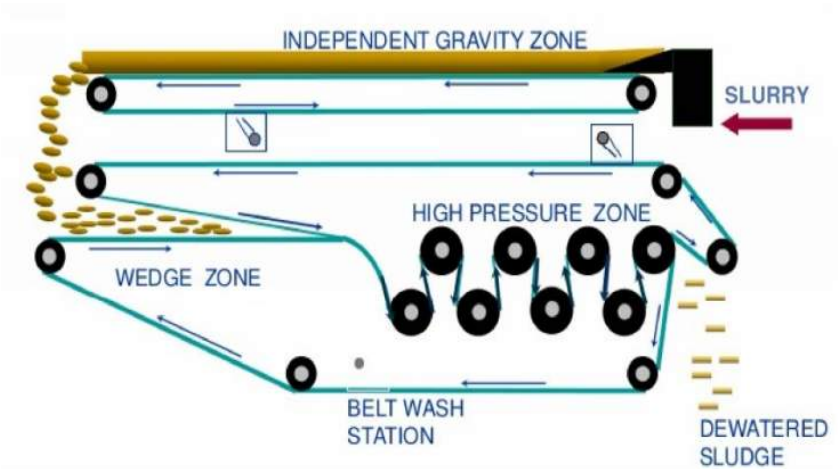
DEWATERING

As noted previously, hydraulic dredging creates a slurry comprised of dredged materials and water to facilitate transport by a pipeline. Dredged materials associated with hydraulic dredging, therefore, typically have a high water content. As a result, materials would need to be dewatered to facilitate management and transport to off-site facilities. Dredged material would be pumped by feed pumps from the dredging location to a temporary upland dewatering and treatment facility at the dewatering site. The dewatering process would produce material that is more suitable for transport and disposal.

Several dewatering alternatives were explored, including thickening, mechanical dewatering (e.g., belt filter and plate and frame presses) and the use of Geotubes®. The most effective method to dewater the material was determined to be a combination of thickening through the addition of a flocculent with

mechanical dewatering using belt filters and presses. A belt filter press is typically made up of a series of mechanical equipment that use belts and rollers to physically remove water from the slurry to produce a dry solid (see **Photograph 8.2-2)**. A typical belt filter press system consists of pumps that feed the slurry to the system, a thickening agent feed system, a slurry conditioning tank, a belt filter press, a conveyor for the dry solids and supporting equipment such as washwater pumps and air compressors. The press is typically divided into zones for chemical conditioning (i.e., addition of a thickening agent such as a flocculent), and water removal zones including the belts that remove excess water through gravity and compression rollers that "squeeze" the water out of the material. As part of the dredging-related activities, the slurry would initially be conditioned with a chemical flocculent to thicken the mixture and make it easier to move through the system. After the flocculent is added, the material would move to a conditioning tank and then to a belt that would move the sediment along and allow excess water to separate from the sediment by gravity. The material would then be moved to the belt presses that would compress the material to remove excess water. The compressed material would then be scraped off the belt and collected into water-tight bins capable of holding 20 cy of material. The bins would then be loaded onto trucks for transport and disposal at a licensed facility. The collected material would be tested prior to disposal in accordance with applicable federal, State, and local requirements to confirm that it is nonhazardous.

It is anticipated that a large trailer-mounted belt filter press would be used at the dewatering site (see **Photograph 8.2-3**). The large presses are approximately 6.5 feet to 8 feet wide on a trailer that is approximately 30 feet long. These systems are typically capable of producing approximately 3,000 pounds of dry solids per hour. It is estimated that three belt filter press units would be used. Assuming 8 hours of operation per day, approximately 72,000 pounds of dry solids would be processed per day using all three units.



Photograph 8.2-2. Typical Schematic of a Belt Filter Press[7]

Photograph 8.2-3. Typical Trailer-mounted Belt Filter Press[8]

[7] Image courtesy of Ashbrook Simon-Hartley.

[8] Image courtesy of SeaBright Products, LLC.

The dewatering and treatment system would result in the production of a dewatered dredged material suitable for off-site transport (i.e., a material with a higher solids concentration) and filtrate water. The filtrate water extracted from the dredged material would be collected in temporary storage tanks. The filtrate would be pumped to the CATIC site through a temporary pipeline for discharge to the Reservoir within the area enclosed by the temporary turbidity curtain.

DISPOSAL OF DREDGED MATERIAL

The dewatering process would produce material that is more suitable for transport and off-site disposal. The solid byproduct or filter cake from the dewatering process would be transferred by belt conveyors to water-tight containers. The containers would then be transported by truck to an off-site disposal location. The filter cake would be regulated as a solid waste requiring upland disposal at a licensed facility or may potentially be suitable for a beneficial reuse dependent upon the nature of the final filter cake. Management and transport of these materials would be in accordance with applicable federal, State, and local regulations.

8.2.3 SCHEDULE

The anticipated duration of construction, including mobilization, site preparation, dredging and demobilization is between 31 and 34 months (see **Table 8.2-4**). The anticipated duration of active dredging and dewatering is approximately 27 to 30 months. Dredging would occur Monday through Friday, ten hours per day; generally from 8:00 AM to 6:00 PM. Dewatering activities would also occur Monday through Friday, eight hours per day based upon the use of three dewatering treatment units.

Table 8.2-4. Construction Schedule

Activity	Estimated Duration (Months)[1,2]
Site Preparation	3
Dredging and Dewatering	27 to 30
Site Restoration	1
Total	**31 to 34**

Notes:
[1] Duration is based on the assumption that approximately 91,000 to 98,400 cubic yards (cy) of sediment would be dredged.
[2] Construction schedule may be extended, if needed, due to cold weather delays.

8.3 POTENTIAL IMPACTS AND BENEFITS OF THE PROPOSED ACTION ON THE KENSICO RESERVOIR STUDY AREA

8.3.1 WATER RESOURCES AND WATER QUALITY

This section presents the assessment of the potential for significant adverse impacts from delaying the dredging of alum deposits at Kensico Reservoir and identifies environmental considerations associated with the dredging of these deposits on water resources and water quality within the Kensico Reservoir study area. Water resources within the Kensico Reservoir study area include surface water and floodplains.

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the Proposed Action includes the delay of dredging, but this is not expected to result in any substantive impacts to water resources and water quality. However, dredging activities in the future would present specific environmental effects that warrant consideration within the overall context of the Proposed Action and these are therefore also discussed within this section.

BASELINE CONDITIONS

The study area for the water resources and water quality assessment includes one-quarter mile radius around the CATIC site and the potential location for a dewatering facility near Westlake Drive (dewatering site), as well as 400 feet on either side of two temporary pipelines that would be installed between the CATIC and dewatering sites (**Figure 8.3-1**).

This section describes the baseline water resources in the study area including: a description of the surface water in the study area; water quality in Kensico Reservoir; causes of turbidity including geological conditions, and the history of turbidity events and alum application; and a description of areas of alum floc deposition in Kensico Reservoir. Mapped floodplains within the Kensico Reservoir study area are also described.

SURFACE WATER

Kensico Reservoir consists of the main western basin and the eastern Rye Lake basin, where water freely passes between the two sections. The Reservoir has a drainage area of approximately 13 square miles that includes portions of the Town of Harrison, Town of Mount Pleasant, and Town of North Castle in Westchester County, New York, and a small portion of Fairfield County, Connecticut. In addition, several perennial and intermittent streams are part of the watershed. The Reservoir receives most of its inflow from the Delaware and Catskill Aqueducts. Water enters the Reservoir through the CATIC and Delaware Aqueduct's Shaft 17 (DEL17). Water leaves the Reservoir through the Catskill Upper Effluent Chamber (UEC) and the Delaware Aqueduct's Shaft 18 (DEL18). Under typical operations, DEP manages diversions into the Reservoir via the Catskill and Delaware Aqueducts and diversions out of the Reservoir via the Delaware Aqueduct and balances these diversions with natural inflow. Releases from Kensico Reservoir are not required, and the Reservoir is operated such that it does not spill.

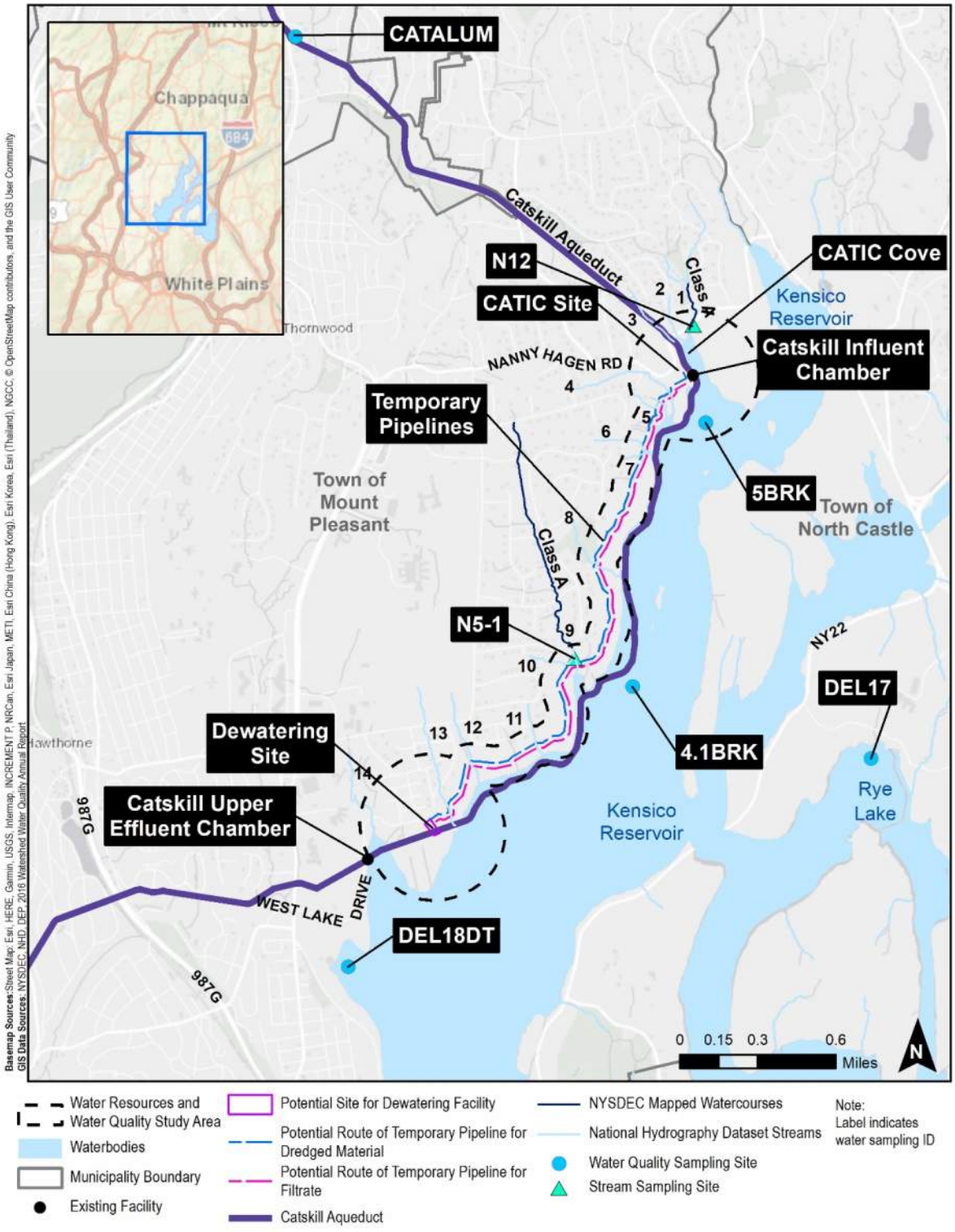


Figure 8.3-1
Kensico Reservoir Study Area
Surface Water Locations and Water Quality Sampling Stations

Kensico Reservoir has an areal extent of approximately 2,145 acres and a maximum depth of approximately 144 feet. It is classified as Class AA by NYSDEC. Best usages of Class AA waters are: as a source of water supply for drinking, culinary, or food processing purposes; primary and secondary contact recreation; and fishing. Kensico Reservoir presently meets these designated uses. The Reservoir is classified as a Lacustrine Limnetic, Unconsolidated bottom permanently flooded, Impounded deep water habitat (L1UBHh) by the United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) (Cowardin et al., 1979).[9] Within the study area, there are two NYSDEC-mapped, unnamed watercourses that flow to Kensico Reservoir. These two watercourses are not mapped as wetlands and are designated as Class A waters by NYSDEC. Class A waters have a best usage as a source of water supply for drinking, culinary, or food processing purposes; primary and secondary contact recreation; and fishing. Twelve additional watercourses within the study area have been mapped by the U.S. Geological Survey (USGS) National Hydrography Dataset. All 14 watercourses flow into Kensico Reservoir and are located within forested riparian systems, with intermittent to perennial flow. These watercourses are mapped by the NWI as Freshwater (Palustrine) Forested/Shrub wetlands and Riverine wetlands with seasonally flooded water regimes. More information can be found within Section 8.3.3, "Wetlands." Surface water monitoring locations within the Kensico Reservoir study area are shown on **Figure 8.3-1**.

WATER QUALITY

Streams and reservoirs within the Catskill watershed can be prone to high levels of turbidity as a consequence of the region's underlying geology. High flows, associated with extreme precipitation events, can scour stream beds and destabilize stream banks, thereby exposing fine glacial clay deposits that, when eroded, can cause high levels of turbidity in the City's water supply system. DEP designed the Catskill System to address turbidity using various operational techniques to allow particles to settle within the Schoharie Reservoir, Ashokan Reservoir West Basin, Ashokan Reservoir East Basin, and the upper reaches of Kensico Reservoir. The Catskill turbidity control measures are outlined in Section 1.3, "Turbidity Control Measures." Wave and wind-driven erosion also cause shoreline destabilization that can influence turbidity levels in Kensico Reservoir during episodic turbidity events. When turbidity in water from Ashokan Reservoir becomes high enough after episodic turbidity events to present a risk that Kensico Reservoir effluent quality might exceed the 5 NTU turbidity limit set by the SWTR, alum application is necessary as a turbidity control measure. While Delaware System diversions typically have low turbidity, turbidity can be elevated in the Delaware System as well. Therefore, DEP has to balance turbidity of water that enters Kensico Reservoir to maintain drinking water quality compliance.

Since the Catalum SPDES Permit was issued, three alum application events have occurred. Refer to Section 1.2.5, "Alum Application and Ashokan Release Channel Use," for more information.

Previous studies of alum application in lake management and its long-term effects on water quality have been investigated. These studies have found improvements in surface water quality following alum application, similar to results from Kensico Reservoir alum application (Huser et al., 2011)[10] (Smeltzer et al., 2009)[11] (Steinman and Ogdahl, 2008).[12] The North American Lake Management Society

[9] Cowardin, L.M., V. Carter, F.C. Golet, E.T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Department of the Interior.

[10] Huser, B., P. Brezonik, and R. Newman. 2011. Effects of Alum Treatment on Water Quality and Sediment in the Minneapolis Chain of Lakes, Minnesota, USA. Lake and Reservoir Management, 27:220-228, 201.

[11] Smeltzer, E., R.A. Kirn, and S. Fiske. 2009. Long-term Water Quality and Biological Effects of Alum Treatment of Lake Morey, Vermont. Lake and Reservoir Management, 15: 173-184.

(NALMS) also indicates alum is a safe and effective lake management technique and is an appropriate tool to accomplish meaningful water quality objectives (NALMS, 2004).[13]

Kensico Reservoir and Tributaries Monitoring

DEP monitors water quality in Kensico Reservoir and its tributaries by regularly sampling physical, chemical, and microbiological parameters in accordance with the DEP Watershed Water Quality Monitoring Plan (WWQMP). There are eight stream and ten reservoir water quality sampling sites. There are three water quality sampling sites that are representative of water quality entering and diverted from Kensico Reservoir via the Catskill and Delaware Aqueducts, which are CATALUM, DEL17, and DEL18DT (**Figure 8.3-1**).

Kensico Reservoir water quality in 2017 (corresponding to the most recent Watershed Water Quality Annual Report [WWQAR]) was excellent overall, and met the SWTR limits for both fecal coliform and turbidity. The 2017 WWQAR includes turbidity summary statistics for routine sampling conducted at three Kensico Reservoir sampling locations: CATALUM, DEL17, and DEL18DT. The CATALUM and DEL17 influent locations are representative of water quality entering Kensico Reservoir via the Catskill and Delaware Aqueducts, respectively. The DEL18DT effluent location is representative of the quality of Kensico Reservoir water that enters the Delaware Aqueduct at a point just prior to disinfection; and where this water ultimately enters the City's distribution system. DEP uses results from all three locations as an indicator of water quality that enters and is diverted from Kensico Reservoir, which is used to optimize operational strategies to provide the highest possible quality of water leaving the Reservoir. Turbidity summary results for 2017 for these three monitoring locations are shown in **Table 8.3-1**.

Table 8.3-1. Kensico Reservoir Sampling Turbidity Results from January 1, 2017 to December 31, 2017

Analyte	Sampling Location	Median	Single Sample Maximum
Turbidity (NTU)	CATALUM	1.8	4.8
	DEL17	0.8	2
	DEL18DT	0.8	1.8

The 2017 WWQAR also includes turbidity and total suspended solids (TSS) summary statistics for two water quality monitoring locations on tributaries to Kensico Reservoir which are located in the Kensico Reservoir study area: N12 and N5-1 (**Figure 8.3-1**). DEP continues to conduct a fixed-frequency, typically monthly, monitoring program of stream sites in the Kensico watershed. Turbidity and TSS summary statistics for 2017 for these two water quality monitoring locations on Stream N12 and Stream N5-1 are shown in **Table 8.3-2**.

[12] Steinman, A.D. and M. Ogdahl. 2008. Ecological Effects after an Alum Treatment in Spring Lake, Michigan. Journal of Environmental Quality, 37:22-29.

[13] North American Lake Management Society (NALMS). 2004. The Use of Alum for Lake Management: Position Statement.

Table 8.3-2. 2017 TSS and Turbidity Summary Statistics for Kensico Watershed Streams N12 and N5-1

Analyte	Site	Number of Samples	Minimum	25th Percentile	Median	75th Percentile	Maximum
TSS (mg/L)	N12	12	<1.0	<1.0	<1.0	2.7	45.3
	N5-1	12	<1.0	<1.0	2.7	3.3	61.2
Turbidity (NTU)	N12	13	0.3	0.5	0.6	1.0	6.2
	N5-1	12	0.7	1.8	2.2	3.1	65

DEP also collects samples from within Kensico Reservoir for water quality compliance monitoring. During 2017, DEP collected turbidity samples at two locations within or adjacent to the Kensico Reservoir study area (**Figure 8.3-2)**. The summary statistics for turbidity samples collected at locations, 4.1BRK and 5BRK, are shown below in **Table 8.3-3**.

Table 8.3-3. 2016 Turbidity Summary Statistics for Kensico Reservoir Sampling Sites 4.1BRK and 5BRK

Analyte	Site	Number of Samples	Minimum	Median	Mean	Maximum	Standard Error of Mean
Turbidity (NTU)	4.1BRK	103	0.50	0.90	0.97	2.20	0.03
	5BRK	33	0.35	1.40	1.43	2.80	0.09

As per the 2017 Watershed Water Quality Annual Report, during 2017, there were no large storm events that affected the water quality of influent or effluent locations of Kensico Reservoir. Short term turbidity increases were attributed to changes in reservoir operations and/or runoff associated with rainfall events.

Aluminum is a component of alum floc and under conditions of extreme pH, such as a pH less than 5.5 or higher than 8.0, has the potential to be re-released into the Reservoir water column. Based on long-term water quality investigations conducted by DEP, no significant adverse impacts to water quality related to aluminum are known to have resulted from alum application. The water quality characteristics of Kensico Reservoir, as discussed further below, are not suitable to support the bioavailability of aluminum within Reservoir waters. DEP conducts continuous monitoring for temperature, pH, conductivity, and turbidity at three locations. Since the issuance of the Catalum SPDES Permit, DEP implemented enhanced monitoring to ensure the regulatory compliance of water entering the distribution system during alum application. Based on this monitoring, as well as prior data collected and/or summarized by Driscoll et al. (2014),[14] reservoir pH and acid-neutralizing capacity do not support aluminum toxicity in Kensico Reservoir. More recent pH data collected by DEP confirms this remained the case during periods of alum application (2011 to 2012) and periods without (2016 to 2017). While alum deposition has occurred on bottom sediments, this has not impaired the achievement of Class AA best usages. Periodic alum application in the Reservoir for nearly 100 years has caused no substantive impact to water quality as water quality standards are generally achieved.

[14] Driscoll, C.T., A. Lee, M. Montesdeoca, D.A. Matthews and S.W. Effler. 2014. Mobilization and Toxicity Potential of Aluminum from Alum Floc Deposits in Kensico Reservoir, NY. Journal of the American Water Resources Association, 50:143-152.

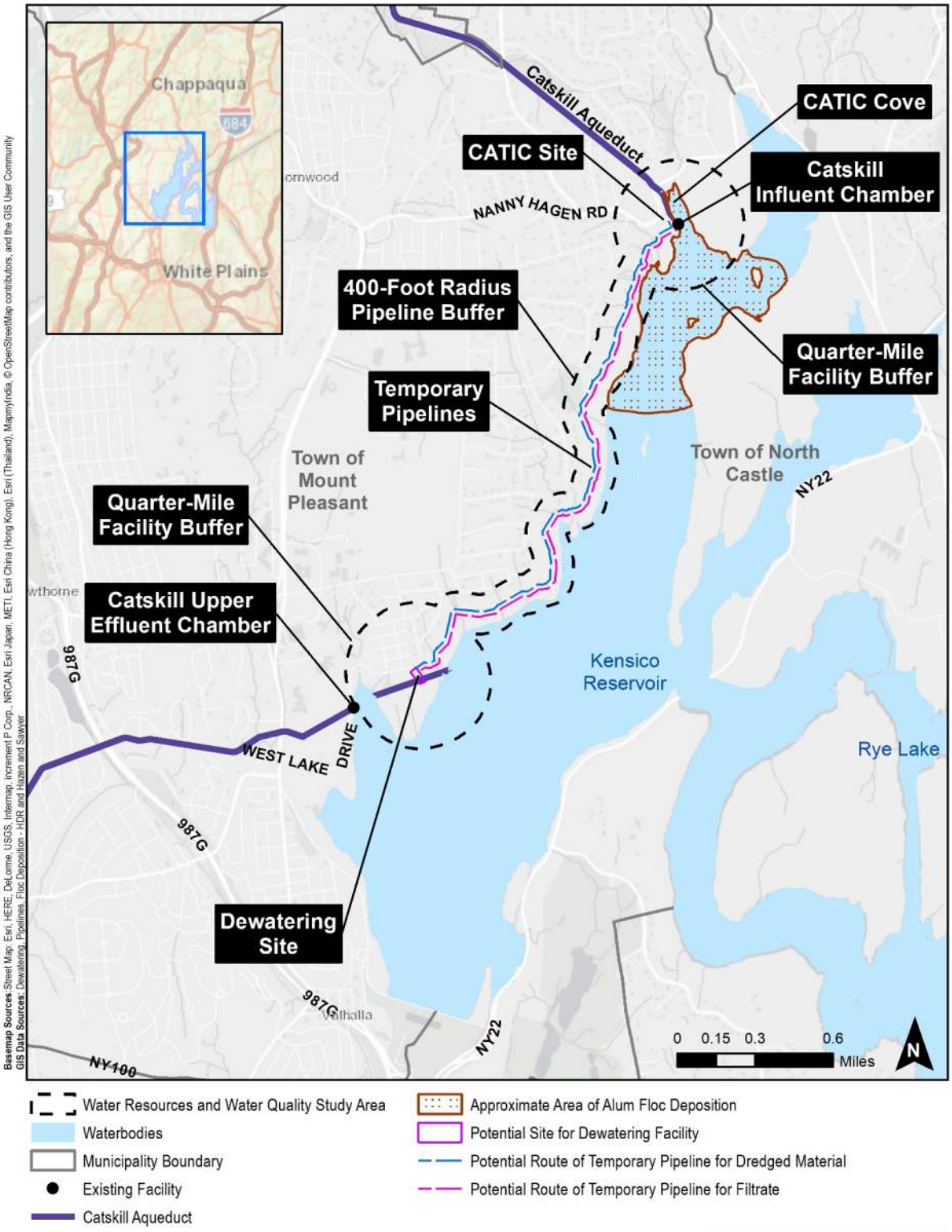


Figure 8.3-2
Kensico Reservoir Study Area
Alum Floc Deposition Area

SEDIMENT QUALITY

DEP has historically applied alum to water diverted from Ashokan Reservoir to Kensico Reservoir when the turbidity in Ashokan Reservoir is elevated. From 1981 through 2006, there were multiple storm events that resulted in episodic turbidity events.

DEP completed a number of technical investigations and modeling studies to determine the estimated location of alum floc deposition along the bottom of Kensico Reservoir to provide a scientific basis for the quantity of alum floc deposits that would need to be removed to meet the narrative water quality standards for suspended, colloidal, and settleable solids in Kensico Reservoir.

Bathymetric and sediment surveys conducted in the area of CATIC Cove in 2006 and November 2014, as summarized in CR Environmental (2015),[15] were used to estimate the existing area and thickness of alum floc deposition within Kensico Reservoir (**Figure 8.3-2**). The thickness of deposited alum was estimated to range between six to ten feet. Southeast of the CATIC at the mouth of CATIC Cove, the thickness was estimated to be approximately 7.5 feet. In between the two small islands located within the main reservoir, the maximum thickness was estimated at approximately 8.6 feet. A comparison of bathymetric surveys conducted in 2006 and 2014 showed deposition of sediment that resulted in an increased thickness of one to five feet over a 1.9-acre area adjacent and southeast of the CATIC Cove inlet chamber area.

FLOODPLAIN

Information regarding floodplains was extracted from the Federal Emergency Management Agency (FEMA) Flood Map Service Center (FIRM numbers 36119C0257F; 36119C0259F; 36119C0276F; dated September 28, 2007). A FEMA-designated 100-year floodplain (Zone A) is present around Kensico Reservoir, which depicts areas with a one percent chance of inundation in any given year (**Figure 8.3-3)**. Areas within Zone A are within the Special Flood Hazard Area and are subject to local flood zone management regulations (see Section 8.3.5, "Public Policy, Land Use, and Zoning").

In addition, as discussed in the Water for the Future: Upstate Water Supply Resiliency FEIS, a review of flood maps did not indicate that there are any FEMA-designated floodways located within the Kensico Reservoir study area. A regulatory floodway is the channel of a river or other watercourse and the adjacent land areas that must be reserved from development in order to discharge the base flood without cumulatively increasing water surface elevations more than a designated height.

FUTURE WITHOUT THE PROPOSED ACTION

In the future without the Proposed Action, Kensico Reservoir would continue operations similar to baseline conditions. DEP has consulted with the Town of Mount Pleasant and Westchester County, and DEP has not been informed of any upcoming projects or developments that would alter water resources within the Kensico Reservoir study area. However, DEP will be implementing its KEC Project in the future without the Proposed Action. As discussed, the KEC Project will construct a new tunnel between Kensico Reservoir and the Catskill/Delaware UV Disinfection Facility. The KEC Project would involve multiple elements, including work within and adjacent to Kensico Reservoir in proximity to the proposed dewatering site.

[15] CR Environmental, Inc. 2015. Kensico Reservoir Geophysical and Aluminum Sampling Program: 2014 Sediment Grab, Vibracore Collection & Bathymetric Survey, Westchester County, NY.

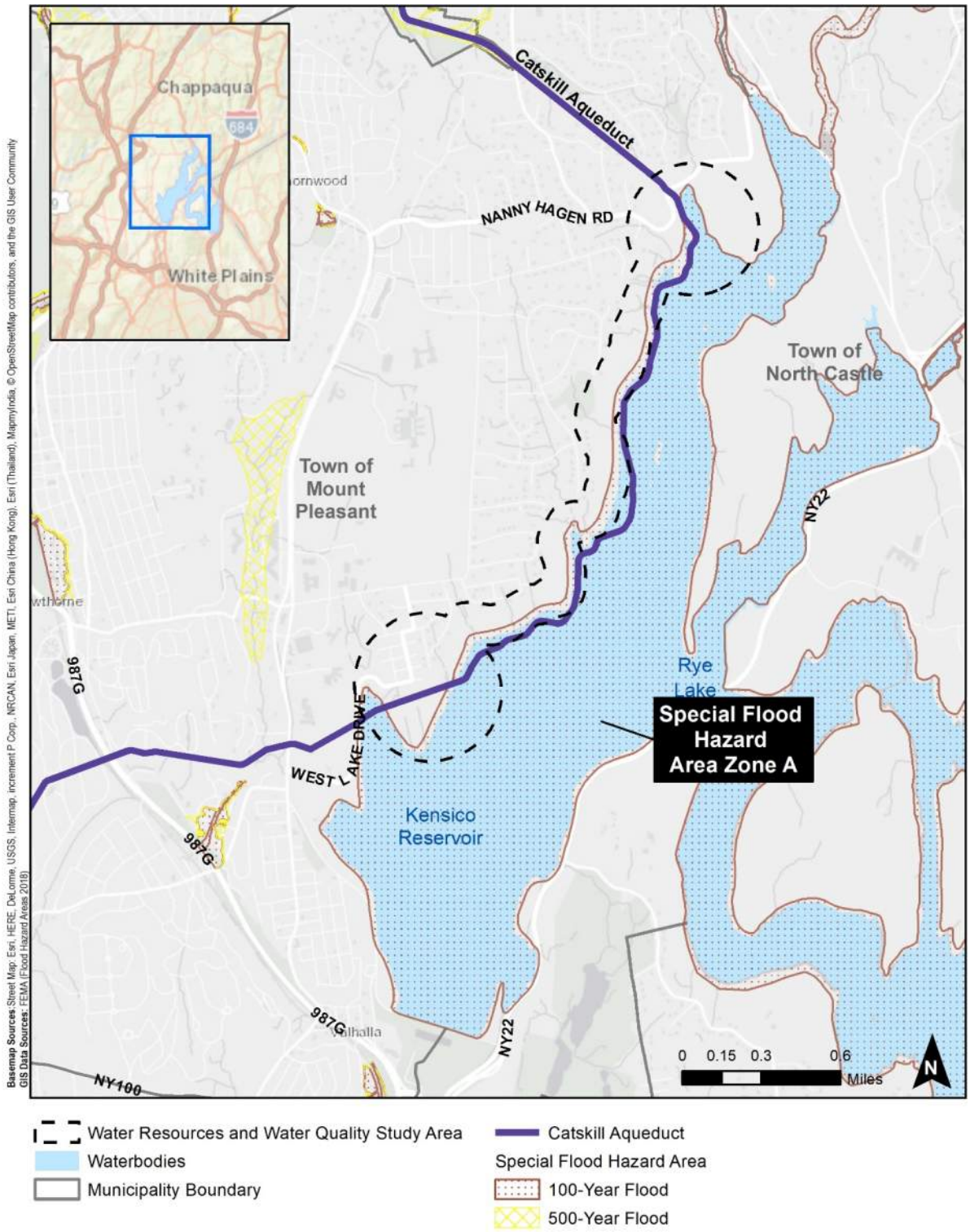


Figure 8.3-3
Kensico Reservoir Study Area
Flood Zones

These activities would all occur south and west of the proposed dewatering site and alum floc deposition area.

In the future without the Proposed Action, the deposited alum would remain in place, and no dredging would take place. For the future without the Proposed Action, it is anticipated that reliance on alum application would be reduced due to additional infrastructure projects that improve DEP's ability to decrease the flow magnitude of Catskill Aqueduct diversions (e.g., replacement of stop shutters in the Catskill Aqueduct upstream of Kensico Reservoir, the Catskill/Delaware Interconnection at Shaft 4, and completion of repairs to the RWBT). These infrastructure projects would minimize the transfer of turbid waters into Kensico Reservoir.

Alum usage has occurred periodically at Kensico Reservoir for many years to maintain water quality standards and to achieve Class AA best uses, while causing no adverse effects to public health or the environment as evidenced by the extensive, long-term water quality monitoring conducted by DEP. Furthermore, alum application is a widely accepted lake management practice that has not been shown to result in either direct or indirect significant adverse effects to water quality (or to natural resources or public health). As a result, no adverse impacts from existing alum floc or the addition of new floc in the future without the Proposed Action is expected.

FUTURE WITH THE PROPOSED ACTION

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging would not result in any substantive or significant impacts to water resources and water quality. Advancement of dredging and supporting activities in the future would however encompass elements that warrant further environmental consideration as summarized below.

Due to limited available upland area for staging, the dewatering operations would be located 2.3 miles to the southwest of the CATIC site and require the installation of temporary pipelines between the CATIC and the dewatering sites. A description of the anticipated dredging activities is provided in the Project Description (Section 8.1, "Kensico Reservoir Project Description").

While engineering controls would be used during the dredging of alum floc within Kensico Reservoir in the future, dredging would introduce equipment and activities that would result in disturbance that would increase turbidity to the Reservoir. As a result, the work would pose some risk to DEP's ability to meet the stringent site-specific filtration avoidance criteria of their FAD that allows the City to comply with the SWTR. Potential changes to water quality would be associated with a temporary increase in turbidity and sediment resuspension which could occur during dredging. A temporary turbidity curtain would be installed by boat prior to commencement of dredging activities. The curtain would be located at the limits of the future proposed dredge area to limit potential transport of resuspended sediments in the water column during dredging into other areas of the Reservoir. The curtain would enclose and isolate the work area and extend from shore to shore and from the water surface to the bottom of the Reservoir. The curtain would be maintained in place for the duration of all dredging activities. DEP or its agents would periodically inspect the boom over the duration of construction and repair and maintain as necessary. The curtain would limit temporary changes in turbidity to the immediate vicinity of any dredging thereby limiting effects upon the continuing use of Kensico Reservoir as a drinking water supply (see Section 9, "Project-Wide Impact Assessment: Public Health").

During construction of the dewatering facility and temporary pipelines, stormwater runoff to surface water could occur. However, stormwater runoff would be managed in accordance with applicable requirements, including a Soil Erosion and Sediment Control Plan that would be prepared as part of the project. Prefabricated structures for air vents and drainage valves would be installed along the temporary pipelines and would have the potential for discharge to the streams that cross the pipeline route. However, these air vents and drainage valves would be drained only when necessary. Construction best

management practices (BMPs) would be followed by the contractor to contain and/or limit any discharge from the pipelines.

Any proposed construction, dredging, and dewatering activities would be temporary. However, dredging would result in changes to water quality associated with elevated levels of turbidity that would not otherwise occur in the future without the Proposed Action, where existing alum floc deposits would be left in place. The direct effects of elevated turbidity levels within the potential dredging area to water resources and water quality would need to be evaluated, as well as an assessment of environmental considerations with regard to fish and benthic invertebrate organisms and their habitat in comparison to the future without the Proposed Action (see Section 8.3.2, "Aquatic (Fish and Benthic) Resources"). Upon further advancement of the design, duration, and extent of dredging and the development of a more detailed plan for dredging-related activities, additional assessment of potential environmental effects to water quality would be completed, as necessary, including potential cumulative effects with work that may be associated with the KEC Project.

8.3.2 AQUATIC (FISH AND BENTHIC) RESOURCES

This section presents the assessment of the potential for significant adverse impacts from delaying the dredging of alum deposits at Kensico Reservoir and identifies environmental considerations associated with the dredging of these deposits on benthic communities, fish, and submerged aquatic vegetation (SAV) that would potentially be present within water resources of the Kensico Reservoir study area.

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the Proposed Action includes the delay of dredging, but this is not expected to result in any substantive impacts to aquatic resources. However, dredging activities present specific environmental considerations that warrant further discussion within the overall context of the Proposed Action and these are therefore also discussed within this section.

BASELINE CONDITIONS

This section summarizes the results of past studies in Kensico Reservoir and additional related studies within the regional watershed to establish aquatic resources that are or may be present in Kensico Reservoir.

PLANKTON, ALGAE, AND SUBMERGED AQUATIC VEGETATION

Phytoplankton are photosynthesizing organisms that inhabit the upper sunlit layer of most waterbodies. Kensico Reservoir is typically mesotrophic[16] with low primary productivity. DEP has not conducted targeted surveys for phytoplankton or SAV at Kensico Reservoir; however, a review of studies from other representative lakes and reservoirs in the region was conducted. Algal phytoplankton occurring in Kensico Reservoir may include green algae (Division: Chlorophyta), blue-green algae (Phylum: Cyanobacteria), yellow-green algae (Class: Xanthophyceae), golden brown algae (Class: Chrysophyceae), cryptomonads (Family: Cryptomonadinaceae), dinoflagellates (Class: Dinophyceae), euglenoids (Class: Euglenophyceae), brown/red algae (Division: Phaeophyta), and diatoms (Division: Chrysophyta) (Principe, 1991).[17] Phytoplankton represent an important food source for zooplankton and fish. Phytoplankton distribution within a waterbody is influenced by the depth of light penetration, temperature, and nutrient availability. Zooplankton are aquatic invertebrates that are suspended in the

[16] Moderately enriched with nutrients.

[17] Principe, M.A. 1991. Temporal Variation and Spatial Heterogeneity of Phytoplankton Abundance within a Water Supply Impoundment. City University of New York. Graduate Dissertation.

water column, generally comprised of rotifers (Phylum: Rotifera), copepods (Subclass: Copepoda), and cladocerans or water fleas (Suborder: Cladocera). Zooplankton include herbivores that feed on phytoplankton and algae and predators which feed on other animals. Zooplankton are an important food source for fish species such as alewife (*Alosa pseudoharengus*), waterfowl, and other larger animals (EPA, 1983).[18] Such "top-down" foraging can strongly influence the seasonal abundance of reservoir phytoplankton communities (Wetzel, 1983).[19]

Macrophytes (higher plants) include SAV and emergent/floating macrophytes, and serve as breeding, feeding, and nursery grounds for fish, mammals, waterfowl, and invertebrates. Additionally, macrophytes stabilize bottom sediments by binding them and reducing wave action (EPA, 1983). Many submerged macrophytes tend to grow in thick mats through the summer before dying back in the fall when water temperatures cool. In addition, thick beds of macrophytes can trap large amounts of decomposing organic material; both of these processes can result in low dissolved oxygen (DO) levels. Floating and submerged macrophyte species typical of lakes and reservoirs within the region include water lilies (*Nuphar* spp.), water-milfoil (*Myriophyllum* spp.), bladderwort (*Utricularia* spp.), pipewort (*Eriocaulon* spp.) and duckweed (*Lemna* spp.).

BENTHIC INVERTEBRATES

Benthic invertebrates are organisms that live in or on the bottom sediments of a waterbody. The benthic invertebrate community is strongly influenced by its environment, including sediment composition and quality, water quality, and hydrological factors that may affect the physical habitat. Benthic invertebrates commonly found in lakes and reservoirs include oligochaetes and leeches (Class: Clitellata), the aquatic larvae of insects (e.g., chironomids [Family: Chironomidae]), crustaceans (Subphylum: Crustacea), nematodes (Phylum: Nematoda), and mollusks (Phylum: Mollusca). Sediment type is a major influence on the composition of the benthic community. For example, deposit feeders, such as many oligochaetes, are usually found in fine sediments, while filter feeders, such as freshwater clams (Phylum: Mollusca), are often observed in coarser substrates. The majority of the benthic habitat in Kensico Reservoir consists of finer-grained sediments.

Extensive benthic surveys were conducted in 2007 (after the 2006 alum application) and 2014 (after the 2011 to 2012 alum application) by DEP in the area of CATIC Cove. Sample locations (41 in total) were selected based on substrate type, water depth, and flow patterns. The data collected during these surveys, along with the grain-size content of the samples, were then used to compare the benthic community composition inside and outside of the estimated area of alum floc deposition.

A total of 23 of the 41 sample locations were sampled in both 2007 and 2014 (**Figure 8.3-4**). A 0.02 square meter (m^2) Petite Ponar grab was used to collect all samples at these locations. In 2014, an underwater video survey of the Reservoir bottom was also conducted at each of the 23 sample locations to assist in the data interpretation.

The benthic invertebrate community was evaluated for the following parameters:

- Number of taxa: A measurement of species richness in a sample. This parameter often decreases as stress increases;
- Abundance: The number of organisms in a sample. This parameter is helpful in determining the state of the invertebrate community at a given station when considered along with the number of taxa. A sample with high abundance but a low number of taxa can indicate stressed conditions;

[18] U.S. Environmental Protection Agency. 1983. Fish and Fisheries Management in Lakes and Reservoirs. EPA-841-R-93.002.

[19] Wetzel, R.G. 1983. Limnology, 2nd Ed. Saunders College Publishing, Philadelphia.

- Diversity: A parameter that combines species richness and community balance. Higher values indicate well balanced communities, while lower values may indicate low diversity, either from low richness or dominance of the sample by a subset of taxa. Low diversity may occur as a response to stressful conditions;
- Evenness: A comparison of a diversity value for a given sample with the maximum possible diversity;
- Hilsenhoff's Biotic Index (HBI): An index that is a measure of tolerance to organic pollution. Pollution-tolerant organisms are assigned higher values than sensitive organisms;
- Dominance 3: The combined percent contribution of the three most numerous species in a sample. High values indicate a lack of community diversity;
- NCO richness: The total number of species other than chironomids and oligochaetes. Since chironomids and oligochaetes often dominate stressed communities, relatively high numbers of NCO can indicate good water quality;
- Percent chironomid individuals: This parameter typically increases with increasing stress; and
- Number of diptera taxa: This parameter typically decreases with increasing stress.

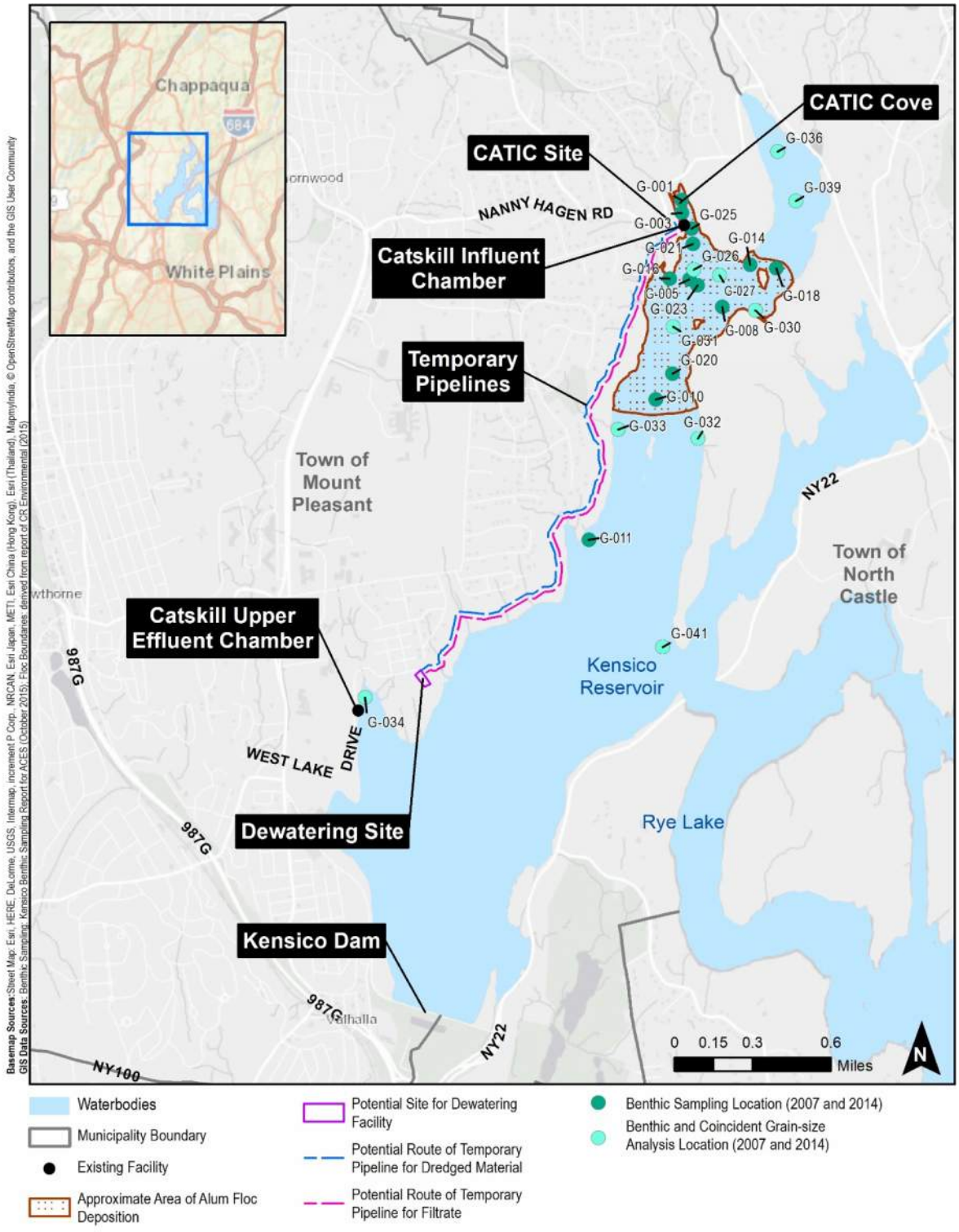


Figure 8.3-4
Kensico Reservoir Study Area
Benthic Locations Sampled in Both 2007 and 2014

The samples contained nearly one hundred species and were numerically dominated by crustaceans, chironomids, oligochaetes, and two types of mollusks (gastropods [Class: Gastropoda] and sphaeriid clams [Order: Veneroida]). Each taxon is discussed briefly below and a summary of all species that were identified in the 2007 and 2014 sampling is shown in **Table 8.3-4** with community index values for each sample collected presented in **Table 8.3-5**. The most abundant species collected included amphipod families (Hyalellidae and Crangonyctidae), isopods (Family: Asellidae), and cladocerans (*Eurycercus lamellatus* and *Sida crystallina*); chironomid species such as *Dicrotendipes modestus, Chironomus* spp., *Procladius bellus*, and *Tanytarsus* spp.; mollusks such as *Musculium* spp. and *Pisidium* spp. and the gastropods *Amnicola* spp. (Family: Hydrobiidae) and *Physella* spp. (Family: Physidae).

Within the 23 stations sampled in 2007 and 2014, there were four benthic sampling stations (G-026, G-027, G-030, and G-031) within the area of estimated alum floc deposition and six stations (G-032, G-033, G-034, G-036, G-039, and G-041) outside this area that have benthic invertebrate and grain-size data for both 2007 and 2014. Overall, the number of taxa and benthic abundance for each of these 10 stations were comparable inside versus outside the estimated area of alum floc in both 2007 and 2014. In 2014, for example, the number of taxa averaged 11 inside compared to 12 taxa outside (**Table 8.3-5**). Similarly, the average benthic abundance was slightly lower (54 organisms) at the stations within the estimated area of alum floc compared to the average benthic abundance of stations located outside the area (63 organisms) in 2014. The substrate throughout the CATIC sampling area, including stations within and outside of the estimated area of alum floc deposition, was dominated by fine-grained material that included high percentages of silt/clay (generally above 75 percent).

Crustacea

Many crustacean taxa are typically present in freshwater lakes and reservoirs within the region including isopods, amphipods (Order: Amphipoda), and cladocerans. The crustacean family Gammaridae includes common amphipods found in lakes, ponds, streams, and springs. Gammarids are omnivores and feed on both plant and animal material, usually detritus. The life history for this family usually revolves around response to light, avoiding bright light and being mostly active at night. Gammarid amphipods are common prey items for fish and in waters with low-density fish populations; they can achieve densities in excess of 10,000 organisms m^{-2}, as set forth in NYSDEC's Freshwater Macroinvertebrates of New York (2018). Other crustacean taxa present in Kensico Reservoir include two additional amphipod families (Hyalellidae and Crangonyctidae), isopods, and cladocerans (*Eurycercus lamellatus* and *Sida crystallina*).

Insecta

A variety of insect taxa typically occupy the benthos of freshwater lakes and reservoirs. The aquatic larvae of non-biting midges (Family: Chironomidae) are well-represented in North America by approximately 100 genera and approximately 2,000 species. Chironomids exhibit a variety of lifestyle strategies (e.g., predators, parasites, filter feeders, and detritivores). Individual species of the family exhibit a wide range of tolerance for environmental conditions. Some chironomids can tolerate low oxygen conditions, enabling them to utilize habitats that other organisms cannot use (McCafferty, 1981).[20] Representative chironomid species present in Kensico Reservoir include *Dicrotendipes modestus*, *Chironomus* spp., *Procladius bellus*, and *Tanytarsus* spp. Other insect taxa collected included mayflies (Order: Ephemeroptera), alderflies (Order: Megaloptera), caddisflies (Order: Trichoptera) and beetles (Order: Coleoptera).

[20] McCafferty, W.P. 1981. Aquatic Entomology. First Edition, Jones and Bartlett Learning.

Table 8.3-4. Benthic Invertebrates Collected and Identified[1] During Sampling of 41 Locations at CATIC Cove in 2007 and 2014

Taxa		
PLATYHELMINTHES	**Crustacea (continued)**	Chironomidae (continued)
Turbellaria	**Isopoda**	*Phaenopsectra punctipes* Group
NEMATODA	Asellidae	*Polypedilum halterale* Group
MOLLUSCA	*Caecidotea sp.*	*Polypedilum illinoense*
Bivalvia	**Amphipoda**	*Procladius bellus*
Veneroida	Crangonyctidae	*Procladius sp.*
Sphaeriidae	*Crangonyx sp.*	*Protanypus sp.*
Musculium sp.	Gammaridae	*Psectrocladius (Monopsectrocladius)*
Pisidium sp.	*Gammarus sp.*	*Psectrocladius psilopterus* Group
Sphaerium sp.	Hyalellidae	*Psectrocladius sordidellus* Group
Gastropoda	*Hyalella sp.*	*Psectrocladius sp.*
Mesogastropoda	*Hyalella azteca*	*Tanytarsus sp.*
Hydrobiidae	**Insecta**	*Tribelos jucundum*
Amnicola sp.	**Diptera**	*Tribelos sp.*
Basommatophora	Ceratopogonidae	*Zalutschia sp.*
Physidae	*Bezzia/Palpomyia* Group	*Zalutschia zalutchicola*
Physella sp.	*Probezzia sp.*	*Zavrelia sp.*
Planorbidae	Chironomidae	*Zavreliella sp.*
Helisoma sp.	*Ablabesmyia mallochi*	Simuliidae
Helisoma anceps	*Ablabesmyia rhamphe* Group	*Simulium sp.*
ANNELIDA	*Ablabesmyia sp.*	**Ephemeroptera**
Oligochaeta	*Cardiocladius sp.*	Caenidae
Lumbriculida	*Chironomus sp.*	*Caenis sp.*
Lumbriculidae	*Cladopelma sp.*	Ephemeridae
Tubificida	*Cladotanytarsus sp.*	*Hexagenia sp.*
Naididae	*Clinotanypus sp.*	Tricorythidae
Vejdovskyella comata	*Conchapelopia sp.*	*Tricorythodes sp.*
Tubificidae w.h.c.	*Cricotopus bicinctus*	**Megaloptera**
Tubificidae w.o.h.c.	*Cricotopus sp.*	Sialidae
Aulodrilus piqueti	*Cricotopus sylvestris*	*Sialis sp.*
Limnodrilus hoffmeisteri	*Cricotopus/Orthocladius* Complex	**Trichoptera**
Hirudinea	*Cryptochironomus sp.*	Hydropsychidae
Rhynchobdellida	*Cryptotendipes sp.*	*Ceratopsyche morosa*
Glossiphoniidae	*Dicrotendipes neomodestus*	*Cheumatopsyche sp.*
Helobdella sp.	*Dicrotendipes sp.*	Hydroptilidae
Helobdella stagnalis	*Dicrotendipes modestus*	*Agraylea sp.*
ARTHROPODA	*Einfeldia natchitocheae*	*Oxyethira sp.*
Arachnoidea	*Einfeldia sp.*	Leptoceridae
Acariformes	*Endochironomus nigricans*	*Oecetis sp.*
Arrenuridae	*Glyptotendipes sp.*	Polycentropodidae
Arrenurus sp.	*Micropsectra sp.*	*Phylocentropus sp.*
Pionidae	*Microtendipes pedellus* Group	**Coleoptera**
Tiphys sp.	*Nilothauma sp.*	Dytiscidae
Crustacea	*Orthocladiinae* species C	*Hydroporus sp.*
Ostracoda	*Orthocladius sp.*	Elmidae
Cladocera	*Pagastiella sp.*	*Stenelmis sp.*
Chydoridae	*Parachironomus sp.*	Haliplidae
Eurycercus lamellatus	*Paracladopelma sp.*	*Peltodytes sp.*
Sidaidae	*Parakiefferiella sp.*	
Sida crystillina	*Paratendipes sp.*	

Note:
[1] Taxon identified to the lowest practical taxonomic level.

Table 8.3-5. Benthic Community Index Values for Samples Collected at CATIC Cove in 2007 and 2014

Station	Sampling Year	Abundance	# of Taxa	Diversity	HBI[1]	Dom3[2]	NCO[3]	% Chiron.[4]	No. Diptera[5]
G-001	2007	442	19	2.61	7.9	79.2%	10	44.3%	7
	2014	100	12	2.56	8.1	78.0%	6	7.0%	3
G-002	2007	223	20	2.73	7.2	70.4%	7	79.4%	13
G-003	2007	394	20	3.03	7.1	64.2%	4	89.6%	17
	2014	69	5	1.82	7.7	87.0%	3	1.4%	1
G-004	2007	52	14	3.13	6.8	61.5%	3	76.9%	12
G-005	2007	137	18	2.96	6.5	67.9%	6	75.9%	12
	2014	137	13	3.04	7.3	58.4%	8	31.4%	5
G-006	2007	95	13	2.18	6.3	80.0%	3	85.3%	11
G-007	2007	50	11	2.92	6.9	62.0%	4	70.0%	7
G-008	2007	54	11	2.70	6.1	70.4%	2	94.4%	9
	2014	58	16	3.26	6.8	62.1%	10	13.8%	5
G-009	2007	121	8	1.84	7.2	90.9%	1	52.9%	7
G-010	2007	93	12	2.03	6.8	89.2%	5	61.3%	8
	2014	147	7	1.49	6.7	91.8%	2	76.9%	5
G-011	2007	196	18	3.08	6.3	67.9%	7	65.3%	12
	2014	37	10	2.49	6.2	75.7%	3	64.9%	7
G-012	2007	28	11	3.04	6.5	60.7%	3	57.1%	8
G-013	2007	65	9	2.52	6.6	70.8%	2	80.0%	7
G-014	2007	84	12	2.83	6.3	65.5%	3	77.4%	9
	2014	26	10	2.75	5.8	61.5%	4	76.9%	6
G-015	2007	85	13	2.96	7.1	65.9%	4	68.2%	9
G-016	2007	108	9	1.83	7.4	89.8%	2	85.2%	6
	2014	70	19	3.60	6.6	48.6%	8	35.7%	11
G-017	2007	225	17	2.11	6.1	78.7%	5	96.9%	12
G-018	2007	280	21	3.21	6.7	55.7%	6	79.3%	13
	2014	88	12	2.43	5.9	80.7%	5	53.4%	7
G-019	2007	76	8	2.07	6.3	80.3%	4	73.7%	4
G-020	2007	119	10	1.79	6.6	90.8%	5	69.7%	5
	2014	127	6	1.22	7.0	91.3%	2	86.6%	4
G-021	2007	49	12	2.19	6.3	81.6%	6	12.2%	6
	2014	47	5	1.37	7.6	91.5%	4	0.0%	0
G-022	2007	333	14	1.28	6.1	88.0%	3	97.6%	12
G-023	2007	251	7	0.60	6.1	97.2%	2	96.8%	6
	2014	57	13	3.12	6.5	56.1%	6	36.8%	7
G-024	2007	134	10	1.42	5.9	90.3%	3	94.0%	7

Table 8.3-5. Benthic Community Index Values for Samples Collected at CATIC Cove in 2007 and 2014 (Continued)

Station	Sampling Year	Abundance	# of Taxa	Diversity	HBI[1]	Dom3[2]	NCO[3]	% Chiron.[4]	No. Diptera[5]
G-025	**2007**	188	22	3.37	6.7	51.6%	9	61.7%	13
	2014	186	11	1.78	7.8	88.2%	7	2.7%	4
G-026[6]	**2007**	71	16	3.05	6.2	63.4%	5	74.6%	12
	2014	50	8	2.75	7.5	64.0%	5	28.0%	3
G-027[6]	**2007**	350	11	1.18	6.0	93.4%	5	97.7%	6
	2014	23	6	2.10	6.1	87.0%	3	52.2%	3
G-028	**2007**	235	16	2.92	7.7	70.6%	6	91.9%	10
G-029	**2007**	235	15	2.56	6.5	77.0%	6	72.8%	9
G-030[6]	**2007**	40	12	2.94	5.6	65.0%	3	80.0%	9
	2014	42	13	3.20	7.9	57.1%	5	54.8%	8
G-031[6]	**2007**	111	13	1.74	6.4	88.2%	7	73.9%	6
	2014	99	14	2.31	6.7	72.7%	7	76.8%	8
G-032[6]	**2007**	64	13	2.67	6.1	67.2%	4	81.3%	9
	2014	43	14	3.36	6.4	53.5%	7	30.2%	8
G-033[6]	**2007**	177	24	3.07	6.0	63.8%	8	89.8%	17
	2014	61	14	3.21	6.3	59.0%	7	21.3%	7
G-034[6]	**2007**	55	16	3.43	6.1	52.7%	6	65.5%	10
	2014	57	16	3.67	6.4	43.9%	7	47.4%	9
G-035	**2007**	522	16	2.90	7.1	68.8%	6	90.4%	10
G-036[6]	**2007**	167	15	2.97	8.0	58.7%	6	71.3%	9
	2014	162	16	3.16	6.5	56.8%	6	79.6%	11
G-037	**2007**	154	14	2.41	7.7	66.9%	6	29.2%	8
G-038	**2007**	96	12	2.65	7.4	74.0%	4	55.2%	8
G-039[6]	**2007**	100	14	3.07	6.9	57.0%	6	55.0%	8
	2014	28	2	0.22	4.0	100.0%	0	100.0%	2
G-040	**2007**	45	10	2.02	6.0	77.8%	3	86.7%	7
G-041[6]	**2007**	153	11	1.668	5.9	90.2%	5	73.9%	6
	2014	28	6	1.940	6.0	85.7%	3	71.4%	3

Notes:
[1] HBI - Hilsenhoff's Biotic Index
[2] Dom3 - Total percent abundance of the top three dominant taxa
[3] NCO - Number of non-chironomid and oligochaete taxa
[4] % Chiron - Percent abundance of chironomids
[5] No. Diptera - Number of dipteran taxa
[6] Stations coincident with grain-size characterization locations in both 2007 and 2014.
Shaded stations were sampled in both 2007 and 2014.

Annelids

Oligochaetes made up the majority of the annelids collected by DEP in 2007 and 2014. (Commonly called "aquatic earthworms," oligochaetes also typically inhabit the sediments of freshwater lakes and reservoirs, as well as marine and estuarine environments.) There are thought to be approximately 200 oligochaete species in North America. Most oligochaetes are deposit feeders and obtain their food from organic material in soft sediments and detritus, while others feed on plant material or are carnivores. Many oligochaetes can tolerate low oxygen conditions (McCafferty, 1981). Dominant oligochaete species collected included *Aulodrilus pluriseta* and *Limnodrilus hoffmeisteri* (Subfamily: Tubificidae). Other annelids present in Kensico Reservoir include leeches (Family: Glossiphoniidae).

Mollusks

Gastropods and sphaeriid clams are two mollusk groups that are commonly encountered in a wide range of freshwater, brackish, and marine environments. Gastropods (snails) are uni-valve mollusks that typically graze on algae, detritus, or other organic material on bottom sediments. Sphaeriids are small, thin-shelled bivalves, commonly called pea-clams or fingernail clams. These relatively sedentary, filter-feeding organisms inhabit the sediment surface (McCafferty, 1981). Dominant mollusks present in Kensico Reservoir include *Musculium* spp. and *Pisidium* spp. and the gastropods *Amnicola* spp. and *Physella* spp.

FISH

A hydroacoustic fish survey and concurrent gill netting was conducted in August 2006 to assess fish distribution throughout the entire Kensico Reservoir (Biosonics, 2010).[21] The gill net samples identified six species of fish: alewife, lake trout (*Salvelinus namaycush*), brown trout (*Salmo trutta*), largemouth bass (*Micropterus salmoides*), smallmouth bass (*Micropterus dolomieu*) and rainbow smelt (*Osmerus mordax*). Alewife was the most abundant species collected, comprising 50 percent of the total catch. Acoustic sampling detected 5,644 fish along 53 transect lines. Fish density for the entire Kensico Reservoir was estimated to be 4.58 fish per 1,000 cubic meters (m^3) or approximately 0.105 fish per m^2 of surface area. The highest densities of fish were observed during the Biosonic study in the southern portion of Main Basin and in Rye Lake.

Fish surveys have also been periodically conducted throughout Kensico Reservoir by NYSDEC. Survey locations varied by year and gear type (e.g., electrofishing, gill nets) but encompassed most of the Reservoir. **Table 8.3-6** lists the fish collected during boat electrofishing sampling efforts in 1990, 1991, 1993, and 2001 along with gill net surveys conducted in 1991, 2001, and 2010.

Rainbow trout (*Oncorhynchus mykiss*) were stocked by the NYSDEC in the Reservoir until 1994 and have not been collected in the three most recent surveys. The species is not currently thought to have a sustained population because of limited spawning opportunities present in tributaries to the Reservoir. Additionally, several fish species common to the region, but not encountered in the surveys presented within **Table 8.3-6**, are likely present in Whippoorwill Creek (a Kensico tributary which enters the Reservoir approximately 0.5 mile north of the Catskill Influent Chamber) and could utilize the shallow littoral areas of the Reservoir including CATIC Cove, such as eastern blacknose dace (*Rhinichthys atratulus*), johnny darter (*Etheostoma nigrum*), and creek chub (*Semotilus atromaculatus*). Several representative fish species that may occur within the Kensico Reservoir study area are discussed briefly below.

[21] Biosonics. 2010. Analysis of Acoustic and Gillnet Data Collected from Kensico Reservoir (Kensico Lake and Rye Lake) in 2006.

Table 8.3-6. Fish Species Collected During NYSDEC Surveys of Kensico Reservoir

Common Name	Species Name	May 1990[1]	May 1991[1]	July 1991[2]	April 1993[1]	May 2001[1]	August 2001[2]	September 2010[2]
Alewife	*Alosa pseudoharengus*	46	0	1,822	0	0	0	2
Bluegill	*Lepomis macrochirus*	0	0	1	0	0	0	0
Brown bullhead	*Ameiurus nebulosus*	0	0	1	0	0	0	0
Brown trout	*Salmo trutta*	11	14	53	7	2	1	5
Chain pickerel	*Esox niger*	8	2	0	0	0	0	0
Lake trout	*Salvelinus namaycush*	0	0	116	0	2	42	68
Largemouth bass	*Micropterus salmoides*	13	27	1	0	10	0	0
Pumpkinseed	*Lepomis gibbosus*	4	0	0	0	0	0	2
Rainbow smelt	*Osmerus mordax*	0	0	0	0	1	0	3
Rainbow trout	*Oncorhynchus mykiss*	1	8	2	2	0	0	0
Redbreast sunfish	*Lepomis auritus*	7	0	4	0	0	0	1
Rock bass	*Ambloplites rupestris*	4	0	18	0	0	0	25
Smallmouth bass	*Micropterus dolomieu*	34	44	17	0	10	0	19
White sucker	*Catostomus commersoni*	1	0	3	0	1	0	0
Yellow bullhead	*Ameiurus natalis*	0	0	8	0	0	0	7
Yellow perch	*Perca flavescens*	93	0	120	0	10	0	24
Total		222	95	2,166	9	36	43	156

Notes:
[1] Numbers Captured in Boat Electrofishing Survey
[2] Numbers Captured in Gill Net Survey

Brown Trout

Brown trout occur throughout many freshwater habitats, including small headwater streams, deep, slow moving parts of streams, lakes, and reservoirs. Brown trout is considered an important cold water game species, and is widely sought after by Kensico Reservoir anglers. Although brown trout are adaptable to a relatively wide range of conditions, the species prefers water temperatures below 20°C, DO concentrations above 5.0 milligrams per liter (mg/L) and a pH range between 6.7 and 7.8. Young trout feed on zooplankton, and as they grow larger in size, on insect larvae and other invertebrates. As per the Fisheries Investigation Report Environmental Impact Statement Project, once individuals reach approximately 12 inches [or about 300 millimeters (mm)] in length, other fish, particularly alewife become the preferred food type in Kensico Reservoir.

Brown trout spawn over gravel beds in areas with low sedimentation and high DO, typically in streams, but the species also utilize sections of lakes where these conditions are present. Spawning occurs in late fall/early winter. Eggs overwinter in the gravel; the time period to hatch is temperature dependent, reportedly varying between 33 days at 11°C and 148 days at 1.9°C, as per C.L. Smith's The Inland Fishes of New York State, compiled for NYSDEC (1985).

NYSDEC releases fish into over a thousand waterbodies in the State each year to enhance recreational fishing and to restore native fishes into their historic range. As detailed in the New York State Office of Information Technology Service's Fish Stocking Lists (2018),[22] since 2011, NYSDEC has released over 8,000 nine-inch brown trout each year into Kensico Reservoir. Brown trout make up about 20 percent of all trout species caught by Kensico anglers. As per the Fisheries Investigation Report Environmental Impact Statement Project, limited spawning opportunities are available within the Kensico tributaries and the Kensico brown trout population is thought to be largely dependent upon stocking; gravid brown trout have also been collected by DEP in Whippoorwill Creek, a tributary which drains into the northern portion of the Reservoir.

Brown trout lengths were recorded during the NYSDEC sampling programs conducted between 1990 and 2010 (**Figure 8.3-5**). Gear selectivity may have limited the catch of fish smaller than 180 mm. However, four distinct length classes were seen in the data and likely represent different age classes of stocked fish indicative of a healthy and stable population. These length classes include 180 to 260 mm (13 percent), 280 to 420 mm (51 percent), 440 to 540 mm (30 percent) and greater than 540 mm (6 percent). Approximately 13 percent of the fish collected ranged from 180 to 260 mm and were likely stocked brown trout from that year based on the size collected and typical stocking size.

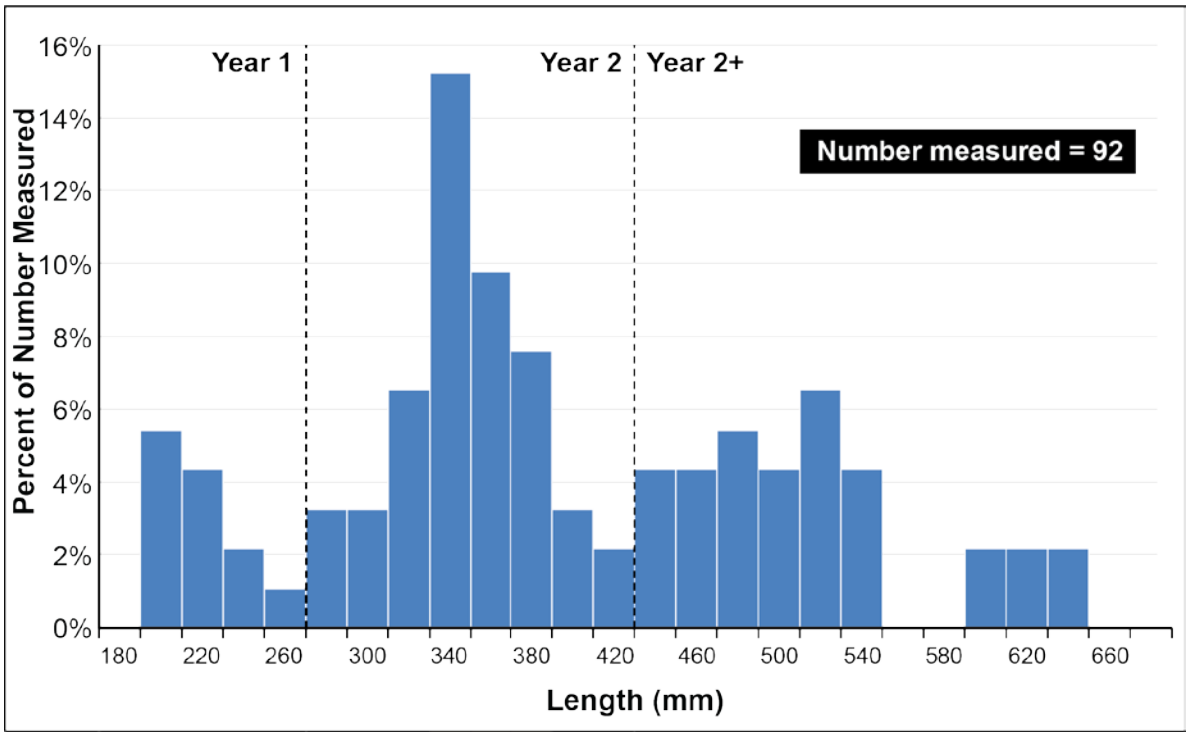


Figure 8.3-5. Length Frequency Distribution and Year Class of Brown Trout Collected in Kensico Reservoir via Boat Electrofishing Sampling Efforts in 1990, 1991, 1993, and 2001 along with Gill Net Surveys Conducted in 1991, 2001, and 2010

[22] New York State Office of Information Technology Service. 2018. Fish Stocking Lists (Actual): Beginning 2011.

Lake Trout

Lake trout prefer deep cold lakes, although they can also be found in shallow lakes and streams in the northern portion of their range (northern North America). As with brown trout, lake trout is considered an important cold water game species, and is widely sought after by Kensico Reservoir anglers. Lake trout are often found in water with temperatures below 18°C though they occasionally stray into warmer water. Young lake trout prey on zooplankton, switching to other invertebrates and finally, other fish as they grow. Important forage fish include rainbow smelt, yellow perch (*Perca flavescens*), alewife, and white sucker (*Catostomus commersoni*); all four species are present in Kensico Reservoir (Smith, 1985).

Natural lake trout reproduction occurs in Kensico Reservoir. Spawning habitat is represented by shallow waters (less than 5 meters) with coarse gravel, cobble and boulder substrate, including areas near the Rye Lake portion of the Reservoir, the Kensico Dam, the Catskill UEC, and DEL18. Lake trout eggs are typically encountered in documented spawning areas from November through April; larvae and juveniles are found in these same areas into early June, after which young of the year typically move into deeper parts of the Reservoir (Smith, 1985).

As per the Fisheries Investigation Report Environmental Impact Statement Project, Lake trout represent approximately 80 percent of the trout species caught by Kensico Reservoir anglers. As set forth in the NYSDEC's New York State Species of Greatest Conservation Need (2018), the NYSDEC released 900 seven-inch lake trout into Kensico Reservoir in 2011 but has not since stocked this species. According to the NYSDEC 2018 Coldwater Fishing Forecast, lake trout fishing in Kensico Reservoir has improved greatly in recent years and now is supported primarily through natural reproduction.

Lake trout lengths were recorded during the NYSDEC sampling efforts from 1990 to 2010 (**Figure 8.3-6**). Gear selectivity may have limited the catch of fish smaller than 160 mm. However, three distinct length classes were seen. Approximately 20 percent of the fish collected ranged from 160 to 340 mm; 56 percent of the lake trout collected ranged from 360 to 540 mm; and 24 percent of the fish measured were greater than 540 mm. Because lake trout growth rate is highly dependent on environmental factors such as forage availability, water temperature, and predation, age is often difficult to discern from length frequency data, as set forth by Scott and Crossman (1973),[23] and therefore no age classes are given.

[23] Scott, W.B. and E.J. Crossman. 1973. Freshwater Fishes of Canada. 1st Edition. Department of the Environmental Fisheries Research Board.

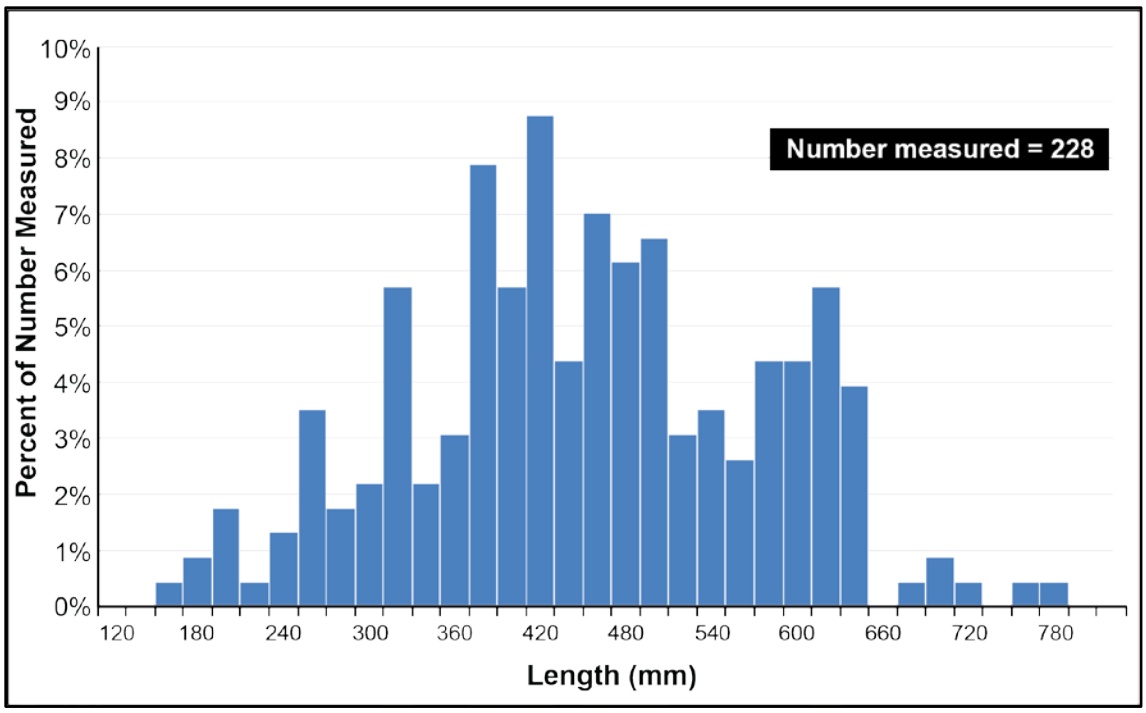


Figure 8.3-6. Length Frequency Distribution of Lake Trout Collected in Kensico Reservoir via Boat Electrofishing Sampling Efforts in 1990, 1991, 1993, and 2001 along with Gill Net Surveys Conducted in 1991, 2001, and 2010

Alewife

Alewife is an important forage fish in Kensico Reservoir. The species in its natural habitat lives in marine environments for most of the year, moving into fresh water to spawn (i.e., it is an anadromous species). Land-locked populations were established throughout the State during the 1800s through stocking efforts to provide forage for recreationally important species, such as lake trout. Alewife prey on zooplankton, insects, and other invertebrates, as well as fish eggs. Land-locked populations occupy the open waters of lakes and reservoirs, including Kensico Reservoir, during most of the year, moving into shallow areas with sand and gravel substrates to spawn. Spawning is temperature dependent and occurs primarily when water temperatures range between 10.5°C and 21.6°C during early spring. As per the Fisheries Investigation Report Environmental Impact Statement Project, the semi-buoyant eggs are carried by water current and, depending on temperature, hatch within 2 to 15 days.

White Sucker

White sucker is primarily a bottom-dwelling species, preferring water depths of 20 to 30 feet and water temperatures of 19°C to 26°C. White suckers typically feed on zooplankton, chironomid larvae, crayfish (Superfamily: Astacoidea), detritus, and plant material in the State's freshwater systems. White suckers migrate to gravelly streams and lake margins to spawn when water temperatures reach approximately 10°C, scattering eggs over the substrate. Eggs hatch in approximately two weeks, and fry remain in the gravel for another two weeks before moving into other parts of the lake. As per the Fisheries Investigation Report Environmental Impact Statement Project, White sucker is an important forage species in Kensico Reservoir, particularly for lake trout and black bass, and are known to spawn in Whippoorwill Creek.

Black Bass

"Black bass" is a collective term for two large members of the sunfish family (Centrarchidae), largemouth bass and smallmouth bass. The largemouth bass is the largest of the centrarchids, with some adults

exceeding 10 pounds. Largemouth bass prefer littoral areas with floating and SAV. Smallmouth bass prefer rocky substrates, reefs, and irregular bottom contours in shallow to moderately deep water. Both species prefer deeper water during winter months, as set forth in Perry et al.'s Characterizing the Status of Black Bass Populations in New York, compiled for NYSDEC (2014). Both species are considered important warm water game fish, and are widely sought after by Kensico Reservoir anglers.

Smallmouth bass prefer cool, clear water areas of lakes and flowing streams with a gravelly or rocky bottom and moderate vegetation. Adult smallmouth are usually found near the protection of rocks or near submerged logs. Largemouth bass prefer warm, shallow, well-vegetated areas of ponds and sluggish streams. They are solitary, rather than schooling fish, preferring to lurk among dense aquatic vegetation or submerged cover, such as stumps, logs, or dock pilings (Perry et al., 2014).

Black bass construct shoreline nests (depressions in the substrate) from late May to early July. Males usually build the nests on sandy, gravel, or rocky bottom areas near the protective cover of rocks, logs, or dense vegetation. Eggs and newly hatched bass fry are guarded by adults. As they mature, juveniles disperse along lake or reservoir shorelines (Perry et al., 2014).

Juvenile largemouth and smallmouth bass feed primarily on benthic invertebrates, including insect larvae and small crustaceans. As adults, smallmouth bass are opportunistic predators, eating whatever live prey is available. The bulk of their diet consists of insects, crayfish, and other fish, but they will occasionally eat tadpoles and frogs. Adult largemouth bass are piscivorous, feeding on a wide range of other fish species. They are sit-and-wait predators, hiding in the cover of dense aquatic vegetation to ambush prey as it swims by. Crayfish, frogs, and small mammals, such as mice, are also taken opportunistically. The most active feeding times are during early morning and evening hours (Perry et al., 2014).

Yellow Perch

Yellow perch are considered to be an important "panfish," they are abundant in Kensico Reservoir and widely sought after by anglers. Yellow perch are generally considered a schooling species, and they occur in a wide range of freshwater environments, from small ponds and streams to large lakes/reservoirs and riverine systems.

Yellow perch occupy shoreline areas in lakes and ponds, with and without vegetation. They move to deeper waters during winter months. While yellow perch are found in a variety of habitats, they generally prefer shallow, weedy protected sections of rivers, lakes, and ponds. Larger adult perch are more likely than juveniles to be encountered in deeper, open waters.

Yellow perch spawn in April or May. Adults migrate into shallow weedy sections and randomly release long strings (up to seven feet) of transparent eggs. The egg masses eventually adhere to SAV, where they remain until hatching. Adult yellow perch feed actively throughout the year on a wide variety of invertebrates (including aquatic insects and crayfish) and small fish. Juveniles tend to rely on more pelagic prey, feeding primarily on chironomid (midge) larvae, cladocerans, and copepods (Smith, 1985).

FUTURE WITHOUT THE PROPOSED ACTION

In the future without the Proposed Action, it is assumed that future conditions of aquatic resources within the study area would be the same as baseline conditions. DEP has consulted with the Town of Mount Pleasant and Westchester County, and DEP has not been informed of any upcoming projects or developments that would alter aquatic resources within the study area. DEP will also be implementing its KEC Project in the future without the Proposed Action. The KEC Project is comprised of several elements primarily within an area southwest of the Proposed Action. These activities would all occur south and west of CATIC Cove, the proposed dewatering site and the area of alum floc deposition. The KEC Project would be the subject of a separate environmental review.

PLANKTON, ALGAE, AND SUBMERGED AQUATIC VEGETATION

In the future without the Proposed Action, no significant changes are expected to occur to the planktonic and SAV communities as the Reservoir would continue to be operated and maintained in its present condition. Although infrastructure improvements have been completed that will reduce the future need for alum application, alum application would continue in the future without the Proposed Action.

BENTHIC INVERTEBRATES

Historical benthic community surveys in the vicinity of CATIC Cove provide context for the analysis of the future without the Proposed Action (**Figure 8.3-4**). Benthic invertebrate taxonomic composition and community structure were comparable between the 2007 and 2014 surveys, as indicated by the majority of benthic community analyses performed (**Figure 8.3-7** through **Figure 8.3-10)**. One exception was the relative percentage of chironomid insect larvae (Percent Chironomid), which decreased at locations inside the alum floc deposition area from 2007 to 2014 (**Figure 8.3-10**); and total abundance of organisms including chironomids which decreased in locations both inside and outside of the alum floc deposition area (**Figure 8.3-7**). Specifically, the Percent Chironomid decrease from 73 percent to 40 percent within the floc area suggests a greater diversity of benthic organisms residing in the floc layer in 2014 versus 2007, overall (**Figure 8.3-10**). The observed decline in the total abundance (density), including chironomids both inside and outside of floc areas (with a concurrent increase in crustacean taxa within the benthic community, overall), suggests a system-wide change in community composition independent of alum floc, although there was no apparent adverse influence from alum floc to this larger trend. The trend is towards a greater diversity of taxa, and a smaller percentage of taxa considered tolerant of degraded conditions. An analysis of Percent Similarity (at the family level) for benthic assemblages was also comparable (nearly identical values) between the 2007 and 2014 surveys (83 Percent Similarity inside/outside alum floc area in 2007; 84 Percent Similarity inside/outside floc area in 2014) indicative of a stable assemblage.

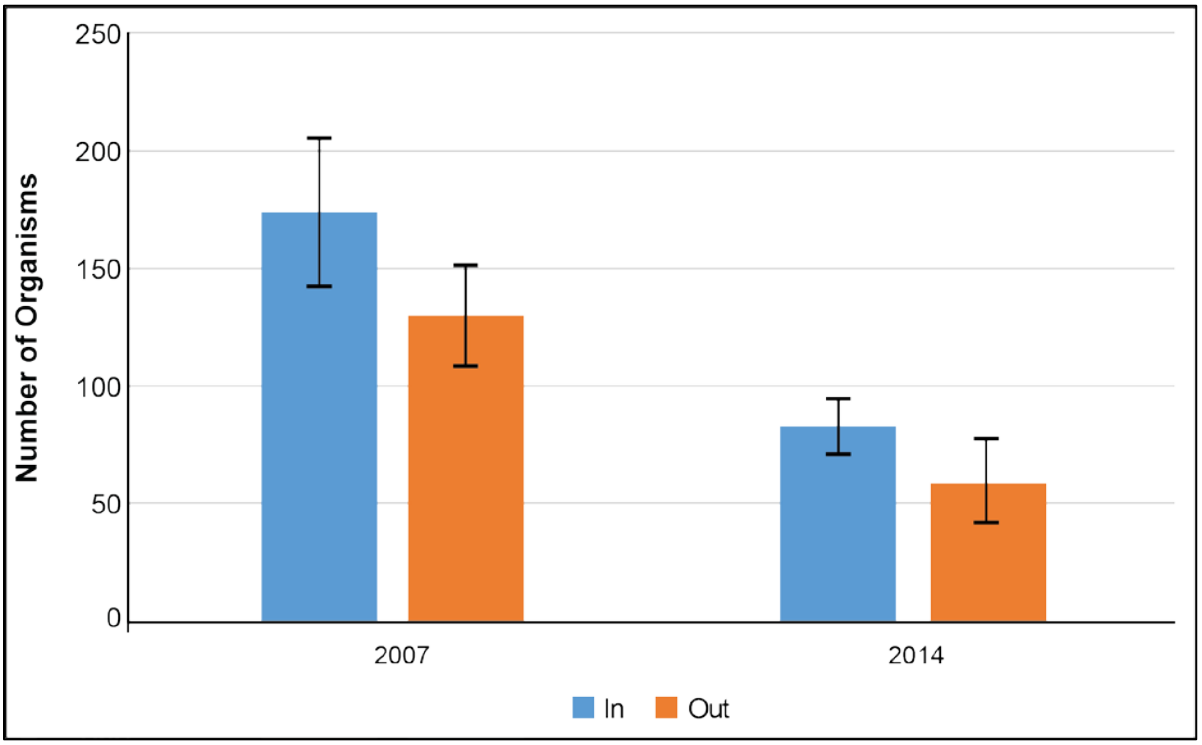


Figure 8.3-7. Total Abundance of Benthic Invertebrates (Inside and Outside of CATIC Cove Alum Floc Deposition Area), 2007 and 2014 Surveys

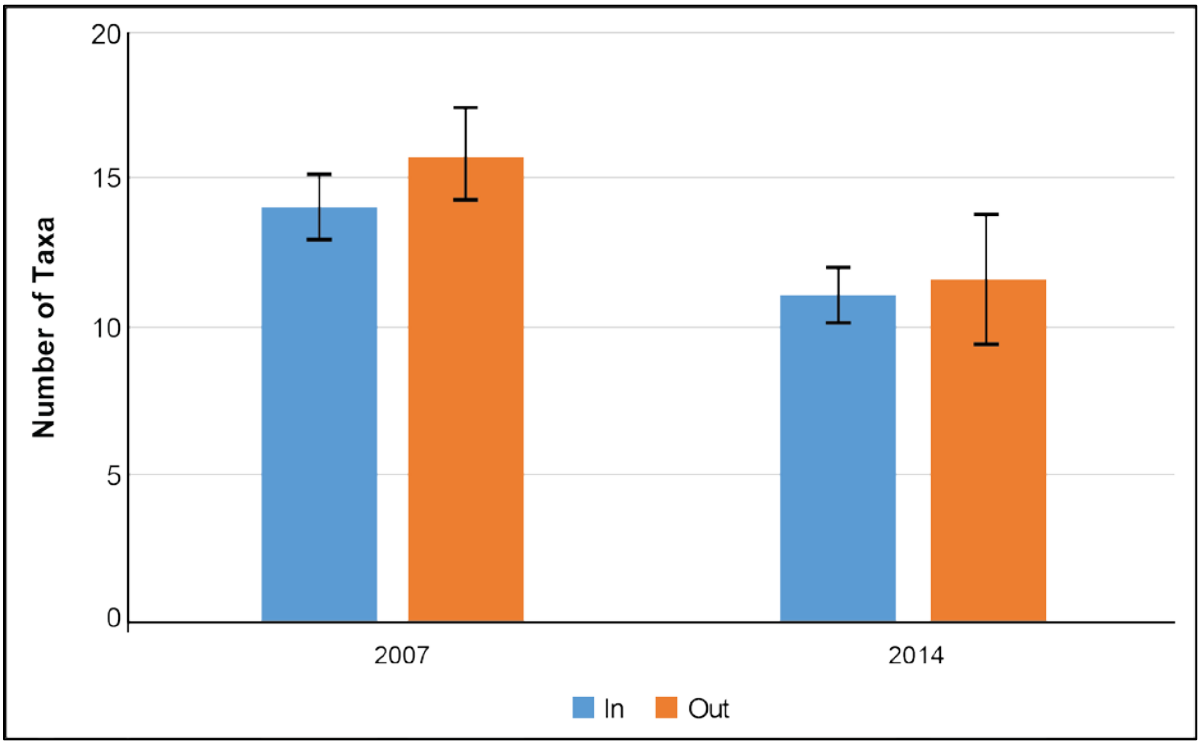


Figure 8.3-8. Taxa Richness of Benthic Invertebrates (Inside and Outside of CATIC Cove Alum Floc Deposition Area), 2007 and 2014 Surveys

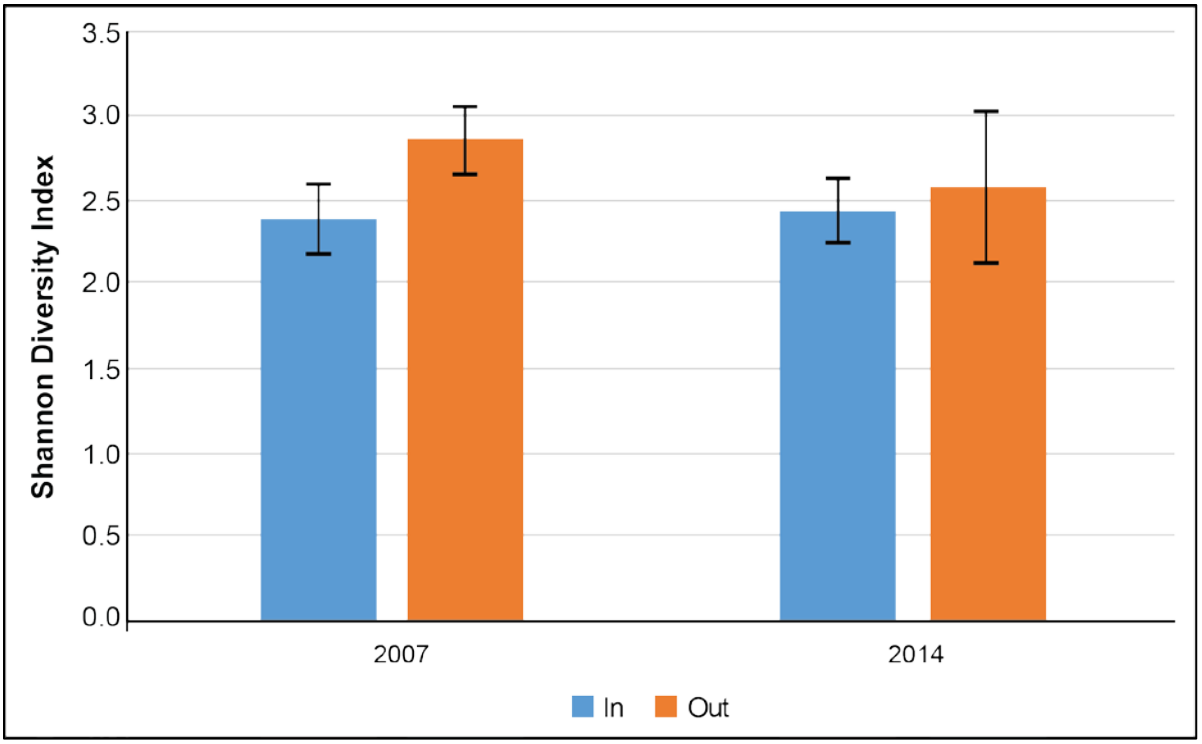


Figure 8.3-9. Shannon Diversity Index (Inside and Outside of CATIC Cove Alum Floc Deposition Area), 2007 and 2014 Surveys

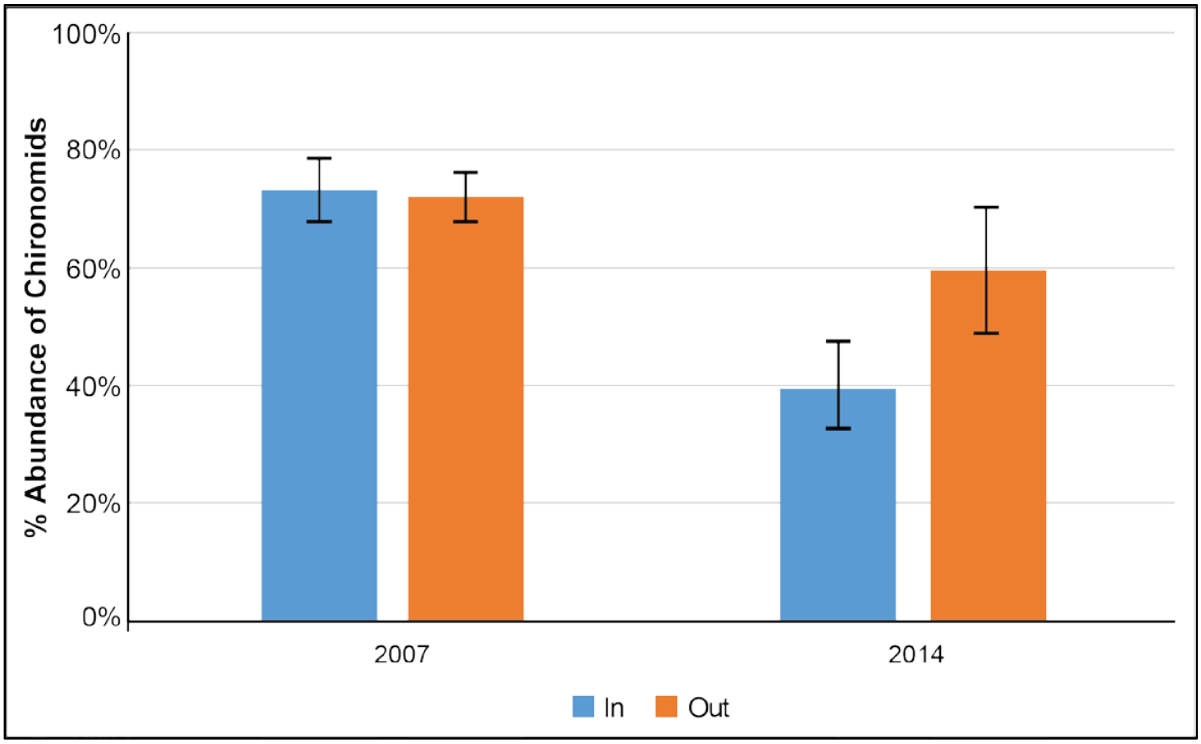


Figure 8.3-10. Percent Abundance of Chironomids (Inside and Outside of CATIC Cove Alum Floc Deposition Area), 2007 and 2014 Surveys

The bioavailability of free aluminum is the key factor affecting its potential toxicity to aquatic organisms within CATIC Cove and the areas of alum floc deposition. Free or elemental aluminum (as a component of aluminum floc) is not mobilized under reducing (anoxic) conditions that typically occur in lake sediments. Rather, it is bound to sediment particles. Under extreme low or high pH conditions (e.g., pH less than 5.5 and greater than 8.0), aluminum may be released in dissolved form or as other bioavailable aluminum compounds. Historic Kensico Reservoir water quality monitoring indicates that these pH extremes do not occur within the Reservoir, including during periods of recent sustained alum application (2011 to 2012). Pilgrim conducted an extensive literature review on the potential toxicity of alum applications to water supply reservoirs, in combination with an analysis of benthic invertebrate community data collected within CATIC Cove and the surrounding area in 2007 (Pilgrim, 2008).[24] This study concluded that it was highly unlikely that alum application has had an adverse effect on benthic community composition and water quality in CATIC Cove. The potential for aluminum toxicity at this location is minimal because dissolved aluminum is biologically unavailable, as the Reservoir pH has consistently been measured at or near pH 7 (Pilgrim, 2008) (Pilgrim and Brezonik, 2005)[25] (Cardwell et al., 2018).[26] A more recent evaluation, conducted by Driscoll et al. (2014), included field measurements, sediment aluminum release experiments conducted under controlled laboratory conditions, and chemical equilibrium calculations. These investigators independently concluded that "under ambient water quality conditions, mobilization of sediment Al [aluminum] is not a noteworthy concern at Kensico Reservoir," reinforcing the primary conclusions found in Pilgrim (2008), and verified by the routine DEP water quality monitoring data.

According to Pilgrim (2008), benthic invertebrates are typically not affected by alum application unless there has been significant accumulation (greater than 1 foot) of nearly pure alum floc (not including alum that has mixed with sediment). The alum floc in Kensico Reservoir is not pure alum floc, but is instead made up of 20 to 30 percent aluminum hydroxide and 70 to 80 percent entrained sediment. A characteristic benthic invertebrate assemblage (including insect larvae, crustaceans, aquatic worms and mollusks) is able to persist at densities generally comparable to reference areas outside of the historic alum deposition area in the vicinity of CATIC Cove (Pilgrim, 2008). Aluminum toxicity to aquatic invertebrates has been less well studied compared with fish, but in general aquatic invertebrates are less sensitive to aluminum in comparison to fish (Gensemer and Playle, 1999)[27] (Soucek, 2006).[28] In the future without the Proposed Action, adverse impacts to benthos or fish are, therefore, not anticipated.

The application of alum to drinking water supplies is also a long-standing, well accepted, and widely used practice throughout the United States, and the periodic application of alum to maintain water quality (for turbidity control) has occurred at Kensico Reservoir for nearly a century. In the future without the Proposed Action without dredging to remove alum floc accumulation within CATIC Cove, existing benthic invertebrate communities would continue to occupy and persist over time within the alum

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[24] Pilgrim, K. 2008. Evaluation of the Potential Adverse Effects of an Alum Treated Kensico Reservoir Inflow. Technical Memorandum prepared for Malcolm Pirnie, Inc., Fair Lawn, NJ.

[25] Pilgrim, K.M. and P.L. Brezonik. 2005. Evaluation of the Potential Adverse Effects of Lake Inflow Treatment with Alum. Lake and Reservoir Management 21: 77-87.

[26] Cardwell, A.S., W.J. Adams, R.W. Genesemer, E. Nordheim, R.C. Santore, A.C. Ryan and W.A. Stubblefield. Chronic Toxicity of Aluminum, at a pH of 6, to Freshwater Organisms: Empirical Data for the Development of International Regulatory Standards/Criteria.

[27] Gensemer, R.W. and R.C. Playle. The Bioavailability and Toxicity of Aluminum in Aquatic Environments. Critical Reviews in Environmental Science and Technology 29: 315-450.

[28] Soucek, D.J. 2006. Effects of Freshly Neutralized Aluminum on Oxygen Consumption by Freshwater Invertebrates. Archives of Environmental Contamination and Toxicology 50: 353-360.

floc/sediment matrix present within the alum floc deposition area. In addition, characteristic benthic assemblages, similar to those present in other large, soft-bottom lakes and reservoirs in the region, would persist throughout the Reservoir, outside of the alum floc deposition area, with minor to moderate changes in community structure occurring over time (inter-annual to decadal) in response to long-term variation in water quality and substrate characteristics. The results of the benthic invertebrate community comparison conducted over time in Kensico Reservoir (2007 versus 2014 surveys) support this paradigm; assemblages within the floc deposits and adjacent non-floc areas of CATIC Cove were similar across the majority of abundance and diversity parameters/indices measured, with a general increase in diversity associated with an overall decrease in the abundance of a single disturbance-tolerant invertebrate family (Chironomidae) over time.

FISH

An extensive review of the literature provided context for the assessment of the future without the Proposed Action with regard to fish assemblages in the vicinity of CATIC Cove. In the absence of dredging to remove alum deposits in CATIC Cove, characteristic fish assemblages (including game fish such as lake trout, brown trout, and black bass) would continue to use the shallow, littoral zone areas of CATIC Cove as refuge, a forage area and as spawning habitat. Forage species, such as alewife, which are anticipated to remain abundant and widely distributed throughout the Reservoir in the future without the Proposed Action, would use the shallow, sheltered waters of CATIC Cove as a spawning area. As described above, no lethal or sub-lethal impacts to the fish community due to the presence of alum floc in CATIC Cove are anticipated to occur as current and historic reservoir pH values would continue to not promote the bioavailability of aluminum (Pilgrim, 2008) (Driscoll et al., 2014).

FUTURE WITH THE PROPOSED ACTION

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging is not anticipated to result in any substantive or significant impacts to aquatic resources. Advancement of dredging and supporting activities would, however, encompass elements that warrant a review of environmental considerations associated with these activities and these are summarized below. Likewise upon further advancement of the design, extent, and duration of dredging and the development of a more detailed plan for these activities, additional environmental assessment would be completed, if necessary, including potential cumulative effects with work that may be associated with the KEC Project.

All dredged alum floc would be transported via an above-ground pipeline to a dewatering site and process filtrate would be pumped back to CATIC Cove via an additional above-ground pipeline and discharged back to Kensico Reservoir. The period of construction would be up to approximately 34 months. (See Section 2.3, "Schedule," for more detail.)

A review of the ecological literature, along with review of Kensico Reservoir water quality and benthic community surveys was conducted to assess and compare the potential changes to biotic resources (primarily benthic invertebrates and fish assemblages) within CATIC Cove and the surrounding areas of Kensico Reservoir as a result of dredging.

PLANKTON, ALGAE, AND SUBMERGED AQUATIC VEGETATION

Any SAV within the limits of dredging would be removed. This would represent a change to this community within the study area, which provides important shallow water (littoral zone) spawning and nursery habitat for fish as described below. Assuming that sediment and hydrodynamic conditions conducive to SAV growth were re-established after dredging, SAV would likely begin re-colonization of CATIC Cove the following growing season from buried rhizomes in adjacent areas and/or seed dispersal (depending on species present nearby).

BENTHIC INVERTEBRATES

Although standard BMPs would be applied throughout the duration of dredging activities, such as the use of turbidity curtains, changes to benthic invertebrate communities would occur within the active dredging areas of Kensico Reservoir (CATIC Cove and nearby waters). This would include direct removal and mortality of benthic organisms in dredged areas, and substantial disturbance (sediment resuspension, erosion, and subsequent deposition/smothering) to those areas located within the active dredging area (i.e., the area encompassed by the placement of turbidity curtains). Excess silt may suffocate some benthic organisms within these areas. Likewise, filter feeders (e.g., mollusks) may have difficulty locating and capturing food due to an increase in suspended non-edible particulates. Benthic microalgae (an important food source for deposit-feeding benthic organisms, such as aquatic worms and some crustaceans) may also be diminished during dredging activities due to a temporary decrease in light penetration to the Reservoir bottom.

Although opportunistic benthic species would initially re-colonize dredged areas within CATIC Cove soon after the completion of dredging activities, full benthic invertebrate community recovery within CATIC Cove would likely take from 2 to 5 years (Rediske et al., 2009)[29] (Wittman et al., 2012).[30] However, benthic recovery/re-colonization through natural succession could be impaired and/or delayed, should dredging-induced changes result in alterations of the existing sediment and physical characteristics of the Cove (e.g., bathymetry, sediment texture, nutrient availability, and other factors). These dredging-induced changes could promote colonization by a less diverse (i.e., species that are more opportunistic or pollutant tolerant) benthic assemblage able to exploit these early post-dredging conditions, as many of these species (especially chironomids and aquatic worms) are short-lived, exhibit high rates of reproduction, and have high larval availability (Rediske et al., 2009) (Wittman et al., 2012).

In summary, dredging to remove alum floc in CATIC Cove could affect benthic invertebrate assemblages within the potential dredging area, as well as in adjacent areas in comparison to the future without the Proposed Action in which existing alum floc would be left in place, undisturbed. These areas presently support benthic invertebrate communities, which are stable and comparable to benthic habitats not subject to alum floc deposition in adjacent areas of CATIC Cove. Dredging to remove the existing alum floc would result in substantial disturbance to these benthic assemblages compared to the future without the Proposed Action. Dredging would require an assessment of the environmental consideration of more substantive disturbance of the benthic community than that associated with the future without the Proposed Action.

FISH

While BMPs would be applied throughout the dredging activities, potential changes to fish communities would occur within the active dredging areas (CATIC Cove and nearby waters) and other areas of Kensico Reservoir. Alteration of fish habitat in CATIC Cove due to disturbances to nursery, foraging, and refuge habitat for a variety of species, especially those which prey on benthic invertebrates, would need to be considered. These species would need to seek alternative foraging areas, potentially increasing competition for prey resources and forage habitat elsewhere in the Reservoir. Alteration of fish habitat (e.g., deeper areas, reduced or altered benthic community and changes in substrate characteristics) could

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[29] Rediske, R.R., L.B. Nederveld, Y. Hong, K. Rieger, N.W. MacDonald, J.P. Dunn and D.G. Uzarski. 2009. Assessment of Benthic Invertebrate Populations in the Muskegon Lake Area of Concern. MR-2009-1. Prepared for Michigan Department of Environmental Quality.

[30] Wittman, M.E., S. Chandra, J.E. Reuter, A. Caires, S.G. Schladow and M. Denton. 2012. Harvesting an Invasive Bivalve in a Large Natural Lake: Species Recovery and Impacts on Native Benthic Macroinvertebrate Community Structure in Lake Tahoe, USA. Aquatic Conservation: Marine and Freshwater Ecosystems 22: 588-597.

result in altered habitat value by promoting changes in abundance and distribution of characteristic prey resources for bottom-feeding fish species for potentially two to four years within the Cove after the completion of dredging.

In addition, some species or individuals' ability to move to other locations may also be hindered by the proposed BMPs (e.g., turbidity curtain) at CATIC Cove, in combination with the physical effects of elevated levels of resuspended sediments in the areas of active dredging. These would potentially impair feeding ability (e.g., for larval fish, or planktivores such as alewife) in the vicinity of dredging activities. Larval and juvenile fish, in particular, are especially susceptible to turbidity impacts, as their gills may become clogged or abraded by floating particulates (Auld and Schubel, 1978).[31] Elevated levels of suspended sediment may also reduce available planktonic food resources in the dredging areas. This is a potentially more important consideration for dredging which would result in significantly elevated levels of turbidity within a relatively limited area, CATIC Cove, as opposed to potential changes due to increased turbidity levels within the Reservoir as a whole or a larger stream or river system.

Shallow water (littoral zone) environments within Kensico Reservoir represent important spawning and nursery habitat for a variety of fish species, including lake trout, an important game species in the Reservoir, and alewife, the primary forage species for lake trout and other game species present. Historically (prior to 2011) NYSDEC stocked lake trout in Kensico Reservoir, and the agency continues to stock brown trout annually; however, natural reproduction by both species also takes place in the Reservoir, with eggs present in shallow spawning areas from November through April, and newly hatched fish present through early June. These sensitive early life stages would be susceptible to smothering (in the case of eggs) and gill abrasion (in the case of larvae/juveniles), should they occur in the vicinity of CATIC Cove during dredging activities.

In summary, dredging to remove alum floc in CATIC Cove may introduce significant changes to fish communities when compared to the future without the Proposed Action including the direct disturbance to nursery, foraging, and refuge habitat for a variety of game species, such as black bass, yellow perch, lake trout, and stocked brown trout.

8.3.3 WETLANDS

This section presents an assessment of the potential for significant adverse impacts associated with the delay of the dredging of alum deposits, and identifies environmental considerations that would potentially be associated with dredging on wetlands within the Kensico Reservoir study area.

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging is not expected to result in any substantive impacts to wetlands. However, dredging activities may present specific areas that warrant environmental consideration within the context of the overall Proposed Action and these are identified within this section.

BASELINE CONDITIONS

Wetlands that potentially occur within the Kensico Reservoir study area and its vicinity are shown on **Figure 8.3-11** and were identified through a desktop evaluation of NYSDEC freshwater wetlands maps and the USFWS NWI maps. There are no NYSDEC-mapped wetlands or NYSDEC check zones in the study area. Check zones are reflected within the NYSDEC Environmental Resource Mapper and usually encompass areas, typically contiguous to mapped wetlands that may contain NYSDEC-regulated

[31] Auld, A.H. and J.R. Schubel. 1978. Effects of Suspended Sediment on Fish Eggs and Larvae: a Laboratory Assessment. Estuarine and Coastal Marine Science 6:153-164.

wetlands. However, there are NWI-mapped wetlands within the study area. NWI uses the Cowardin Classification System as described in Classification of Wetlands and Deepwater Habitats of the United States (1979) to best describe the habitat, dominant vegetation type, substrate, and hydrologic regime for mapped wetlands and deepwater habitats. A breakdown of these watercourses and wetlands by Cowardin classification and approximate acreage within the Kensico Reservoir study area is provided in **Table 8.3-7** and **Table 8.3-8**. The acreages in **Table 8.3-7** reflect the NWI-mapped Cowardin classification.

Kensico Reservoir is classified by NWI as a Lacustrine, Limnetic, Unconsolidated Bottom, Permanently Flooded, Diked/Impounded (L1UBHh) deepwater habitat. NWI depicts six small stormwater ponds as Palustrine, Unconsolidated Bottom, Manmade, Excavated (PUBHx) or as Palustrine, Unconsolidated Bottom, Manmade, Diked/Impounded (PUBHh) wetlands; four on Watercourse 9 and two on Watercourse 14. NWI also depicts a small (approximately 0.02 acres) Riverine, Unknown Perennial, Unconsolidated Bottom, Permanently Flooded wetland (R5UBH) along the waterside of the CATIC site, listed as Wetland 1 in **Table 8.3-7**. In addition, NWI depicts a Palustrine Forested, Broad-Leaved Deciduous, Seasonally Flooded wetland (PFO1C), approximately 0.34 acres in size, in the headwaters of Watercourse 14 and identified as Wetland 2 in **Table 8.3-7**.

There is also a wetland feature within the study area north of Nanny Hagen Road, listed as Watercourse 15 in **Table 8.3-7**, that does not appear to be hydrologically connected to Kensico Reservoir; it is mapped as a R5UBH wetland.

NWI maps identify 14 small tributaries to the western side of Kensico Reservoir within the study area, classified as wetland resources. Eight of these tributaries are mapped by NWI as Palustrine Forested, Broad-Leaved Deciduous, Temporarily Flooded (PFO1A) wetlands. As these are linear features following a topographic gradient, these resources are best considered as watercourses. Of the remaining six small tributaries, four are mapped as Riverine, Intermittent, Streambed, Seasonally Flooded (R4SBC) wetlands, and two are mapped as Riverine, Upper Perennial, Unconsolidated Bottom, Permanently Flooded (R3UBH) wetlands.

Figure 8.3-11 also contains areas identified as potentially containing hydric soils by the Natural Resources Conservation Service (NRCS). NRCS maps areas as hydric soils if they contain a major or minor component that is at least part hydric.

A previous vegetation, watercourse, and wetlands assessment was conducted in August and September 2007. The watercourses and wetlands were identified using guidance from the 1995 New York State Freshwater Wetlands Delineation Manual and the 1987 Corps of Engineers Wetland Delineation Manual. The study identified a series of small perennial and intermittent watercourses; many were associated with existing stormwater BMPs. Most of the watercourses identified in 2007 featured a riprap, cobble, or rock substrate. Most of the wetlands were associated with the watercourses, having formed within the channels or along the stream banks. The identified wetlands featured mainly herbaceous vegetation; noted invasive species were Japanese stiltgrass *(Microstegium vimineum)* and common reed *(Phragmites australis).*

Table 8.3-7. Breakdown of Cowardin Wetlands and Deepwater Habitats and Area within the Kensico Reservoir Study Area

Feature Description	Cowardin Classification	Considered As	Approximate Area Within the Study Area/Comments
Watercourse 1	PFO1A	R4SBC	0.22 acre
Watercourse 2	R3UBH	NA	0.26 acre
Watercourse 3	PFO1A	R4SBC	0.33 acre
Watercourse 4	PFO1A	R4SBC	0.63 acre
Watercourse 5	PFO1A; R4SBC	R4SBC	0.6 acre
Watercourse 6	PFO1A; R4SBC	R4SBC	0.48 acre
Watercourse 7	R4SBC	NA	0.25 acre
Watercourse 8	PFO1A	R4SBC	0.46 acre
Watercourse 9	R3UBH	NA	0.22 acre
Watercourse 10	PFO1A	R4SBC	0.32 acre
Watercourse 11	R4SBC	NA	0.3 acre
Watercourse 12	PFO1A	R4SBC	0.39 acre
Watercourse 13	R4SBC	NA	0.75 acre
Watercourse 14	R4SBC	NA	0.33 acre
Watercourse 15	R5UBH	NA	0.03 acre; north of Nanny Hagen Road
Pond 1[1]	PUBHh	NA	0.04 acre; stormwater pond located on Watercourse 9

Table 8.3-7. Breakdown of Cowardin Wetlands and Deepwater Habitats and Area within the Kensico Reservoir Study Area (Continued)

Feature Description	Cowardin Classification	Considered As	Approximate Area Within the Study Area/Comments
Pond 2[1]	PUBHx	NA	0.04 acre; stormwater pond located on Watercourse 9
Pond 3[1]	PUBHx	NA	0.2 acre; stormwater pond located on Watercourse 9
Pond 4[1]	PUBHh	NA	0.2 acre; stormwater pond located on Watercourse 9
Pond 5[1]	PUBHx	NA	0.15 acre; stormwater pond located on Watercourse 14
Pond 6[1]	PUBHx	NA	0.06 acre; stormwater pond located on Watercourse 14
Wetland 1[1]	R5UBH	NA	0.02 acre; feature not observed during other surveys
Wetland 2[1]	PFO1C	NA	0.34 acre; headwaters of Watercourse 14
Kensico Reservoir	L1UBHh	NA	115.9 acres with the study area

Note:
[1] These ponds/wetlands are too small to be visible on **Figure 8.3-11**.
NA – Not applicable

Table 8.3-8. Total Area by Cowardin Wetland and Deepwater Habitat Types within the Kensico Reservoir Study Area

Wetland Type	Approximate Area (Acres)
Forested/Shrub (PFO1C)[1]	0.3
Freshwater Pond (PUBHh, PUBHx)	3.8
Riverine (R4SBC, R3UBH, R5UBH)	5.6
Lacustrine (L1UBHh)	115.9
TOTAL	125.6

Note:
[1] Does not include the tributaries with Cowardin Classification of Palustrine Forested, Broad-Leaved Deciduous, Temporarily Flooded (PFO1A) wetlands that were considered watercourses. These were included with the Riverine wetland type.

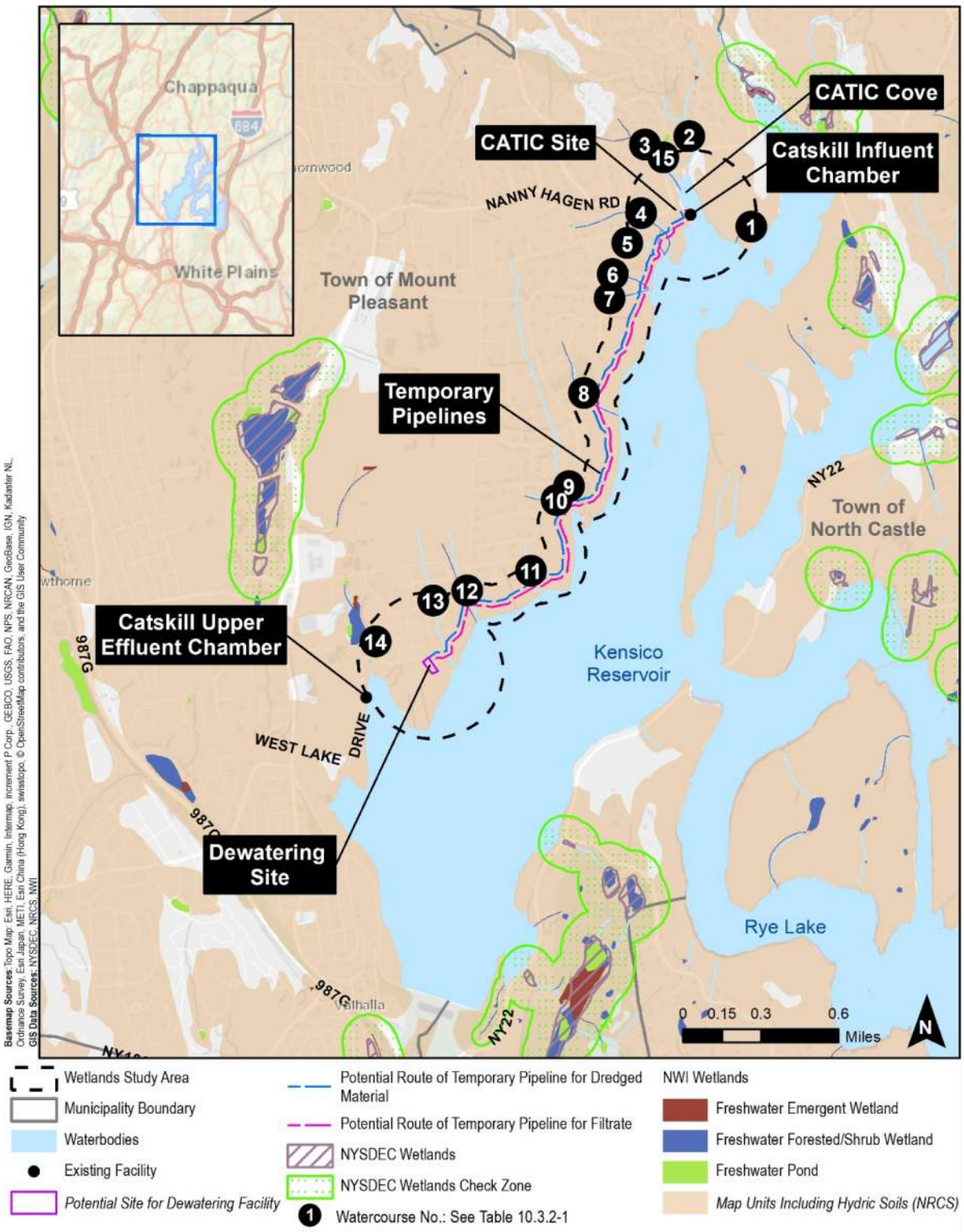

Figure 8.3-11
Kensico Reservoir Study Area
Wetlands

FUTURE WITHOUT THE PROPOSED ACTION

In the future without the Proposed Action, it is assumed that wetlands within the study area would be the same as baseline conditions. DEP has consulted with the Town of Mount Pleasant and Westchester County, and has not been informed of any upcoming projects or developments that would alter wetlands within the study area. In the future without the Proposed Action, changes in habitat due to natural vegetative succession or invasive plant species (common reed), plant diseases (oak wilt [*Bretziella fagacearum*]), or effects of insect pests (Emerald Ash Borer [*Agrilus planipennis*] and woolly adelgid [*Adelges tsugae*]) are anticipated to continue. These changes could affect the future plant species composition/dominance within these wetlands, but are not expected to change the extent of wetlands.

In addition, DEP will be implementing its KEC Project in the future without the Proposed Action. The KEC Project is comprised of several elements which could have potential short term effects on wetlands in the study area. These activities would largely occur south and west of the proposed dewatering site and alum floc deposition area. The KEC Project would be the subject of a separate environmental review.

FUTURE WITH THE PROPOSED ACTION

The delay of dredging, as discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," would not result in any significant impacts to wetland resources in comparison to the future without the Proposed Action condition. Advancement of dredging and supporting activities would, however, encompass elements that warrant further environmental considerations; these are identified and summarized below.

Prior to commencement of construction activities within the Kensico Reservoir study area, silt fencing would be installed to limit and/or prevent the potential migration of soils and runoff. Stormwater runoff would be managed in accordance with applicable State, local, and DEP requirements and a Soil Erosion and Sediment Control Plan would be prepared.

Construction of the approximately 2.3 mile temporary pipelines from the CATIC site to the dewatering site would require crossing of riverine wetlands, considered for this analysis to be watercourses (Watercourses 4 through 13). The pipelines would be installed along an existing Consolidated Edison easement access road. Some minor grading and clearing would be required to install the temporary pipelines, as well as several temporary, culverted watercourse crossings for the roadway. Crushed stone would be placed at crossings to support the pipelines. The crushed stone for the pipelines would be placed at a far enough distance from the edge of the watercourses to avoid placing fill in these regulated water features. Culverts would be properly sized and pitched as to not be an impediment to baseline runoff and flow patterns.

Prefabricated structures for air vents and drainage valves would also be installed along the temporary pipelines and would have the potential for discharge to the streams that cross the pipeline route. These air vents and drainage valves, however, would be drained only when necessary. To the extent possible, construction BMPs would be implemented by the contractor to contain and/or limit any potential discharge from these pipelines to surface water.

The dredging activities would be within Kensico Reservoir and would not result in changes to wetlands upgradient of the Reservoir. Proper installation and maintenance of sedimentation control features (such as silt curtains) would limit any potential for the re-deposition of sediment on nearby wetlands during dredging.

Neither construction of the dewatering facility and temporary pipelines nor dredging-related activities would affect non-riverine wetlands. The construction and dredging-related activities would be temporary, limited in nature, and would include the engineering controls discussed above. Federal, State, and local permits would be obtained prior to construction, as required, and construction and dredging-related activities would be performed in compliance with permit conditions and other regulatory requirements.

Following completion of the construction and dredging-related activities, the project sites would be returned to baseline conditions. Upon the further advancement of the design, extent, and duration of dredging and the development of a more detailed plan for dredging, additional environmental assessment would be completed, if necessary, including potential cumulative effects with work that may be associated with the KEC Project.

8.3.4 TERRESTRIAL AND WILDLIFE RESOURCES

This section presents an assessment of the potential for significant adverse impacts associated with the delay of the dredging of alum deposits, which includes an analysis of the potential for the Proposed Action to result in changes to wildlife or terrestrial habitat within the Kensico Reservoir study area.

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging is not expected to result in any substantive impacts to terrestrial and wildlife resources. However, as dredging activities would involve environmental considerations that warrant further discussion within the overall context of the Proposed Action, these are also discussed within this section.

BASELINE CONDITIONS

This section summarizes terrestrial (vegetation) and wildlife resources that are known or expected to be present in the vicinity of Kensico Reservoir based on land cover mapping and studies of the area around the Reservoir or the region. Vegetation resources include habitat communities, land cover types, and species documented to be present. Wildlife resources include avian, reptile, amphibian, and mammalian species and federal and State Threatened, Endangered, and Special Concern Species that have the potential to be present within the Kensico Reservoir study area.

TERRESTRIAL RESOURCES

The Kensico Reservoir study area is comprised of numerous land cover types. The USGS National Land Cover Dataset (2011)[32] was consulted to determine which land cover types make up the majority of the study area (**Figure 8.3-12, Table 8.3-9**). Upon review of the dataset, land cover types within the study area include deciduous forest (beech-maple mesic forest), evergreen forest, and woody wetlands. Based on these land cover types in the USGS National Land Cover Dataset, the Edinger et al. Ecological Communities of New York State (2014), compiled for NYSDEC, was consulted to determine representative species and conditions present in each community type.

[32] U.S. Geological Survey (USGS). 2011. USGS National Land Cover Dataset (NLCD).

Table 8.3-9. National Land Cover Data for the Kensico Reservoir Study Area[1]

Land Cover Type (Edinger Community)	Approximate Area (Acres)	Percent of Study Area[1]
Deciduous Forest	194	42.8%
Evergreen Forest	26	5.8%
Woody Wetlands	15	3.4%
Mixed Forest	1	0.3%
Emergent Herbaceous Wetlands	1	0.3%

Note:
1 The remaining area is developed (approximately 119 acres [26.4 percent]) or open water (approximately 95 acres [21.1 percent]). Open water areas are discussed in Section 8.3.2, "Aquatic (Fish and Benthic) Resources."

Source: Edinger et al. Ecological Communities of New York State, dated 2014; USGS National Land Cover Dataset, dated 2011.

Several studies of plant communities have been completed within the Kensico Reservoir study area in support of previous projects undertaken by DEP. A vegetation and wetlands assessment of the study area was conducted by DEP in August and September 2007. Additionally, as discussed in the Water for the Future: Upstate Water Supply Resiliency FEIS, a habitat and vegetation survey was conducted in October 2014 and in August 2015 in the Kensico Reservoir study area. Based on these studies, the Kensico Reservoir study area is dominated by deciduous forest with small pockets of freshwater riverine and emergent and forested wetlands associated with stream drainages and floodplains (**Table 8.3-9**; see Section 8.3.3, "Wetlands," for more information). The forest community is part of a much larger forest community that borders Kensico Reservoir. It is best characterized as a beech-maple mesic forest (Edinger et al., 2014). Tree species observed within the community include black gum (*Nyssa sylvatica*) and white pine (*Pinus strobus*), with an understory of shagbark hickory (*Carya ovata*), red oak (*Quercus rubra*), Norway maple (*Acer platanoides*), and American beech (*Fagus grandifolia*). As discussed in the Water for the Future: Upstate Water Supply Resiliency FEIS, Garlic mustard (*Alliaria petiolata*), pansy (*Viola* spp.), and striped wintergreen (*Chimaphila maculata*) were observed within the herbaceous strata in the forested areas.

In addition to forested areas, herbaceous and maintained lawn areas are present within the Kensico Reservoir study area. Plant species observed in the herbaceous communities include: Canada lettuce (*Lactuca canadensis*), sensitive fern (*Onoclea sensibilis*), goldenrod species (*Solidago* spp.), and poison ivy (*Toxicodendron radicans*). Species within the mowed lawn include mixed grasses that were not identified to species, given that they are mowed or maintained on a regular basis. Vegetation observed in upland areas during vegetation surveys in 2014 and 2015 are presented in **Table 8.3-10**.

Table 8.3-10. Upland Vegetation Inventory Observed During 2014 and 2015 Site Visits

Common Name	Scientific Name
Trees	
Sugar maple	*Acer saccharum*
Sweet birch	*Betula lenta*
Shagbark hickory	*Carya ovata*
American beech	*Fagus grandifolia*
Black gum	*Nyssa sylvatica*
Norway spruce	*Picea abies*
White pine	*Pinus strobus*
Black cherry	*Prunus serotina*
White oak	*Quercus alba*
Norway maple	*Acer platanoides*
Red oak	*Quercus rubra*
Tuliptree	*Liriodendron tulipifera*
Shrubs	
Japanese barberry	*Berberis thunbergii*
Honeysuckle species	*Lonicera* spp.
Multiflora rose	*Rosa multiflora*
Japanese honeysuckle	*Lonicera japonica*
Herbaceous	
Garlic mustard	*Alliaria petiolata*
Spreading dogbane	*Apocynum androsaemifolium*
Biennial wormwood	*Artemisia biennis*
Common mugwort	*Artemisia vulgaris*
Striped wintergreen	*Chimaphila maculata*
Queen Anne's lace	*Daucus carota*
Barnyard grass	*Echinochloa crus-galli*
Pilewort	*Erechtitets hieraciifolius*
Canada lettuce	*Lactuca canadensis*
Bird’s-foot trefoil	*Lotus corniculatus*
Sensitive fern	*Onoclea sensibilis*
Timothy-grass	*Phleum pratense*
Christmas fern	*Polystichum acrostichoides*
Japanese knotweed	*Polygonum cuspidatum*
Goldenrod species	*Solidago* spp.
Red clover	*Trifolium pratense*
Mullein	*Verbascum thapsus*
Pansy species	*Viola* spp.
Vine	
Virginia creeper	*Parthenocissus quinquefolia*
Poison ivy	*Toxicodendron radicans*

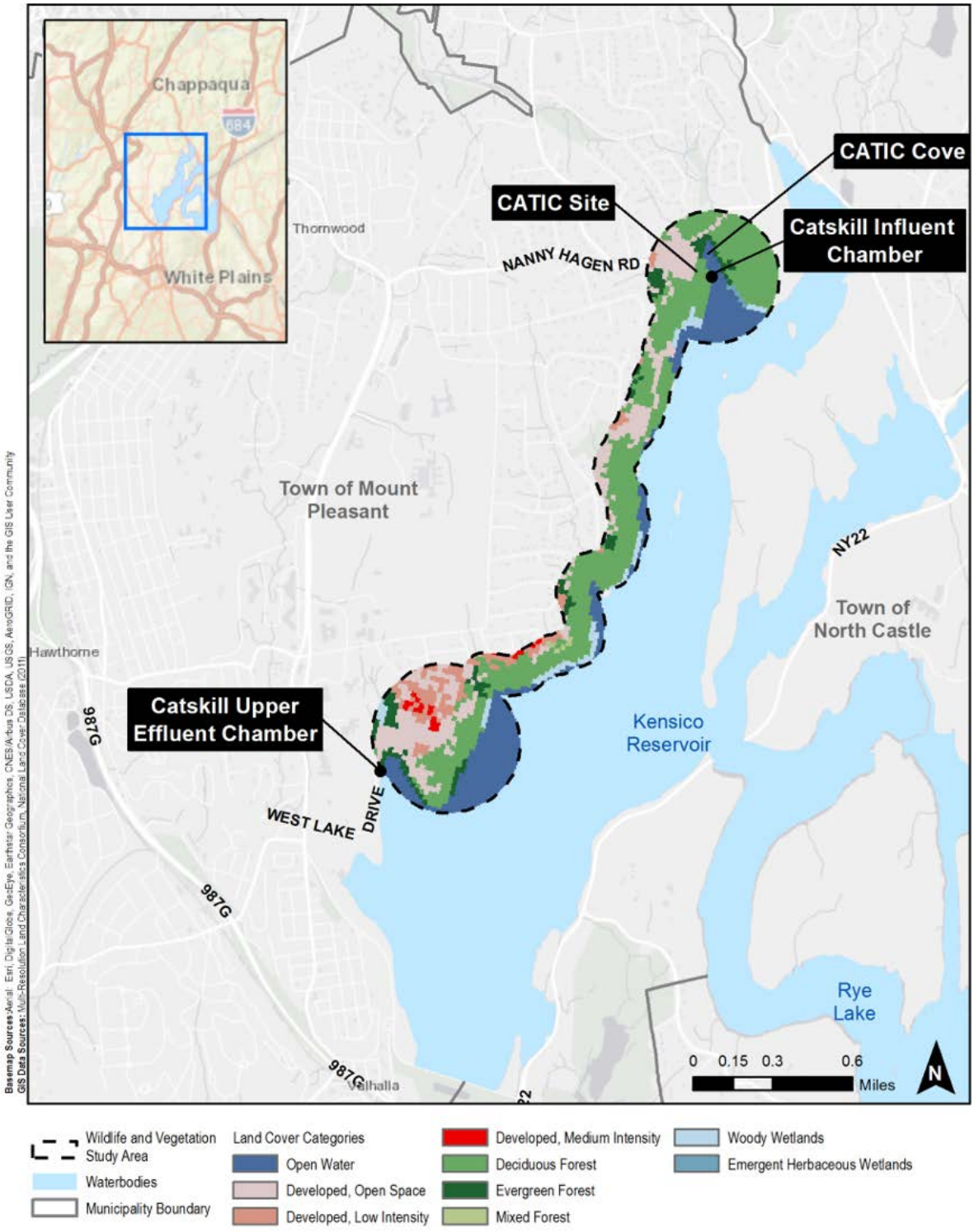

Figure 8.3-12
Kensico Reservoir Study Area
National Land Cover Data

WILDLIFE RESOURCES

The study area includes several different wildlife habitats including deciduous forest, wetlands, and open water. **Table 8.3-10** summarizes the plant species that may be found within the uplands in the vicinity of the study area. Further information on wetlands and open water habitats can be found in Section 8.3.3, "Wetlands," and Section 8.3.1, "Water Resources and Water Quality," respectively. Potential wildlife species were compiled by considering the habitats that are present within the study area, reviewing baseline resources, and documenting observations made during site visits conducted in May, August, and September of 2007 and October 2014 and August 2015, as discussed in the Water for the Future: Upstate Water Supply Resiliency FEIS.

Avian Species

A list of avian species expected to be present in the project vicinity was compiled by considering habitats that are present within the study area based on the USGS National Land Cover Dataset and consulting the Second Atlas of Breeding Birds in New York State (McGowan and Corwin, 2008).[33] The species identified are present in one or more of the following Breeding Bird Atlas Blocks: 5955D, 5954B, 6054A, and 6055C. The Breeding Bird Atlas is the result of a five-year survey in which the State was divided into three-mile by three-mile survey blocks that were assessed for breeding bird species by State biologists, researchers, and volunteer ornithologists and bird watchers. This data is available in a database through the NYSDEC website. Additionally, as noted above, observations made during site visits conducted in May, August, and September of 2007 and in October 2014 and August 2015, were considered.

Amphibian and Reptile Species

A list of amphibian and reptile species anticipated to inhabit the project vicinity was compiled by considering the habitats that are present within the study area based on the USGS National Land Cover Dataset (2011), and consulting the NYSDEC Amphibian and Reptile Atlas (Herp Project) (2000) and The Amphibians and Reptiles of New York State (Gibbs et al., 2007).[34] The Herp Atlas is a statewide survey of amphibians and reptiles that was conducted over 10 years starting in 1990. The Herp Atlas information is organized by USGS 7.5-minute quadrangles and is also available through the NYSDEC website. It is reliant on public reporting of species observations and locations. The quadrangles searched in the Herp Atlas included Bedford, Harrison, New Castle, and Greenburgh. Additionally, as noted above, observations made during site visits conducted in May, August, and September of 2007, and in October 2014 and August 2015 were considered.

Mammals

A list of mammal species was compiled by considering habitats that are present within the study area based on the USGS National Land Cover Dataset (2011), and consulting the NYSDEC Mammals of New York State provided in the NYSDEC *Conservationist* Magazine (2003), and the Loarie (2018)[35] iNaturalist internet resource, a joint initiative between the California Academy of Sciences and the National Geographic Society. The *Conservationist*, published six times a year by the NYSDEC, provides informative articles focused on New York State, including environmental and natural history topics. The iNaturalist internet resource provides biodiversity mapping and observation information from naturalists, citizen scientists, and biologists from across the globe. Species observations at a particular location

[33] McGowan, K.J. and K. Corwin. The Second Atlas of Breeding Birds in New York State. Comstock Publishing Associates.

[34] Gibbs, J.P., A.R. Breisch, P.K. Ducey, G. Johnson, J.L. Behler and R.C. Bothner. 2007. The Amphibians and Reptiles of New York State: Identification, Natural History, and Conservation. Oxford University Press.

[35] Loarie, S. 2018. Mammals of New York State.

(i.e., Westchester County) can be filtered for licensed, research-grade observations, indicating the community agrees on the species-level identification or lower (i.e., when more than two-thirds of identifiers agree on a taxon). All species observations undergo a Data Quality Assessment to summarize an observation's accuracy, completeness, and suitability for sharing with data partners (Loarie, 2018). Additionally, observations made during site visits conducted in May, August, and September of 2007, and in October 2014 and August 2015 were considered.

THREATENED AND ENDANGERED SPECIES

The New York Natural Heritage Program (NYNHP) Database was searched to obtain information on any known occurrences of federally- or State-listed animals or plants, or significant habitats in the immediate vicinity of the Kensico Reservoir study area. Correspondence with the NYNHP in May 2018 indicated "no records of rare or State-listed animals or plants, or significant natural communities at the project site or in its immediate vicinity." The USFWS Information, Planning and Consultation System (IPaC) was consulted for the Kensico Reservoir study area in January 2019. According to the IPaC, two species were listed as potentially occurring near the study area. These include the federally-endangered Indiana bat (*Myotis sodalis*) and the federally-threatened northern long-eared bat (*Myotis septentrionalis*). Additionally, the Bald Eagle (*Halieaeetus leucocephalus*) and Golden Eagle (*Aquila chrysaetos*) are protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act (MBTA), and the Osprey (*Pandion haliaetus*) and Sharp-shinned Hawk (*Accipiter striatus*) are protected under the MBTA.

RARE PLANT OR ANIMALS OR SIGNIFICANT NATURAL COMMUNITIES

A review of the NYSDEC's Environmental Resource Mapper and NYSDEC's Natural Heritage Program correspondence indicates no presence of any rare plant or animals or significant natural communities within the current Kensico Reservoir study area.

FUTURE WITHOUT THE PROPOSED ACTION

DEP has consulted with the Town of Mount Pleasant and Westchester County and has not been informed of any upcoming initiatives or projects that would significantly affect terrestrial and wildlife resources within the study area. Natural processes, such as changes in habitat due to natural vegetative succession, would be anticipated to continue. In addition, DEP will also be implementing its KEC Project in the future without the Proposed Action. This would involve multiple elements including work within and adjacent to Kensico Reservoir in proximity to the proposed dewatering site. KEC Project efforts could potentially overlap with dredging at Kensico and would be the subject of a separate environmental review.

In the future without the Proposed Action, the deciduous and evergreen forest areas in and around the study area (i.e., along the western shore of Kensico Reservoir) would continue to be an abundant forested area. The area would continue to provide potential habitat for the avian, amphibian, reptilian, and mammalian species that are or may be present under baseline conditions. Additionally, the area would continue to provide potential habitat to the threatened, endangered, or special concern species that are or may be present – in particular the Osprey, Bald Eagle, Golden Eagle, and Sharp-shinned Hawk. Trees that could offer potential habitat for Indiana or northern long-eared bats would remain in place. These include trees with crevices and small spaces that bats would be able to use for roosting, such as those listed in **Table 8.3-10**, along with black locust (*Robinia pseudoacacia*) and shagbark hickory, should they be encountered on the project sites. Forested wetlands that currently exist along the small tributaries flowing through the area into Kensico Reservoir would also remain unaffected and species that may utilize these wetlands (turtles, salamanders, frogs) would remain unaffected.

Potential indirect impacts on terrestrial and wildlife resources in the future without the Proposed Action include exposure to insect pests, including the emerald ash borer, that are impacting forested communities in the State, including Westchester County.

FUTURE WITH THE PROPOSED ACTION

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging is not anticipated to result in any significant impacts to terrestrial and wildlife resources. Advancement of dredging and supporting activities would, however, encompass elements that warrant further environmental consideration and these are identified and summarized below, as applicable.

Potential environmental considerations identified for terrestrial and wildlife resources as a result of dredging-related activities would be minor with the majority related to the clearing that would take place within the study area. As discussed in Section 8.1, "Kensico Reservoir Project Description," stormwater runoff would be managed in accordance with applicable requirements and a Soil Erosion and Sediment Control Plan would be prepared as part of dredging-related activities.

Terrestrial and Wildlife Resources

Avian and terrestrial species are anticipated to avoid the area during construction and dredging-related activities. Specifically, construction activities may include: access road improvements at the CATIC site which would involve minor clearing, grading, possible tree removal and gravel placement; the placement of temporary pipelines; and a temporary staging area associated with dewatering operations. Some species may potentially be displaced temporarily as a result of noise and construction activity, but would be able to utilize existing similar habitat in the vicinity of the study area. BMPs would be utilized during construction to avoid or limit effects to adjacent habitats. As part of dredging-related activities, a temporary perimeter fence with a gate would be installed for site security purposes at the CATIC and dewatering sites. This would serve to exclude any larger, terrestrial wildlife from the project sites such as deer and other mammals.

Construction of the approximately 2.3-mile temporary pipelines from the CATIC site would require crossing a total of 14 riverine wetlands, considered watercourses for the purposes of this EIS (see Section 8.3.3, "Wetlands"). The pipelines would be installed along an existing Consolidated Edison easement access road and some minor grading and clearing would be required to facilitate the installation. Crushed stone would be placed at crossings to support the pipelines at a far enough distance from the edge of the watercourses to avoid placing fill in these features. These watercourses may serve as wildlife corridors for some species. Some smaller wildlife species would likely be able to cross the watercourse crossings as the pipelines would be elevated above the watercourse. Smaller wildlife species that cannot utilize the watercourses nor cross the pipelines by land would temporarily be unable to access Kensico Reservoir from the study area. However, comparable habitat and corridors to the Reservoir would be available within proximity of the study area during construction.

The sites would be restored to baseline conditions and areas that did not involve the placement of gravel would be reseeded, as needed, following project completion. Any potential displacement of wildlife (mammals and birds) would be temporary with species utilizing comparable surrounding habitat and would likely return to those areas that may be disturbed as part of dredging activities. There would be some limited tree removal as part of the dredging activities, as well as potential anticipated work associated with the KEC Project; however, substantial comparable forest habitat would remain undisturbed within and in proximity to the study area.

Threatened and Endangered Species

Tree clearing could lead to loss of potential roosting habitat for threatened and endangered bat species. Prior to any tree clearing, a detailed tree survey would be completed to identify all roosting trees. These trees would be preserved, if possible, or cleared during the hibernation period (November 1 through April 1) for the bats. Based on NYNHP's response, which indicated that no rare plants, animals, or significant natural communities exist within the study area, impacts to nesting birds are not anticipated. Surveys for Bald Eagles, Golden Eagles, Osprey, and Sharp-shinned Hawks would be conducted prior to tree clearing. If active nests are located in the vicinity of the study area, BMPs would be implemented to minimize the likelihood of disturbance to nesting birds. The nearest known nest is approximately 9,600 feet from the study area. Therefore, no significant changes are anticipated to threatened and endangered species as a result of dredging.

Conclusion

The proposed construction, dredging, and dewatering activities would be temporary and limited in nature. Grading, site access, and tree removal activities are anticipated to be limited in scope. The sites would be restored to baseline conditions and areas that did not involve the placement of gravel would be reseeded, as needed, following project completion. Upon further advancement of the design, extent, and duration of dredging and the development of a more detailed plan for dredging, additional environmental assessment would be completed, if necessary, including potential cumulative effects with work that may be associated with the KEC Project.

8.3.5 PUBLIC POLICY, LAND USE, AND ZONING

This section describes existing public policies, land use, and zoning within the Kensico Reservoir study area and assesses the Proposed Action's compatibility with land use and compliance with, and effect on, the area's zoning and applicable public policies. The public policy assessment reviews consistency of the Proposed Action with existing public policies within the study area. The land use assessment considers the Proposed Action's potential effect on current and known future land uses within the study area, as well as the Proposed Action's potential effect on land use patterns. The zoning assessment reviews the compatibility of the Proposed Action with existing zoning regulations within the study area.

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging is not expected to result in any substantive impacts to public policies, land use, or zoning. Dredging activities would potentially present specific environmental considerations that would warrant further discussion and these are therefore identified and discussed within this section, as applicable.

BASELINE CONDITIONS

The public policy, land use and zoning study area for Kensico Reservoir includes a one-quarter mile study area around the CATIC and potential dewatering sites near Westlake Drive, as well as a 400-foot radius on either side of the temporary pipelines that would be installed between the CATIC and dewatering sites. The study area, as shown in **Figure 8.3-13** and **Figure 8.3-14**, is entirely within the Town of Mount Pleasant.

The following sections describe relevant public policies, land use patterns, and zoning districts applicable to the study area.

PUBLIC POLICY

Applicable local public policies were reviewed in relation to dredging-related activities within the study area. There are no applicable State policies in the study area.

Federal

Flood Disaster Protection Act of 1973

The Flood Disaster Protection Act of 1973 is applicable to the dredging-related activities, as the study area is located within the Zone A, 100-year FEMA Special Flood Hazard Area (SFHA). This act requires the purchase of flood insurance mandatory for the protection of property located in SFHAs.

Local

Westchester 2025

The Westchester 2025 Plan was adopted in May 2008 and amended in January 2010. The plan provides guidance to municipalities within Westchester County so that they may incorporate recommendations into their respective comprehensive plans. The Westchester County Department of Planning outlines 15 policies in the Westchester 2025 Plan, ranging from "Nurture economic climate" to "Define and protect community character." The following three policies are relevant to dredging-related activities:

- Policy 5 – Preserve Natural Resources

  Preserve and protect the County's natural resources and environment, both physical and biotic. Potential impacts on water resources (waterbodies, wetlands, coastal zones, and groundwater), significant land resources (unique natural areas, steep slopes, ridgelines, and prime agricultural land), and biotic resources (critical habitat, plant communities, and biotic corridors) require careful consideration as part of land management and development review and approval.

- Policy 9 – Protect Historical and Cultural Resources

  Enhance the quality of life for Westchester residents by protecting the County's cultural and historical resources, integrating their consideration into land use decisions and promoting awareness of such resources through educational programs.

- Policy 10 – Maintain Utility Infrastructur*e*

  Maintain safe and environmentally sound systems and policies for waste removal, collection, and treatment, as well as the treatment and distribution of drinking water consistent with the County's land use policies. Programs to reduce and recycle the waste stream, protect water quality, control and treat stormwater, and mitigate or reduce the impacts of flooding must be strengthened.

Open Space Initiative – Westchester County

Westchester County's Open Space Policy seeks to protect environmental integrity, recreational opportunities, and scenic quality of the County's open spaces. The County executes these goals through two approaches. The first approach is through land acquisition. As the study area is within DEP-owned land, it is not subject to this approach. In the second approach, the County acts as a facilitator of preservation actions for other agencies, municipalities, or private organizations. Policy 5 of the Open Space Initiative, below, prioritizes the protection and preservation of properties.

- Policy 5 – Environmental Resources

  It shall be the policy of the County to facilitate the protection and preservation of properties that the County has identified as having special natural, scenic, or environmental significance, such as properties that lie along shorelines or reservoirs.

Town of Mount Pleasant Comprehensive Master Plan

The Town of Mount Pleasant Comprehensive Plan was adopted in 1970. Recommendations discussed throughout the plan refer to both short- and long-term goals to guide development or address key issues of concern within the Town. The only goals relevant to the dredging-related activities are to preserve the open space that gives the Town of Mount Pleasant its semi-rural character and provide adequate recreational facilities throughout the Town.

LAND USE

The CATIC and dewatering sites as well as the temporary pipelines would be located within an area of water supply land use, as shown on **Figure 8.3-13**. Land uses within the study area to the north, east, and south consists of areas of water supply land use. Land uses within the study area to the west consists of areas of water supply land use, as well as the following land uses: single-family residential, institutional and public assembly, public parks and parkway lands (Stonegate Park), and vacant/undeveloped.

ZONING

The CATIC and dewatering sites as well as the temporary pipelines would be located within a single-family residential (R-40) zoning district, as shown on **Figure 8.3-14.** Public utility facilities, such as the Catskill Aqueduct, CATIC, and UEC, are a permitted special use within the single-family residential (R-40) zoning district. Two additional single-family zoning districts were identified within the southeast portion of the study area, specifically R-10 and R-20. Permitted principal uses allowed within these three single-family residential (R-10, R-20 and R-40) zoning districts include:

- One-family dwellings.
- Churches and other places of worship.
- Public elementary and high schools.
- Railways: railroad or public service passenger stations, including accessory services therein, and right-of-way, not including switching, storage or freight yards or sidings.
- Playgrounds, parks, parkways, libraries, firehouses, police stations to other municipal uses, not including incinerators or dumps, municipal garages or public works yards.
- Recreation areas, playgrounds, parks, swimming pools, libraries and other buildings, the use of which shall be limited solely to school district and/or municipal purposes, constructed by an individual or corporation and to be dedicated as a gift to a school district and/or municipality, provided that evidence is submitted that such school district or municipality has indicated its willingness to accept such gift.
- Municipal, State or national historic sites or museums open to the public under specific or general visitation policies and meeting the general standards of the National Trust Historic House Museum Public Visitation Program or other owner-related private visitation, educational, eleemosynary or philanthropic program, such use to be subject to site plan review by the Planning Board.

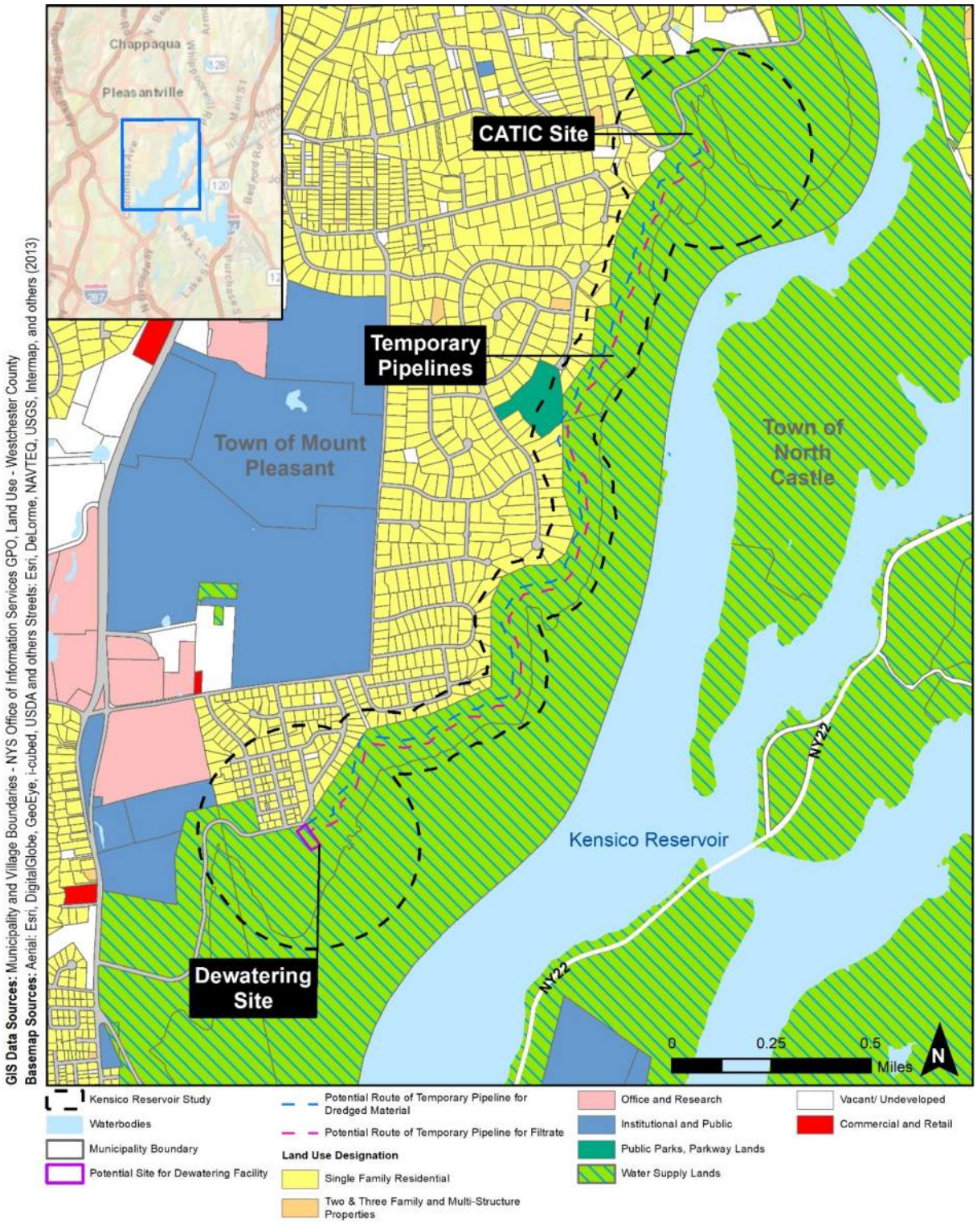

Figure 8.3-13
Kensico Reservoir Study Area
Land Use Designations

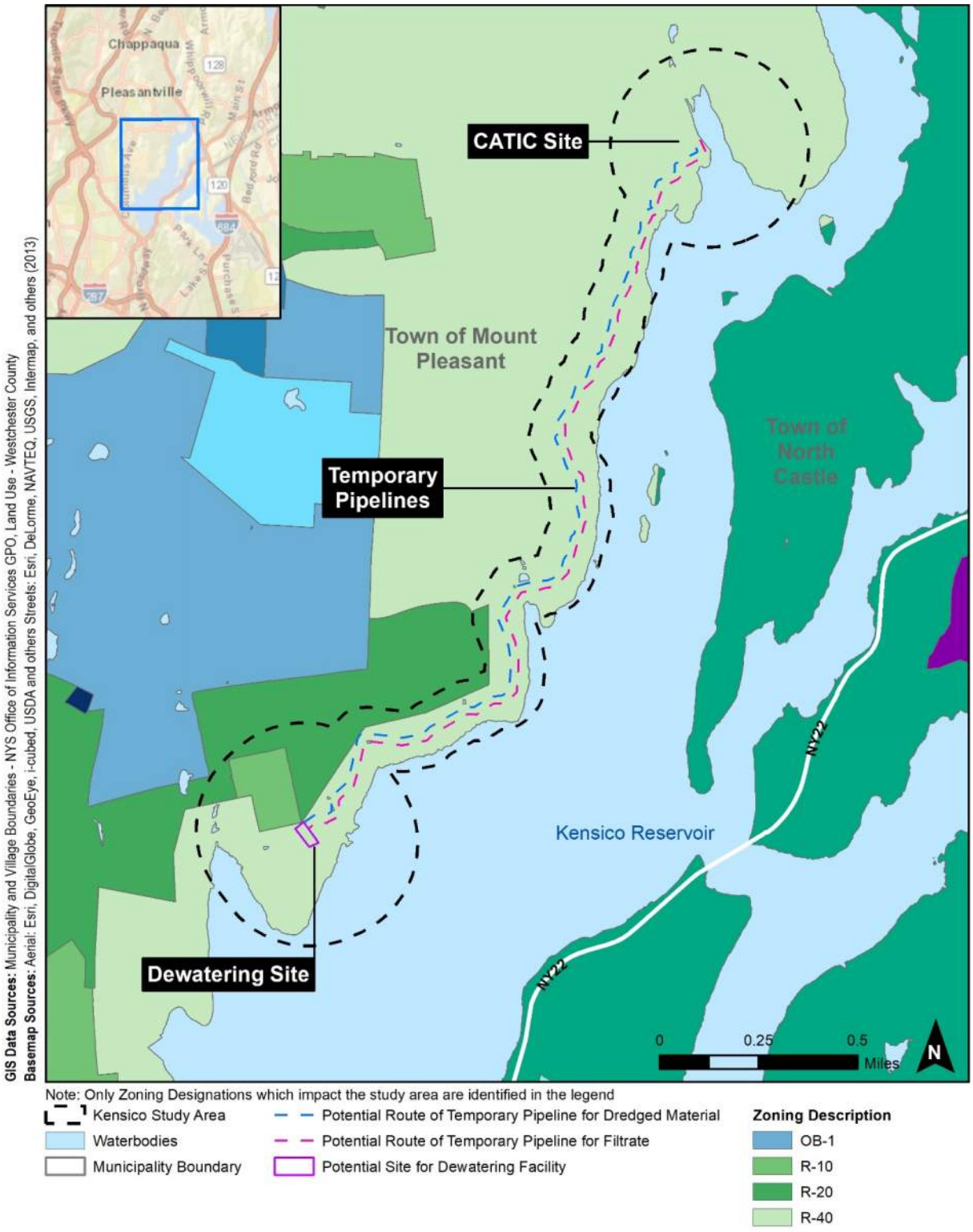

Figure 8.3-14
Kensico Reservoir Study Area
Zoning Districts

FUTURE WITHOUT THE PROPOSED ACTION

DEP has consulted with the Town of Mount Pleasant and Westchester County and has not been informed of any changes to public policy, land use, or zoning regulations planned or under development within the Kensico Reservoir study area. Therefore, it is assumed that in the future without the Proposed Action, public policies, land use, and zoning regulations would remain the same as baseline conditions. Likewise, DEP projects are not anticipated to result in substantive changes to public policy, land use, or zoning.

FUTURE WITH THE PROPOSED ACTION

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging would not result in any substantive or significant impacts or changes to public policy, land use, or zoning. Advancement of dredging and supporting activities, however, may encompass elements that warrant further environmental consideration and, as applicable, these are identified and summarized below.

Upon further advancement of the design, extent, and duration of dredging and the development of a detailed plan for dredging, additional assessment of potential environmental effects would be completed, if necessary. Cumulative effects from potential overlap with the KEC Project are not anticipated.

PUBLIC POLICY

Potential environmental considerations related to public policy associated with dredging is discussed below.

Westchester 2025

Policy 5 – Preserve Natural Resources

As discussed in Sections 8.3.1, "Water Resources and Water Quality," and 8.3.2, "Aquatic (Fish and Benthic) Resources," construction and dredging activities may cause temporary changes to the water and aquatic resources within and near CATIC Cove. Dredging to remove alum floc may introduce significant environmental impacts to benthic invertebrate assemblages within the potential dredging area. Biotic resources removed during dredging activities are anticipated to recover after completion of these activities, but may be delayed or impaired. Temporary impacts to water quality due to dredging activities would be minimized through the use of standard BMPs, such as a temporary turbidity curtain, which would be removed after dredging-related activities are fully completed. The sites would be restored to baseline conditions and areas that did not involve the placement of gravel would be reseeded, as needed, following project completion. While the dredging-related activities have the potential to cause temporary changes to natural resources, steps would be taken to minimize any impacts and site restoration would be taken upon completion of the project, if necessary. Therefore, dredging-related activities would be consistent with this policy.

Policy 9 – Protect Historical and Cultural Resources

As noted in Section 8.3.8, "Historic and Cultural Resources," dredging would not affect historical and cultural resources in the study area. Therefore, dredging activities would be consistent with this policy.

Policy 10 – Maintain Utility Infrastructure

As described in Section 8.3.11, "Infrastructure and Energy," dredging is not anticipated to require substantive needs related to infrastructure or energy. Further, as noted in Section 8.1, "Kensico Reservoir Project Description," BMPs would be used during dredging activities to protect the surrounding environment and would not result in environmental considerations related to drinking water supply or operations. Dredging and related activities would be conducted in accordance with applicable federal, State, and local regulations. Potential stormwater runoff would be managed in accordance with applicable

requirements and a Soil Erosion and Sediment Control Plan. Therefore, dredging activities would be consistent with this policy.

Open Space Initiative – Westchester County

Policy 5 – Environmental Resources

Dredging activities would not result in any environmental considerations for any properties along the Reservoir or shoreline within the study area, nor would it result in changes related to the protection and preservation of properties that the County has identified as having special natural, scenic, or environmental significance. Therefore, dredging-related activities would be consistent with this policy.

Town of Mount Pleasant Comprehensive Master Plan

Construction and dredging-related activities in the future may temporarily limit access to open space and recreation in the study area, as further discussed in Section 8.3.6, "Open Space and Recreation." However, these changes would only be short term, other recreational uses would remain available in other areas of the Reservoir during these activities and at the completion of dredging this access would be restored. Therefore, dredging-related activities would be consistent with this plan.

LAND USE AND ZONING

As described in Section 8.1, "Kensico Reservoir Project Description," proposed activities within the Kensico Reservoir study area would include improvements to the CATIC site for access to the Reservoir and for temporary equipment laydown and storage during dredging activities; construction and operation of a dewatering facility; and operation of two temporary above-ground pipelines connecting the CATIC and dewatering sites. As site alterations would be minor and temporary, dredging and related activities would not present long-term changes to existing land uses or zoning within the study area.

8.3.6 OPEN SPACE AND RECREATION

Open space and recreational resources are defined as publicly- or privately-owned land that is publicly accessible and available for leisure, play, or sport, or is set aside for the preservation of the natural environment. This section evaluates the potential effects of the Proposed Action on open space and recreation within the Kensico Reservoir study area. As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the Proposed Action includes the delay of dredging, but this is not expected to result in any substantive impacts to open space and recreational resources. However, dredging activities may present specific areas for environmental consideration within the overall context of the Proposed Action and these are therefore also identified and discussed within this section.

BASELINE CONDITIONS

The open space and recreation study area for dredging-related activities includes the area within a one-quarter mile radius surrounding both the CATIC and proposed dewatering sites, as well as the area within a 400-foot radius surrounding the proposed temporary pipelines (see **Figure 8.3-15**). In addition, the assessment evaluated the potential changes to open space and recreation due to dredging that would occur within and adjacent to CATIC Cove in the area of alum floc deposition.

The immediate vicinity of the Kensico Reservoir study area consists of wooded land, vegetated areas, and existing structures associated with DEP's water supply operations. Surrounding areas include residential development, schools, paved access roads, and Kensico Reservoir.

The study area includes portions of the western shoreline of Kensico Reservoir, which is a recreational resource. DEP provides the public with valid access permit opportunities for recreational fishing and

hunting within and surrounding the Reservoir in designated areas. Fishing is allowed from most of the shoreline within the study area, from approximately the CATIC site to the dewatering site along the northeast to southeast shorelines of Kensico Reservoir and from DEP-registered non-motorized boats. Per DEP Recreation Rules, access and recreational use are not permitted within 500 feet of any dikes, dams, tunnel outlets, spillways, buildings, and other significant water supply structures (Part 16-15(b)(1)). As such, no fishing (i.e., either from the shoreline or a boat) is permitted in the southwestern portion of the study area in the vicinity of the dewatering site, due to proximity to the UEC and DEL18. In addition, no fishing within CATIC Cove is allowed because of the proximity to the CATIC. Fishing is allowed in much of the Reservoir beyond the study area, and both shoreline fishing and hunting are permitted on the Big Peninsula, located southeast of CATIC Cove and immediately northeast of the open waters within the Reservoir.

Non-motorized boats used for fishing are launched and stored at a number of designated access points, which are located along the eastern and northeastern shorelines of Kensico Reservoir, adjacent to State Route 22 and State Route 120, respectively. These access points are well beyond the study area (see **Figure 8.3-15**).

FUTURE WITHOUT THE PROPOSED ACTION

In the future without the Proposed Action, neither dredging nor dredging activities would occur. DEP consulted with the Town of Mount Pleasant and Westchester County and has not been informed of any upcoming plans to expand or create new open space or recreational resources within the Kensico Reservoir study area. However, DEP will be implementing its KEC Project in the future without the Proposed Action. The KEC Project is comprised of several elements within the study area. These activities would all occur south and west of the proposed dewatering site and CATIC Cove in an area that does not allow recreational uses due to the presence of the Catskill UEC and DEL18. The KEC Project would be the subject of a separate environmental review

The current recreational access and use of Kensico Reservoir within the study area is expected to remain the same as baseline conditions and continue in the future without the Proposed Action.

FUTURE WITH THE PROPOSED ACTION

As discussed in Section 8.2, “Kensico Reservoir Dredging Analysis,” the delay of dredging would not result in any substantive or significant impacts to open space and recreational resources. Advancement of dredging and supporting activities would, however, encompass elements that would warrant further environmental consideration. These are identified and summarized below.

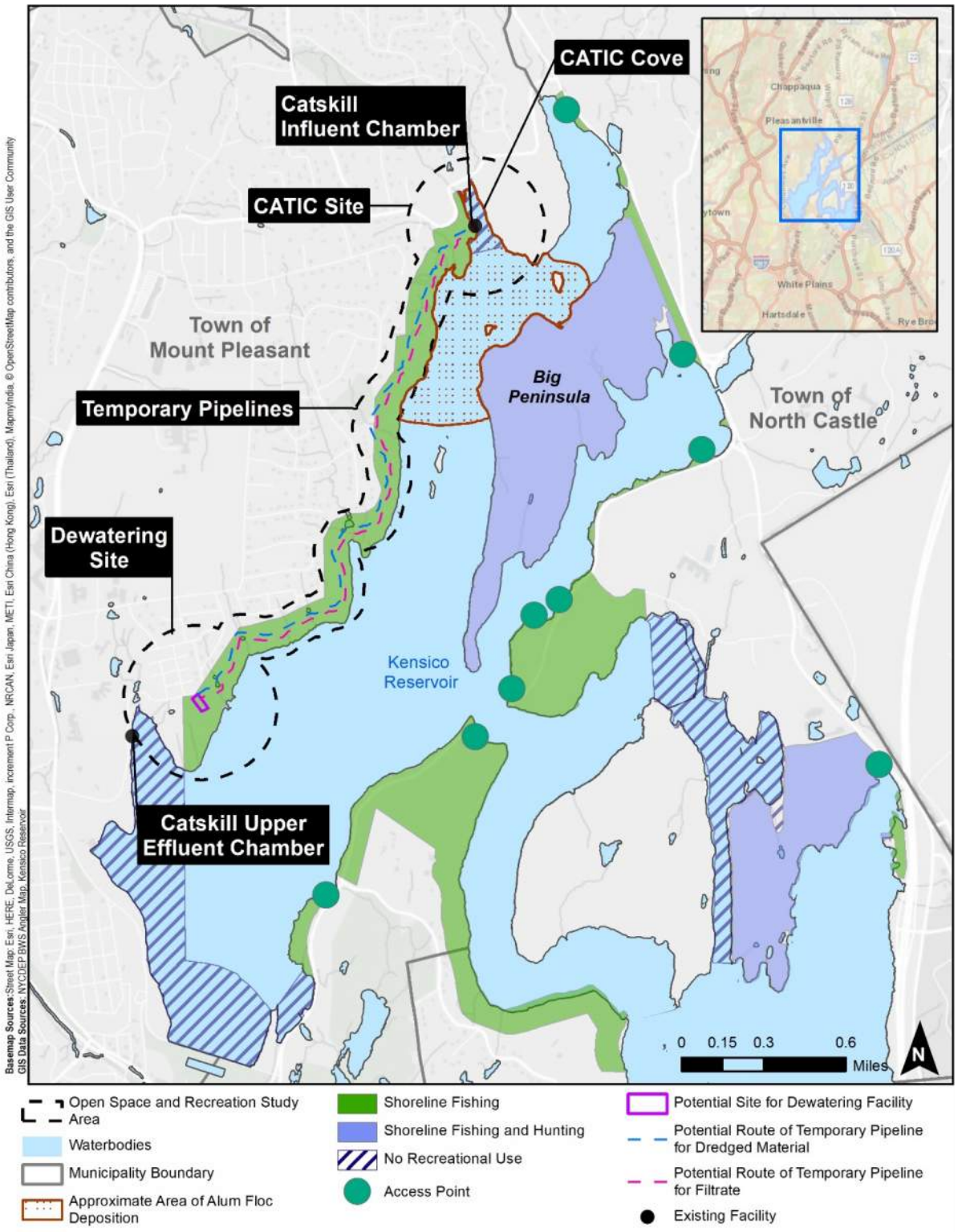

Figure 8.3-15
Kensico Reservoir Study Area
Open Space and Recreational Resources

Fishing and recreational access to CATIC Cove would remain restricted primarily due to the proximity to CATIC and this would also be the case for the area to the west and south of the dewatering site. However, fishing from the shoreline or boat would not be allowed within additional portions of Kensico Reservoir within the limits of the proposed area of active dredging due to dredging and the placement of turbidity curtains. This limitation would be for up to approximately three years until dredging is completed. However, the area where recreational access would be temporarily off-limits would represent a small area relative to the remaining areas within the Reservoir that would remain open and suitable for recreation and fishing during dredging. None of the existing access points would be affected by the dredging. Recreational activities within areas of temporary restriction would be restored upon completion of dredging activities. Upon further advancement of the design, extent, and duration of dredging and the development of a more detailed plan for dredging, additional assessment of potential effects upon open space and recreational resources would be completed, if necessary, including potential cumulative effects with work that may be associated with the KEC Project.

8.3.7 CRITICAL ENVIRONMENTAL AREAS

Critical Environmental Areas (CEAs) are specific geographic areas with exceptional or unique character as designated by local agencies and NYSDEC. Certain criteria must be met for an area to be designated as a CEA; specifically, the area must present one of the following:

- A benefit or threat to human health;
- A natural setting (fish and wildlife habitat, forest and vegetation, open space and area) of important aesthetic or scenic quality;
- Agricultural, social, cultural, historic, archaeological, recreation, or educational value; or
- An inherent ecological, geological, or hydrological sensitivity to change that may be adversely affected by any change.

This section evaluates the potential for significant adverse effects from the delay of dredging on the one CEA within the study area, but also identifies environmental considerations associated with dredging.

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the Proposed Action includes the delay of dredging, but this is not expected to result in any substantive impacts to CEAs. However, dredging activities present specific environmental considerations that warrant further discussion within the overall context of the Proposed Action and these are, therefore, identified and discussed within this section.

BASELINE CONDITIONS

The dewatering site and a portion of the temporary pipelines are within the Westchester County Airport 60 Ldn Noise Contour CEA, which was designated a CEA by Westchester County in 1990 (see **Figure 8.3-16**). Ldn is "day-night average sound level" or the equivalent sound level over a 24-hour period, modified so that noise that occurs during the nighttime (from 10 PM to 7 AM) is artificially increased by 10 decibels (dB) to reflect the added intrusiveness of nighttime noise as ambient noise becomes quieter. The contour represents the extent of low-level noise generated by airport operations determined in 1990. This area has been designated a CEA due to the potential for elevated aircraft-related noise levels, and in an effort to alert proposed noise-sensitive development, such as residences,

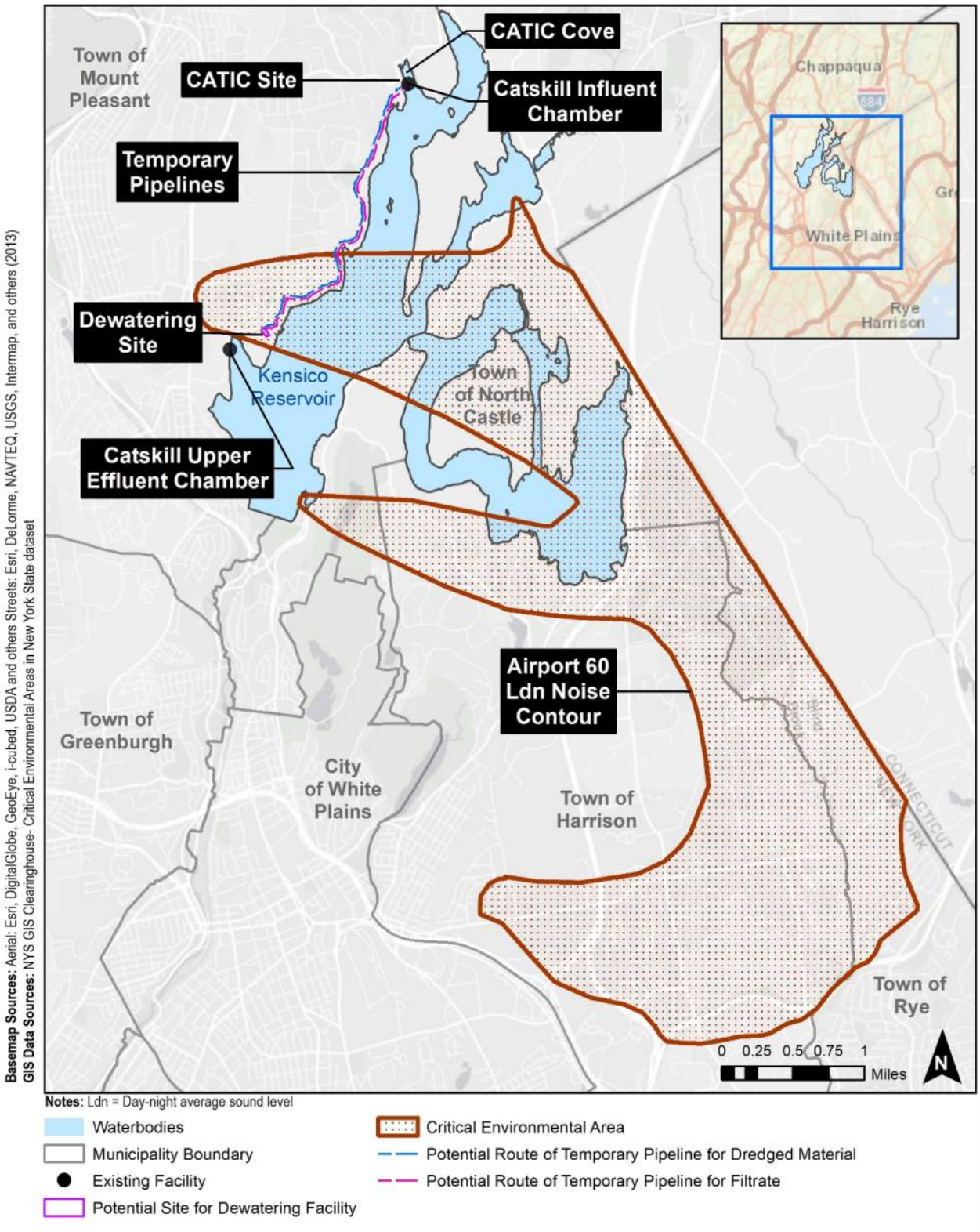

Figure 8.3-16
Kensico Reservoir Study Area
Critical Environmental Area

recreational facilities, libraries, and churches, etc.[36] An updated 2002 noise evaluation for Westchester County Airport commissioned by the Westchester County Department of Transportation determined that the extent of the 60 Ldn contour was significantly reduced from the earlier evaluations, such that it no longer intersects the Kensico Reservoir study area. However, the earlier 1990 noise contour that intersects with the anticipated location of dredging-related activities remains on the list of Westchester County CEAs on the NYSDEC website.

FUTURE WITHOUT THE PROPOSED ACTION

DEP has consulted with the Town of Mount Pleasant and Westchester County and has not been informed of any newly proposed CEAs in the study area. Likewise, no changes to the nature or limits of the existing CEA would be anticipated.

DEP would also implement its KEC Project in the future without the Proposed Action. The KEC Project is comprised of several elements which could have the potential to result in changes to noise levels within the study area, but may not be located within the actual limits of the existing CEA. KEC Project efforts could potentially overlap with the dredging at Kensico. The KEC Project would be the subject of a separate environmental review

FUTURE WITH THE PROPOSED ACTION

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging, would not result in any substantive or significant impacts to the CEA. Advancement of dredging and supporting activities would, however, encompass elements that may warrant a discussion of environmental considerations, including potential cumulative effects with work that may be associated with the KEC Project.

Potential noise from construction and dredging-related activities at the dewatering site and along the proposed temporary pipelines may result in effects within the CEA during the daytime hours when these activities would occur. However, these activities would be temporary, and changes related to noise levels identified within the CEA are not expected and when taking into account the significant reduction in the 60 Ldn contour in 2002 that would not encompass the location of the dredging activities. Therefore, dredging activities would not result in changes that would affect the CEA.

8.3.8 HISTORIC AND CULTURAL RESOURCES

Historic and archaeological resources encompass buildings, structures, sites, districts, and objects of historical, aesthetic, cultural, and archaeological importance. This section describes historic and archaeological resources within or partially within the Kensico Reservoir study area and evaluates the potential for significant adverse impacts from delaying the dredging of alum deposits at Kensico Reservoir and identifies environmental considerations associated with the dredging of these deposits on these resources.

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging is not expected to result in any substantive impacts to historic and archaeological resources. However, dredging activities may present specific environmental consideration that warrant additional discussion in the overall context of the Proposed Action and these are, therefore, also identified and discussed within this section.

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[36] Noise levels below 65 Ldn are generally considered compatible with residential and other sensitive land uses by the Federal Aviation Administration (FAA), and the U.S. Department of Housing and Urban Development (HUD), among other federal agencies.

BASELINE CONDITIONS

The study area for historic and cultural resources in the vicinity of Kensico Reservoir includes a one-quarter mile area around the CATIC site and the potential dewatering site, as well as 400 feet on either side of two temporary pipelines that would be installed between the two sites (see **Figure 8.3-17**).

An assessment of historic and cultural resources located within the study area related to both architectural resources, which encompass above-ground resources of historic or cultural significance, and archaeological resources, which include subsurface resources of historic or cultural significance was completed. The New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP) Cultural Resource Information System (CRIS) does not identify any architectural resources within the study area.

NYSOPRHP CRIS also does not identify any archaeological resources within the study area. However, CRIS has record of an archaeological survey previously conducted within the study area limits. This assessment was previously completed for another DEP project at Kensico Reservoir. As discussed in the Final Environmental Impact Assessment for the Catskill/Delaware UV Facility, the survey stated that the area's physiographic profile suggests Native Americans likely used the area for settlement, camp sites, and food procurement and there are documented pre-contact archaeological sites within a two-mile radius. However, the assessment stated that areas near Kensico Reservoir were not sensitive due to historic period disturbance, namely the construction of the Catskill Aqueduct.

FUTURE WITHOUT THE PROPOSED ACTION

In the future without the Proposed Action, conditions would remain unchanged. DEP has consulted with the Town of Mount Pleasant and Westchester County and has not been informed of any upcoming projects or structures that would alter historic and cultural resources within the study area. Likewise, DEP will also be implementing its KEC Project in the future without the Proposed Action. The KEC Project is comprised of several elements within the study area. These activities would, however, all occur south and west of the proposed dewatering site and alum floc deposition area. KEC Project efforts would be the subject of a separate environmental review.

FUTURE WITH THE PROPOSED ACTION

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging would not result in any substantive or significant impacts to historic and cultural resources. Advancement of dredging and supporting activities would, however, encompass elements that may warrant further environmental consideration as discussed below.

Expected land disturbances would include minor grading and clearing, limited construction of new or temporary facilities and installation of temporary pipelines. As noted above, there are no known architectural resources located within the study area. As a result, project-related activities would not have the potential to disturb any architectural resources. Potential land disturbance could result in a need to assess effects to archaeological resources. Upon the further advancement of the design, extent, and duration of dredging and related activities and the development of a more detailed plan for dredging, additional assessment of potential effects on historic and cultural resources, including consultation with NYSOPRHP, would be completed, if necessary, including potential cumulative effects with work that may be associated with the KEC Project.

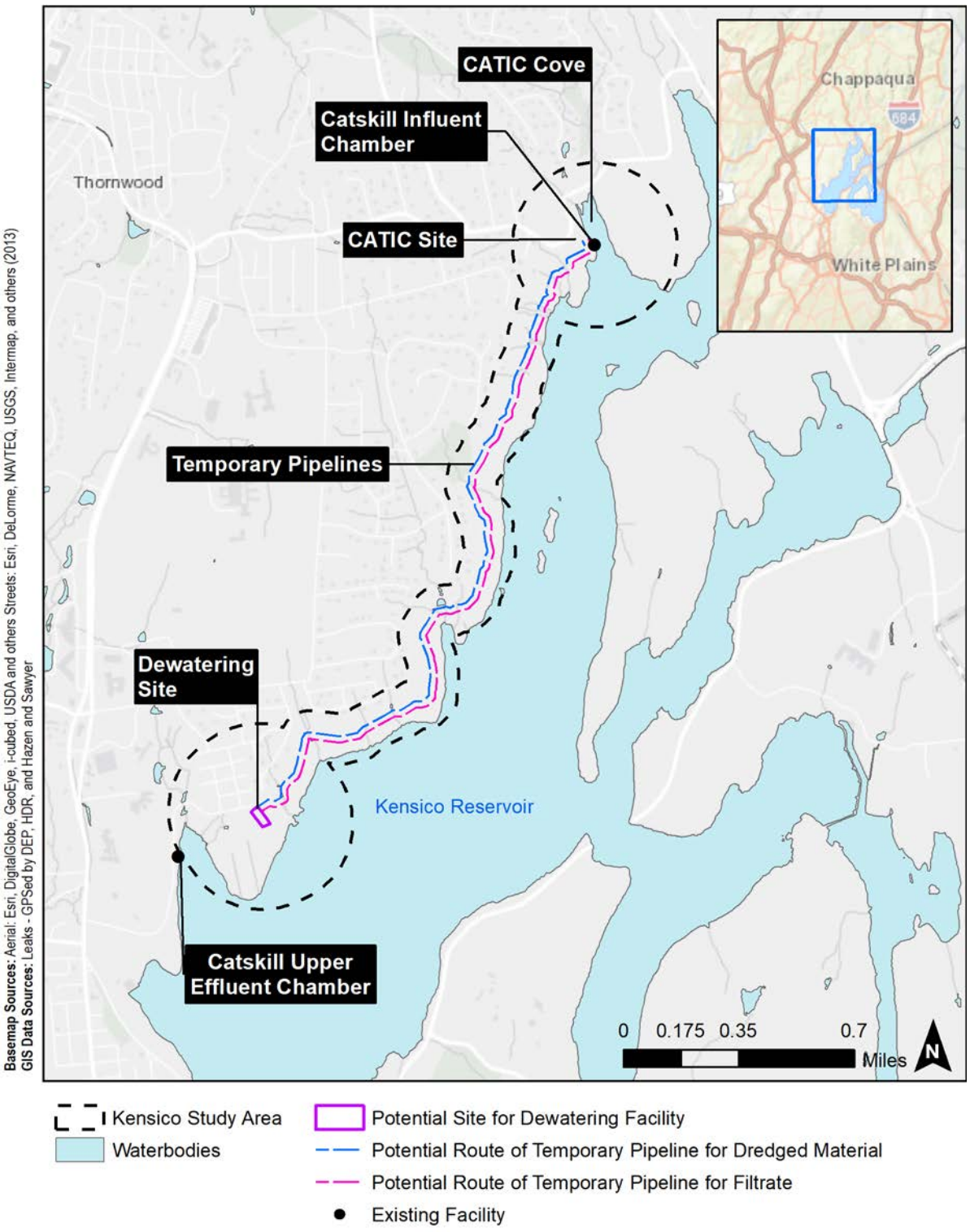

Figure 8.3-17
Kensico Reservoir Study Area
Historic and Cultural Resources

8.3.9 AESTHETIC (VISUAL) RESOURCES

This section presents the assessment of the potential for the delay of dredging to result in significant adverse impacts associated with changes to views to or from aesthetic (visual) resources and identifies environmental considerations associated with dredging. This includes assessment of view corridors with aesthetic value within and around the Kensico Reservoir study area that could change.

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the Proposed Action includes the delay of dredging, but this is not expected to result in any substantive impacts to aesthetic (visual) resources. However, other environmental considerations that may result from dredging activities are identified and discussed within this section, as applicable.

BASELINE CONDITIONS

The aesthetic (visual) resources analysis study area consisted of the area within 400 feet of the CATIC site adjacent to where dredging would occur, the location of proposed temporary pipelines, and dewatering site. A desktop assessment, conducted in accordance with the impact assessment methodology for visual resources described in Section 5.3.7, "Aesthetic (Visual) Resources" methodology, identified Kensico Reservoir itself as a visual resource within the study area, which is actively utilized as open space by anglers (as discussed in Section 8.3.6, "Open Space and Recreation") and is visible to some surrounding residential locations. In addition, the desktop analysis identified two view corridors with views of the Reservoir (including the study area), which include: the view of Kensico Reservoir from the Kensico Dam Day Use Area located at the southern end of the Reservoir, and the view of Kensico Reservoir from New York State Route 22 (State Route 22) located to the east of the Reservoir (see **Figure 8.3-18**). Therefore, this section includes a characterization of baseline views to and from the Reservoir from the general, publicly accessible areas both within and surrounding the Reservoir (i.e., open spaces), as well as specific views to the Reservoir from identified visibly sensitive areas (i.e., viewsheds).

The overall setting of the area surrounding the Reservoir is characterized by suburban residential lands to the west and north, suburban residential and light industrial lands to the east, undeveloped lands to the southeast, and open space (i.e., Kensico Dam Day Use Area) to the south. State Route 22 generally extends along the eastern border of the Reservoir. The first 100-feet of land immediately surrounding the Reservoir is almost completely comprised of forested lands owned by DEP. These forested lands generally hinder views to the Reservoir from the surrounding neighborhoods and local roadways. Though visibility of the Reservoir from these locations may be somewhat better during winter months when deciduous trees lose their leaves, the density and size of the trees largely obstruct views in all seasons. See **Photograph 8.3-1** for a representative view of the Reservoir from an adjacent neighborhood, and **Figure 8.3-18** for photograph locations. Since Kensico Reservoir is not visible from the neighborhoods to the north, views from surrounding neighborhoods in future conditions were not analyzed.

As discussed in Section 8.3.6, "Open Space and Recreation," DEP provides opportunities for the public with valid access permits for recreational fishing (i.e., shoreline fishing and fishing from DEP-registered, non-motorized boats) and hunting within and surrounding the Reservoir in designated areas. Therefore, there are ample scenic views of the Reservoir for permitted anglers and hunters within and directly adjacent to the Reservoir. Direct, unobstructed views of the Reservoir are experienced by anglers from the area within and surrounding the study area, both from the shoreline and boats. However, no fishing (i.e., either from the shoreline or from a boat) is permitted in the southwestern portion of the study area in the vicinity of the dewatering site, due to its proximity to the Catskill UEC and DEL18. In addition, no fishing within CATIC Cove is allowed because of the proximity to CATIC. There are no designated hunting areas within the study area. Fishing is allowed in much of the Reservoir beyond the study area, and both shoreline fishing and hunting are permitted on the Big Peninsula, located east of CATIC Cove and immediately north of the open waters of the Reservoir (see **Figure 8.3-18**).

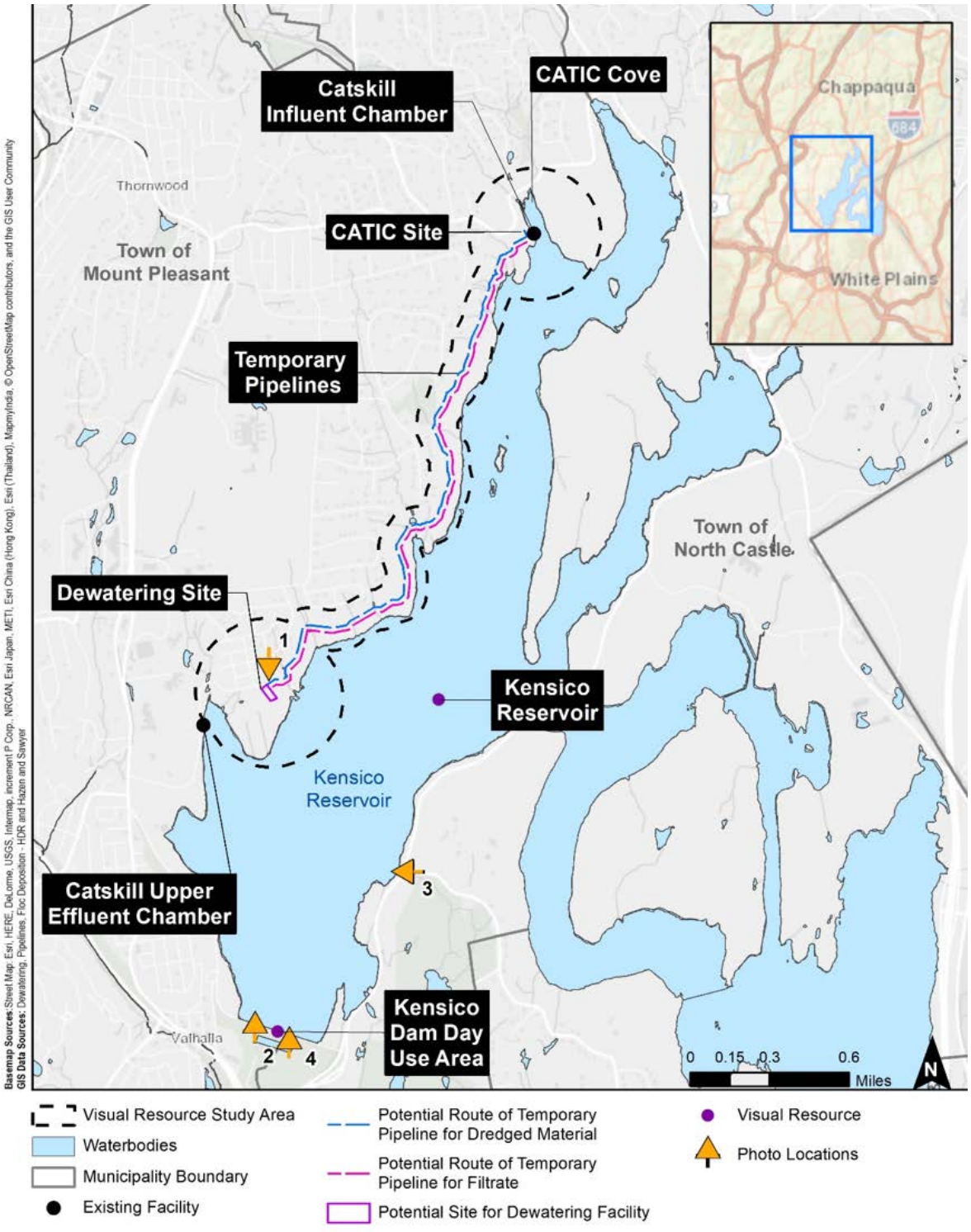

Figure 8.3-18
Kensico Reservoir Study Area
Visual Resources

The Kensico Dam Day Use Area is a DEP-owned pedestrian walkway located along the top of Kensico Dam that provides the public with a view of Kensico Reservoir, including the study area. Visitors looking northward are offered expansive, unobstructed views of Kensico Reservoir from this pedestrian walkway. It also provides views to the south over the Kensico Dam Plaza and Bronx River Parkway Reservation, which are picturesque Westchester County-owned parks. See **Photograph 8.3-4** for a representative view of the Reservoir from the Kensico Dam Day Use Area and **Figure 8.3-18** for photograph location.

The second view corridor is from State Route 22, located on the eastern side of Kensico Reservoir. While drivers have some opportunities to view the Reservoir while traveling on State Route 22, a number of factors limit the scenic quality of this viewshed to the Reservoir and study area: the relatively dense vegetation surrounding the Reservoir, the relatively high speed of travel on the roadway (50 miles per hour), and the distance between the roadway and the study area (approximately 0.75 mile or greater). See **Photograph 8.3-3** for a representative view of the Reservoir from State Route 22.

FUTURE WITHOUT THE PROPOSED ACTION

DEP has consulted with the Town of Mount Pleasant and Westchester County and has not been informed of upcoming projects or structures that would alter views of Kensico Reservoir or the study area from the three visual or aesthetic resources discussed previously. Natural processes, such as changes to vegetation due to natural succession, would continue in the future without the Proposed Action. Recreational fishing from the shoreline and non-motorized boats would continue to be prohibited within an area in proximity to the dewatering site and in CATIC Cove, while fishing in the remaining portions of the study area would continue to be permitted from the shoreline and from boats. Scenic opportunities from the Reservoir and surrounding area are anticipated to remain available in the future without the Proposed Action

In addition, DEP would implement its KEC Project in the future without the Proposed Action. This would include work within and adjacent to Kensico Reservoir in proximity to the southern edge of the study area near the proposed dewatering site. KEC Project efforts could potentially overlap with the dredging at Kensico. KEC Project efforts would be the subject of a separate environmental review.

FUTURE WITH THE PROPOSED ACTION

As discussed in Section 8.2, “Kensico Reservoir Dredging Analysis,” the delay of dredging would not result in any substantive or significant impacts to aesthetic (visual) resources. Advancement of dredging and supporting activities would, however, result in specific environmental considerations that warrant further discussion and these are summarized below.

Dredging and related construction activities would include dredging, the construction and operation of a dewatering facility, and two above-ground temporary pipelines. The total anticipated duration of construction including site preparation, dredging and dewatering, and site restoration, would be up to approximately 34 months. The anticipated changes to views from Kensico Reservoir, the Kensico Dam Day Use Area, and State Route 22 as a result of dredging and related activities are described below.

Photograph 8.3-1. View of Kensico Reservoir in the direction of the study area from the intersection of Johns Road and Rutledge Road, looking south. November 14, 2018.

Photograph 8.3-2 - View across Kensico Reservoir toward study area from Kensico Dam Day Use Area, looking north. November 14, 2018

Photograph 8.3-3. View of Kensico Reservoir from the intersection of State Route 22 and Old Orchard Street (the eastern side of the Reservoir looking toward the study area), looking west. November 14, 2018

Photograph 8.3-4. View of proposed Dewatering Site from Kensico Dam Day Use Area, looking north. November 14, 2018

KENSICO RESERVOIR

Anglers may potentially experience altered views from the shoreline or Reservoir to the study area as a result of dredging. While viewsheds are not the primary concern of fishing, changes in views as a result of dredging and related activities could present a change in anglers' fishing experience, depending on their location on the Reservoir or its shoreline. There would be no change in views from hunting – which is allowed on the peninsula in the northern portion of the Reservoir – since hunters surrounded by dense vegetation, would have a very limited view of the study area.

No fishing would be allowed at CATIC Cove in the future when dredging-related activities would occur. Fishing would not be allowed within the remaining portions of the study area, either from the shoreline or from boats, for the duration of dredging. This area, where recreational access would be temporarily off-limits, is small relative to the remaining areas within the Reservoir that would remain open for recreational use. Hence, anglers would continue to utilize the Reservoir, and therefore would continue to have ample scenic viewing opportunities from locations beyond the study area for the duration of any dredging.

Anglers to the south or east of the dewatering site would have limited views of the dredging and related activities due to the presence of over 350 feet of forested land that would surround the site. Anglers fishing from boats directly to the east of the dewatering site would have the potential to view activities at the dewatering site through the vegetation, both during the proposed future construction and dredging-related activities. Anglers fishing from the Reservoir directly to the southeast of the temporary pipelines would have the potential to view the temporary pipelines through, on average, more than 100 feet of vegetation. Visibility from the Reservoir to these locations may be somewhat better during winter months when deciduous trees lose their leaves. Anglers fishing from the Reservoir directly to the southeast of the CATIC site would have an unobstructed view of any dredging activities. While the dredging vessel would be visible, given the ample viewing opportunities in the remainder of the Reservoir, this temporary, localized visual change is not anticipated to be substantial. The Reservoir offers abundant areas anglers could utilize where the dredge would either not be visible, or its visual prominence would be greatly diminished given the visual context of the surrounding areas of the Reservoir.

The potential dredging location would be surrounded by a temporary turbidity curtain prior to and during dredging to limit potential impacts to water quality within the Reservoir beyond the area of active dredging (see Section 8.3.1, "Water Resources and Water Quality").

In summary, because there are various other views of the Reservoir that would be available, and because dredging would not result in major permanent visual alterations, nor visual changes to the Reservoir waters, the change in the viewshed and anglers' visual experience of the study area would be temporary and minor, particularly in the context of the surrounding views of the Reservoir.

KENSICO DAM DAY USE AREA

As discussed above, the Kensico Dam Day Use Area is located on the southern end of the Reservoir and offers the public an expansive view of the Reservoir. CATIC Cove is not visible from this location. While the dredging vessel would potentially be visible in the distance, it would be over 3 miles from Kensico Dam and would not significantly alter the viewshed. The temporary pipelines would follow an existing easement. As depicted in **Photograph 8.3-4,** with the photograph location noted on **Figure 8.3-18**, the lower portions of the existing Consolidated Edison towers, along that easement, are not visible from this location; therefore, the temporary pipelines are not anticipated to be visible from the Kensico Dam Day Use Area. The portion of the study area that would be most visually prominent from the Kensico Dam Day Use Area would be the dewatering site, located approximately 1 mile to the north of the dam. A view towards the dewatering site is depicted in **Photograph 8.3-4** with the photograph location noted on

Figure 8.3-18. Visitors may be able to view the proposed dewatering activities during future construction and dredging-related activities. However, the dewatering site is a very small portion of the expansive view of the Reservoir available at the Kensico Dam Day Use Area.

NEW YORK STATE ROUTE 22

Views of the study area from State Route 22 would be limited to the dewatering site because both the potential dredging area and temporary pipelines are not anticipated to be visible from the road. CATIC Cove and the dredging activities are north of this stretch of State Route 22, while the viewshed is to the west/northwest. As depicted on **Photograph 8.3-3**, the bases of the existing Consolidated Edison towers, along the route of the temporary pipelines, are not visible; therefore, the temporary pipelines are not anticipated to be visible from State Route 22. The dewatering site, which is approximately 0.75 mile across the Reservoir from the intersection of State Route 22 with Old Orchard Street, may be visible from the road by some drivers. While visibility from Route 22 may be somewhat better during winter months when deciduous trees lose their leaves, generally, the 100 feet of forested land between State Route 22 and the Reservoir edge, as well as vegetation near the dewatering site, would limit drivers' abilities to discern the dewatering site.

CONCLUSION

Any proposed construction, dredging, and dewatering activities would be temporary and limited in nature. Upon further advancement of the design, extent, and duration of dredging activities and development of a more detailed plan for dredging, and its potential to overlap with activities related to DEP's planned KEC Project south of the study area, additional assessment of potential effects on aesthetic resources would be completed, if necessary, including potential cumulative effects with work that may be associated with the KEC Project.

8.3.10 HAZARDOUS MATERIALS

The hazardous materials section includes a discussion of the baseline conditions, and of the future without and future with the Proposed Action in the vicinity of Kensico Reservoir relative to hazardous materials. This section presents an assessment of the potential for the delay of dredging to result in significant adverse impacts and also identifies potential environmental considerations associated with dredging related to hazardous materials.

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging is not expected to result in any substantive impacts relative to hazardous materials. However, dredging activities may result in specific environmental considerations that warrant further discussion and these are, therefore, identified and discussed within this section, as applicable.

BASELINE CONDITIONS

The hazardous materials study area consisted of the area within a one-quarter mile radius surrounding both the CATIC and proposed dewatering sites, as well as the area within a 400-foot radius of the proposed temporary pipelines (see **Figure 8.3-19**). The immediate vicinity of the Kensico Reservoir study area consists of wooded land, vegetated areas, and existing structures associated with DEP's water supply operations. Surrounding areas include scattered residential development, schools, paved access roads, and Kensico Reservoir.

Several readily available public databases containing information on the presence of hazardous materials in and near the study area were reviewed (see Section 5.3.9, "Hazardous Materials" methodology) and the results are described herein. Where publicly available databases were not specifically mentioned in this

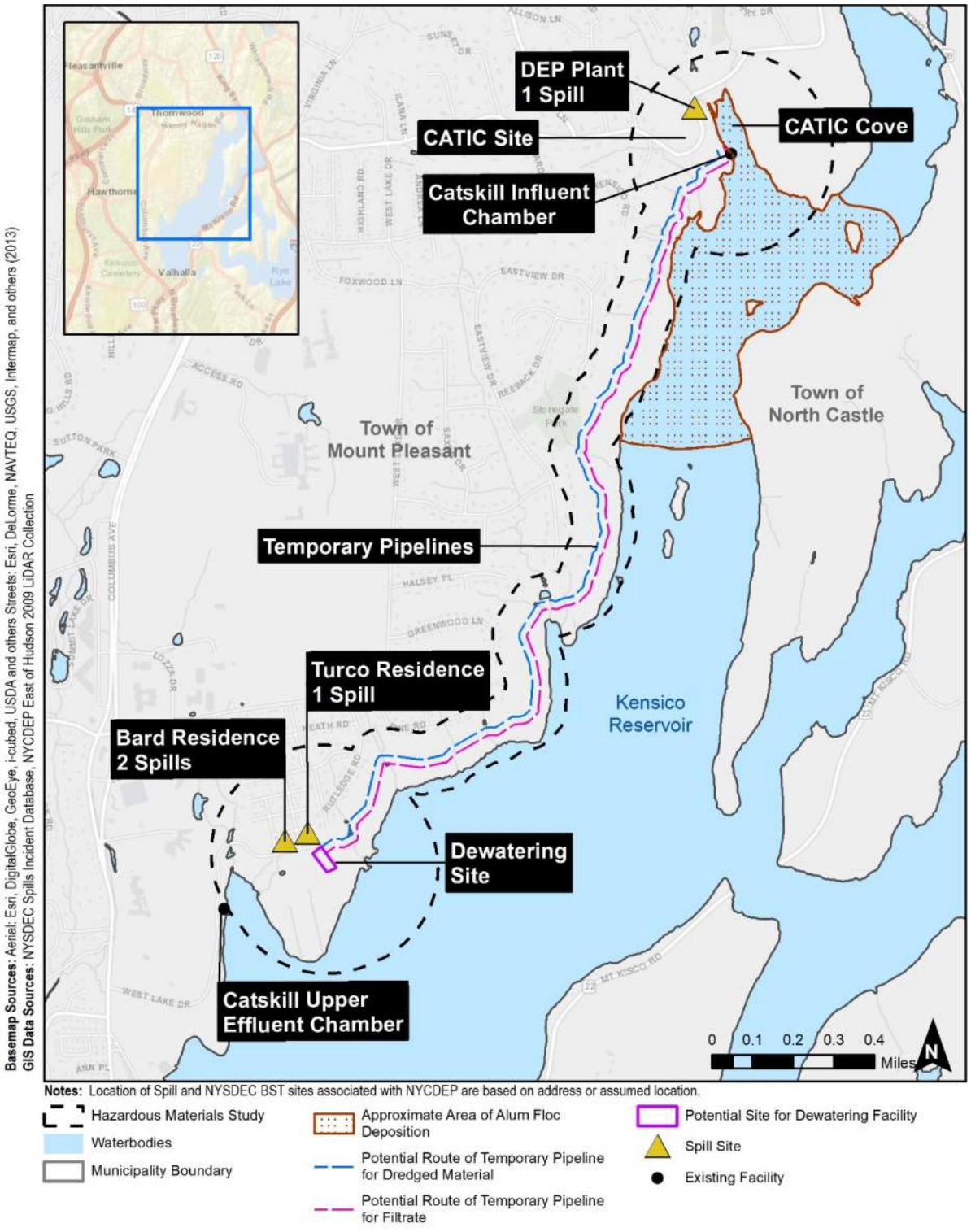

Figure 8.3-19
Kensico Reservoir Study Area
Spill Sites

section, reviews of those environmental databases did not indicate the presence of hazardous materials in the study area.

Based on a review of the NYSDEC Spills Incident Database, there were three Spills sites within the Kensico Reservoir study area with reported spill incidents (see **Figure 8.3-19)**. One spill incident was associated with DEP property referred to as DEP Plant; two spill incidents were reported at the Bard Residence/Home; and one spill incident was reported at the Turco residence. All of these reported spill incidents have been closed by NYSDEC. No open spill incidents are currently located within the study area.

As described in Section 2, "Purpose and Need," DEP has added alum and sodium hydroxide to water entering Kensico Reservoir to protect public health and meet drinking water standards. The application of these chemicals to drinking water supplies to address turbidity is a long-standing, well accepted, and widely used practice throughout the United States. The addition of these compounds has resulted in the accumulation and deposition of alum floc extending from the northern shore of CATIC Cove to the southern shore opposite the Cove, as shown in **Figure 8.3-19.**

Sampling and bathymetric surveys were conducted in 1997 to 2000, 2006, and 2007 to identify concentrations of aluminum and other constituents in CATIC Cove alum floc deposits. Additionally, in 2014, a geophysical and bathymetric survey, including sediment samples collected for chemical and physical analyses in a northern portion of Kensico Reservoir near CATIC, were completed following a period of alum application to address high turbidity. Comparisons were made between the bathymetry conducted in 2006 and 2014, and sediment chemistry at comparable sampling stations in 2006 and 2014. No toxicity data or hazardous materials were identified as a result of the 2014 geophysical and bathymetric survey. The 2006 sampling results were considered illustrative of the sampling results as a whole. As part of the 2006 sampling, comparison of sample results to NYSDEC's Technical and Administrative Guidance Memorandum (TAGM) 4,046 concentrations were completed on December 1, 2006 for three core locations.

Results indicated that the sediments at Kensico Reservoir fell within "no appreciable contamination" (no toxicity to aquatic life) and "moderate contamination" (chronic toxicity) due to slightly elevated levels of copper, lead, and arsenic.

FUTURE WITHOUT THE PROPOSED ACTION

In the future without the Proposed Action, no significant changes in the use, storage or management of hazardous materials are anticipated at the CATIC and dewatering sites or the location of the temporary pipelines. DEP will be implementing its KEC Project in the future without the Proposed Action and this project may include the use, generation, and/or management of hazardous substances and materials. The KEC Project, however, would be the subject of a separate environmental review.

FUTURE WITH THE PROPOSED ACTION

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging would not result in any substantive or significant impacts relative to hazardous materials. Advancement of dredging and supporting activities would, however, encompass environmental considerations that warrant further discussion and these are identified and summarized below.

Construction, dredging, dewatering, and related activities within the Kensico Reservoir study area would require the storage and use of petroleum and other chemical products, such as diesel fuel for the hydraulic dredge, potential back-up power, construction equipment and vehicles, lubricating oil for the construction vehicles, and miscellaneous cleaning and maintenance chemicals. The use and storage of all petroleum

and other chemical products would be in accordance with all applicable federal, State and local regulatory requirements and guidelines.

Potential excavation associated with future construction activities for access roads, equipment laydown and storage, temporary pipelines, and dewatering facility construction are largely not anticipated to require additional special handling. Any excavated soils would be temporarily stored on site with appropriate measures implemented to limit erosion, analyzed as necessary prior to off-site disposal or reuse, and managed and transported in accordance with all applicable regulations and guidelines.

Dewatering operations would result in the production of a solid byproduct (e.g., filter cake) that would require off-site transport and filtrate water. The filter cake is not anticipated to be hazardous, but would be regulated as a solid waste. The filter cake would be placed within water-tight containers and then transported by trucks to a licensed off-site disposal facility or beneficial reuse site, if applicable. Management and transport of these materials would be in accordance with applicable federal, State, and local regulations. The filtrate water extracted from the dredged material would be collected in temporary storage tanks and returned to the dredging location for discharge to the Reservoir within the area that would be protected by a temporary turbidity curtain.

Upon further advancement of the design, extent, and duration of dredging and the development of a more detailed plan for dredging, additional assessment of potential effects related to hazardous materials would be completed, if necessary. Cumulative effects from potential overlap with the KEC Project are not anticipated.

8.3.11 INFRASTRUCTURE AND ENERGY

The infrastructure assessment consisted of identifying the potential for changes to conveyance and demand for water and sewer infrastructure including municipal drinking water intakes, storm sewer discharges, drinking water wells, and septic systems due to the delay of the dredging of alum deposits, but also identifies environmental considerations that would be potentially associated with dredging in the future within the Kensico Reservoir study area. This section also presents an assessment of potential changes in energy generation, demands, or distribution due to the delay of dredging, as well as a discussion of environmental considerations, as applicable, related to dredging activities.

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging is not expected to result in any substantive impacts to infrastructure and energy. However, dredging and related activities may present specific environmental considerations within the study area that may warrant further discussion within the overall context of the Proposed Action. These are, therefore, also identified and discussed within this section, as applicable.

BASELINE CONDITIONS

WATER SUPPLY

Kensico Reservoir is an integral component of the City's Water Supply System. Water from the Ashokan Reservoir enters Kensico Reservoir via the CATIC. Water from the Rondout and West Branch Reservoirs enters Kensico Reservoir via the CATIC and Delaware Aqueduct at DEL17 in North Castle, respectively.

Independent of Kensico Reservoir, water supply in the Kensico Reservoir study area is provided by the Kensico Water District, which also supplies the Old Farm Hill Water District, located in Westchester County in the Towns of Mount Pleasant and New Castle. The Kensico Water District is operated by the Town of Mount Pleasant Water Department. It supplies water purchased from DEP and drawn from the Delaware Aqueduct. The Kensico Water District serves approximately 17,962 people through approximately 5,132 service connections. On an annual basis, the Kensico Water District consumes

approximately 916 million gallons of water. There are no known drinking water wells within the Kensico Reservoir study area based upon a review of NYSDEC's water well inventory.

SEWER INFRASTRUCTURE

Sewer infrastructure within the study area consists of the Westchester County Upper Bronx Sewer District and private septic systems. The Upper Bronx Sewer District serves portions of the Town of Mount Pleasant. The Upper Bronx Sewer District transports wastewater to the Yonkers Joint Wastewater Treatment Plant via an existing Westchester County trunk line. An inventory of private septic systems was completed to estimate the number of potential septic systems located within the Kensico Reservoir study area. Four parcels were identified within the study area that contain known septic systems based on a review of Westchester County's "Mapping Westchester County" ArcGIS data (2018).[37] Two of these parcels are in proximity to the proposed dewatering site, one on Westlake Drive and the other on Pine Road. The other two parcels are in proximity to the CATIC site, one on Old Kensico Road and the other just off Nanny Hagen Road. The Town of Mount Pleasant is also a Municipal Separate Storm Sewer System (MS4) community, containing a total of approximately 118 NYSDEC-regulated stormwater outfalls. Five of the regulated outfalls discharge to Kensico Reservoir and one is located within the study area near the CATIC site.

ENERGY

Consolidated Edison (Con Edison) provides electrical service in the vicinity of Kensico Reservoir.

FUTURE WITHOUT THE PROPOSED ACTION

DEP has consulted with the Town of Mount Pleasant and Westchester County and has not been informed of any upcoming projects or structures that would significantly affect water and sewer infrastructure or the demand, generation, or transmission of energy within the study area. However, DEP will also be implementing its KEC Project in the future without the Proposed Action. The KEC Project is comprised of several elements and could potentially overlap with the dredging at Kensico. These activities would all occur south and west of the proposed dewatering site and alum floc deposition area. KEC Project efforts would be the subject of a separate environmental review.

FUTURE WITH THE PROPOSED ACTION

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging would not result in any substantive or significant impacts to infrastructure and energy. Advancement of dredging and supporting activities would, however, encompass several elements that warrant a further discussion of environmental considerations which are discussed below.

WATER AND SEWER INFRASTRUCTURE

For dredging in the future, the CATIC and dewatering sites would utilize temporary facilities consisting of portable toilets, portable water containers, etc. Throughout the dredging activities, temporary trailers and operations, such as dewatering, would be located at the work sites and would tie into the existing water supply at the site, if possible. Significant new demand is not anticipated as the existing water supply

[37] Westchester County. 2018. Septic Pump Out Data. Accessed May 1, 2018 at https://giswww.westchestergov.com/gismap/.

system would be able to accommodate anticipated water demand. Likewise, significant upgrades to the existing water supply system are not expected.

Demand on the existing water supply due to the proposed construction, dredging, and dewatering activities would be expected to be minimal and temporary. The dredging would also not affect the limited storm sewer infrastructure within the study area. Upon further advancement of the design, extent, and duration of dredging and development of a more detailed plan for dredging, as well as further advancement of the KEC Project, additional assessment of potential effects on sewer infrastructure would be completed, if necessary, including potential cumulative effects with work that may be associated with the KEC Project. Following completion of the dredging and dewatering activities, water supply demands would return to baseline conditions.

ENERGY

Temporary increases in energy usage associated with dredging would be primarily driven by the pumping operations to transport dredged material and filtrate between the CATIC and dewatering sites and for the operation of the temporary dewatering facility.

The proposed construction, dredging, and dewatering activities would be temporary and limited in nature and Con Edison routinely evaluates its energy infrastructure and needs and implements upgrades when necessary and required. Upon further advancement of the design, extent, and duration of dredging activities and development of a more detailed plan for dredging, and its potential overlap with activities related to DEP's planned KEC Project south of the study area, additional assessment of potential future energy demand, generation, or transmission needs would be identified, if necessary, including potential cumulative effects with work that may be associated with the KEC Project, and discussed with Con Edison. Similarly, as part of these efforts, additional assessment of potential effects on energy would be completed, if necessary. Following completion of dredging and dewatering activities, energy demand is generally anticipated to return to baseline conditions.

8.3.12 TRANSPORTATION

This section discusses baseline conditions and presents an assessment of the potential changes to traffic conditions associated with the Proposed Action due to the delay of dredging, but also identifies environmental considerations that would be potentially associated with dredging in the future within the Kensico Reservoir study area.

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging is not expected to result in any substantive impacts to transportation. However, construction, dredging, and dewatering activities may present specific environmental considerations within the study area that warrant further discussion within the overall context of the Proposed Action. These are, therefore, identified and discussed within this section.

BASELINE CONDITIONS

The study area for the transportation analysis consisted of the major convergent roadways that would potentially be used by worker and construction vehicles associated with proposed construction, dredging, and dewatering activities within the Kensico Reservoir study area. See **Figure 8.1-1** in the Project Description for the location of the sites where potential dredging-related activities in the future would occur consisting of the CATIC, dewatering sites, proposed temporary pipelines, and access roads.

The area immediately to the west of the project site contains local through-streets, cul-de-sacs, collector roadways, and dead-end streets. Sensitive land uses in the study area include single-family homes, parks, and educational facilities. The CATIC site is directly accessible via an access road that intersects with

Nanny Hagen Road in the Town of Mount Pleasant, and the site where the dewatering facility would be located is directly accessible via an access road that intersects with Westlake Drive. The site where the two temporary pipelines would be installed is accessible from the CATIC site, dewatering site, and Nanny Hagen Road. Both Nanny Hagen Road and Westlake Drive are classified by the New York State Department of Transportation as major collector roadways.

FUTURE WITHOUT THE PROPOSED ACTION

DEP has consulted with the Town of Mount Pleasant and Westchester County and has not been informed of any upcoming major projects that would result in a significant change in land use or an increase in traffic due to outside developments within the study area. However, DEP will also be implementing its KEC Project in the future without the Proposed Action. The KEC Project is comprised of several elements which could have the potential for short term changes upon traffic within the study area. KEC Project efforts could potentially overlap with the dredging at Kensico. These activities would all occur south and west of the proposed dewatering site and alum floc deposition area. KEC Project efforts would be the subject of a separate environmental review.

FUTURE WITH THE PROPOSED ACTION

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging would not result in any substantive or significant impacts to transportation. Advancement of dredging and supporting activities would, however, encompass several areas for additional environmental consideration. Dredging and associated activities would result in temporary increases to vehicles within the study area due to:

- Construction workers commuting to and from the CATIC and dewatering sites;
- Construction vehicles commuting to and from the CATIC and dewatering sites;
- Transport of dredging and treatment equipment; and
- Transport of the dewatered dredged material or filter cake to a landfill or other appropriate off-site management facility.

Proposed activities would occur for up to 34 months, Monday through Friday, and would be limited to typical construction hours of 7 AM to 6 PM. To the extent possible, construction trucks would travel on truck-permitted roadways directly to and from the study area.

The increase in vehicular traffic during the construction activities, as well as construction activities for the KEC Project, would be temporary and limited to the construction period. Dredging-related activities overlapping with the KEC Project would be coordinated in order to minimize potential changes to traffic during construction. Following completion of the dredging and dewatering activities, no additional traffic associated with the project is anticipated. Upon further advancement of the design, extent, and duration of dredging and development of a more detailed plan for dredging, additional environmental assessment would be completed, if necessary, including potential cumulative effects with work that may be associated with the KEC Project.

8.3.13 AIR QUALITY

This section presents the air quality baseline conditions and an assessment of potential changes to air quality due to the delay of dredging of alum deposits, but also identifies environmental considerations that would be potentially associated with dredging in the future within the Kensico Reservoir study area.

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the Proposed Action includes the delay of dredging, but this is not expected to result in any substantive impacts to air quality. However, construction, dredging, and dewatering activities may present environmental considerations within the study area that warrant further discussion within the overall context of the Proposed Action and these are, therefore, also identified and discussed within this section.

BASELINE CONDITIONS

This section includes a discussion of the air quality baseline conditions including the climatology and meteorology, and ambient air quality in the vicinity of Kensico Reservoir.

CLIMATE AND METEOROLOGY

Kensico Reservoir is situated in the Town of Mount Pleasant in the central portion of Westchester County. Westchester County is located in the southeastern portion of New York State and is part of the New York Metropolitan Area (NYMA) region.

The climate in the NYMA region is representative of the humid, continental climate characteristics of the northeastern United States. The continental characteristics of the climate are due to the variety of air masses across the region. Cold winter weather prevails whenever Arctic air masses push south from central Canada. Warm, humid air is transported into the region by winds from the south and southwest. Storms and frontal systems often approach from the west or south along the Atlantic seaboard.

The prevailing wind across the State is generally from the west. Southwesterly winds become more evident in the warmer months while northwesterly winds predominate in the colder portion of the year. Occasionally, well-developed storm systems moving across the continent or along the Atlantic coast are accompanied by strong winds. In the cooler months, the area can be affected by coastal storms known as Nor'easters, which undergo rapid development just offshore along the strong gradient in water temperatures between the warm central Atlantic coast and the much cooler waters along the northeast Atlantic coast.

BASELINE AMBIENT AIR QUALITY

The Kensico Reservoir air quality study area, and all of Westchester County, is designated by the EPA as a moderate nonattainment area for ozone (O_3) and a maintenance area (former nonattainment area) for carbon monoxide (CO) and fine inhalable particulate matter (particulate matter with an aerodynamic diameter below 2.5 micron) ($PM_{2.5}$). The area is designated as in attainment with the National Ambient Air Quality Standard (NAAQS) for the remaining criteria air pollutants. The current O_3 nonattainment classification level is "serious" for the 2008 O_3NAAQS, which is equal to 75 parts per billion (ppb), and "moderate" for the 2015 O_3 NAAQS, which is equal to 70 ppb. However, because the area was never redesignated to maintenance/attainment for the prior NAAQS for 1-hour ozone (1979 NAAQS), for which it was classified as "severe" nonattainment, the anti-backsliding provisions of the Clean Air Act require that for permitting, Transportation Conformity, and General Conformity requirements, the area is treated as if it is still in severe O_3 nonattainment status.

Monitored concentrations of criteria air pollutants (for which a NAAQS exists) are shown in **Table 8.3-11**. The last two criteria pollutants shown in **Table 8.3-11**, sulfur dioxide (SO_2) and lead (Pb), were emitted in significant amounts by vehicles using United States highways and marine engines in prior decades. However, sulfur and Pb have been largely removed from highway and marine engine fuels used in the U.S.

The air pollutant monitoring locations shown in **Table 8.3-11** are the nearest available NYSDEC monitoring locations for the periods of data shown. However, because each of these monitoring sites is in

an area that is generally much more developed than the Kensico Reservoir study area in terms of the surrounding land use, the air quality data are expected to be conservatively high in comparison to the air quality in the more rural Kensico Reservoir study area.

The data shown in **Table 8.3-11** indicates compliance with the NAAQS for pollutants other than O_3. For O_3, the measured air quality does not meet either the prior (2008) O_3 NAAQS of 75 ppb at the White Plains monitor or the latest (2015) O_3 NAAQS of 70 ppb.

Table 8.3-11. NYSDEC Monitored Concentrations of Criteria Air Pollutants in the Region[1]

Pollutant	Averaging Period	Monitoring Location[8]	Monitored Concentration	NAAQS	Units
NO_2	1-hour	Bronx Botanical Garden, Bronx	55.5[2]	100	ppb
	Annual		17.2[3]	53	ppb
CO	1-hour	Bronx Botanical Garden, Bronx	2.01[4]	35	ppm
	8-hour		1.60[4]	9	ppm
$PM_{2.5}$	24-hour	Bronx Botanical Garden, Bronx[5]	19.9[6]	35	µg/m^3
	Annual		8.1[7]	12	µg/m^3
PM_{10}	24-hour	Division Street, Manhattan	38[8]	150	µg/m^3
Ozone	8-hour	White Plains, NY	0.075+[9]	0.070	ppm
SO_2	1-hour	Bronx Botanical Garden, Bronx	6.23[10]	75	ppb
Pb	3-month	Wallkill, NY	0.01[11]	0.15	µg/m^3

Notes:

[1] Values were obtained from the most recent NYSDEC monitoring report (2018) and earlier reports, as applicable (available at http://www.dec.ny.gov/chemical/8536.html). As described in each footnote below, each value was derived using the methodology/basis for determining background concentrations contained in the background table notes of the *2014 CEQR Technical Manual* available at:http://www.nyc.gov/html/oec/downloads/pdf/2014_ceqr_tm/2014_ceqr_tm_ch17_air_quality_background_data.pdf.

[2] Value is the 98th percentile of 1-hour daily maximum concentrations averaged over three years (2016 to 2018).

[3] Value is the maximum annual average from the last five years (2014 to 2018).

[4] Value is the highest 2nd high from the last five years (2014 to 2018).

[5] Botanical Garden $PM_{2.5}$ monitor values were used because the White Plains $PM_{2.5}$ monitor is used for Air Quality Index (AQI) purposes and is not used for NAAQS attainment demonstration purposes.

[6] Value is the three-year average of the 98th percentile of 24-hour values (2016 to 2018).

[7] Value is the average of annual values during the last three years (2016 to 2018).

[8] Value is the highest 2nd high during the last three years (2016 to 2018).

[9] Value is the average of the 4th highest daily maximum during the last three years (2016 to 2018). + Denotes a contravention of NYS/Federal AAQS.

[10] The value represents the average of the 99th percentile of daily maximum 1-hour values for the last three years (2016 to 2018).

[11] Maximum 3-month rolling average over the last 5 years (2014 to 2018).

FUTURE WITHOUT THE PROPOSED ACTION

DEP has consulted with the Town of Mount Pleasant and Westchester County and has not been informed of any upcoming major projects that would result in a significant change in land use, or new air emission sources that would contribute to an increase in ambient air quality pollutant concentrations within the Kensico Reservoir study area. In addition, air quality in the region is expected to be fairly stable with continued gradual improvement as has been the case for the past several decades. However, DEP will also be implementing its KEC Project in the future without the Proposed Action. The KEC Project is comprised of several elements which could have the potential for short term changes to air quality within the study area. KEC Project efforts could potentially overlap with the dredging at Kensico. These activities would all occur south and west of the proposed dewatering site and alum floc deposition area. KEC Project efforts would be the subject of a separate environmental review.

FUTURE WITH THE PROPOSED ACTION

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging would not result in any substantive or significant impacts to air quality. Advancement of dredging and supporting activities would, however, encompass several elements that warrant a discussion of environmental considerations.

Dredging and associated activities would result in temporary changes in pollutant emissions and ambient air concentrations. Activities within the Kensico Reservoir study area that would produce new air emissions would include the following:

- Emissions from construction equipment;
- Vehicle emissions from construction workers commuting, transport of dredging and treatment equipment, and trucks for the transport of dewatered sediment to a landfill or other off-site management facility; and
- Combustion exhaust from engines used for dredging and dewatering activities.

Potential emissions from proposed construction, dredging, and dewatering activities, as well as construction activities for the KEC Project that may overlap, would be largely temporary and transient, occurring just during the construction period. Following completion of the dredging and dewatering activities, no long-term sources of new emissions would be anticipated. Upon further advancement of the design, extent, and duration of dredging and development of a more detailed plan for dredging, additional environmental assessment would be completed, if necessary, including potential cumulative effects with work that may be associated with the KEC Project.

8.3.14 NOISE

This section discusses baseline conditions and presents an assessment of potential changes to stationary and/or mobile noise emissions sources associated with the Proposed Action due to the delay of dredging of alum deposits, and also identifies additional areas for environmental consideration that would be potentially associated with dredging within the Kensico Reservoir study area.

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging is not expected to result in any substantive noise impacts to sensitive receptors. However, stationary and/or mobile noise sources associated with proposed construction, dredging, and dewatering activities may present specific environmental considerations within the Kensico Reservoir study area that warrant further discussion within the overall context of the Proposed Action. These are therefore also identified and discussed within this section.

BASELINE CONDITIONS

The noise study area consisted of a 1,500-foot radius extending from the CATIC site and the potential location for a temporary dewatering facility near Westlake Drive, as well as either side of two temporary pipelines that would be installed between the CATIC and dewatering sites. The noise study area is shown in **Figure 8.3-20**.

Noise-sensitive land use in the study area includes single-family homes, parks, and educational facilities. Within 1,500 feet of the dewatering site are single-family homes and the Valhalla High School recreational fields west of the site, and the school building and outdoor playgrounds at Kensico School northwest of the site. Within the noise study area surrounding the temporary pipelines are single-family homes and Stone Gate Park located to the west of the temporary pipelines. Noise-sensitive land uses near the CATIC site are primarily comprised of single-family homes. Baseline noise levels in the study area are dominated by local roadways such as Westlake Drive and Nanny Hagen Road, as well as aircraft associated with the Westchester County Airport.

As discussed in Section 8.3.7, "Critical Environmental Areas," the southern portion of the Kensico Reservoir study area (i.e., surrounding the potential dewatering facility) is located within the Westchester County Airport 60 Ldn Noise Contour CEA. Based on noise monitoring performed as part of a Westchester County Airport noise abatement program in January through May of 2018, the Ldn in the noise study area is 56.5 dBA, consisting of 55.1 dBA from community noise and 51.3 dBA from aircraft noise.

FUTURE WITHOUT THE PROPOSED ACTION

DEP has consulted with the Town of Mount Pleasant and Westchester County and has not been informed of any upcoming major projects that would result in a significant change in land use, or new noise-generating sources that would contribute to an increase in ambient noise levels within the study area. However, DEP will also be implementing its KEC Project in the future without the Proposed Action. The KEC Project is comprised of several elements which could have potential short term effects upon noise levels within the study area. KEC Project efforts could potentially overlap with the dredging at Kensico. These activities would all occur south and west of the proposed dewatering and alum floc deposition area. KEC Project efforts would be the subject of a separate environmental review.

FUTURE WITH THE PROPOSED ACTION

As discussed in Section 8.2, "Kensico Reservoir Dredging Analysis," the delay of dredging would not result in any substantive or significant noise impacts to noise-sensitive receptors. Advancement of dredging and supporting activities would, however, encompass several elements for environmental consideration.

Potential stationary and/or mobile noise sources associated with the proposed construction, dredging, and dewatering activities would result in temporary changes in noise levels within the study area. Activities within the study area that would potentially produce new noise emissions would include the following:

- Noise emissions from construction equipment;
- Noise emissions from engines used for dredging and dewatering activities; and
- Vehicle noise emissions from construction workers commuting, transport of dredging and treatment equipment, and trucks for transport of the dewatered sediment to a landfill or other off-site management facility.

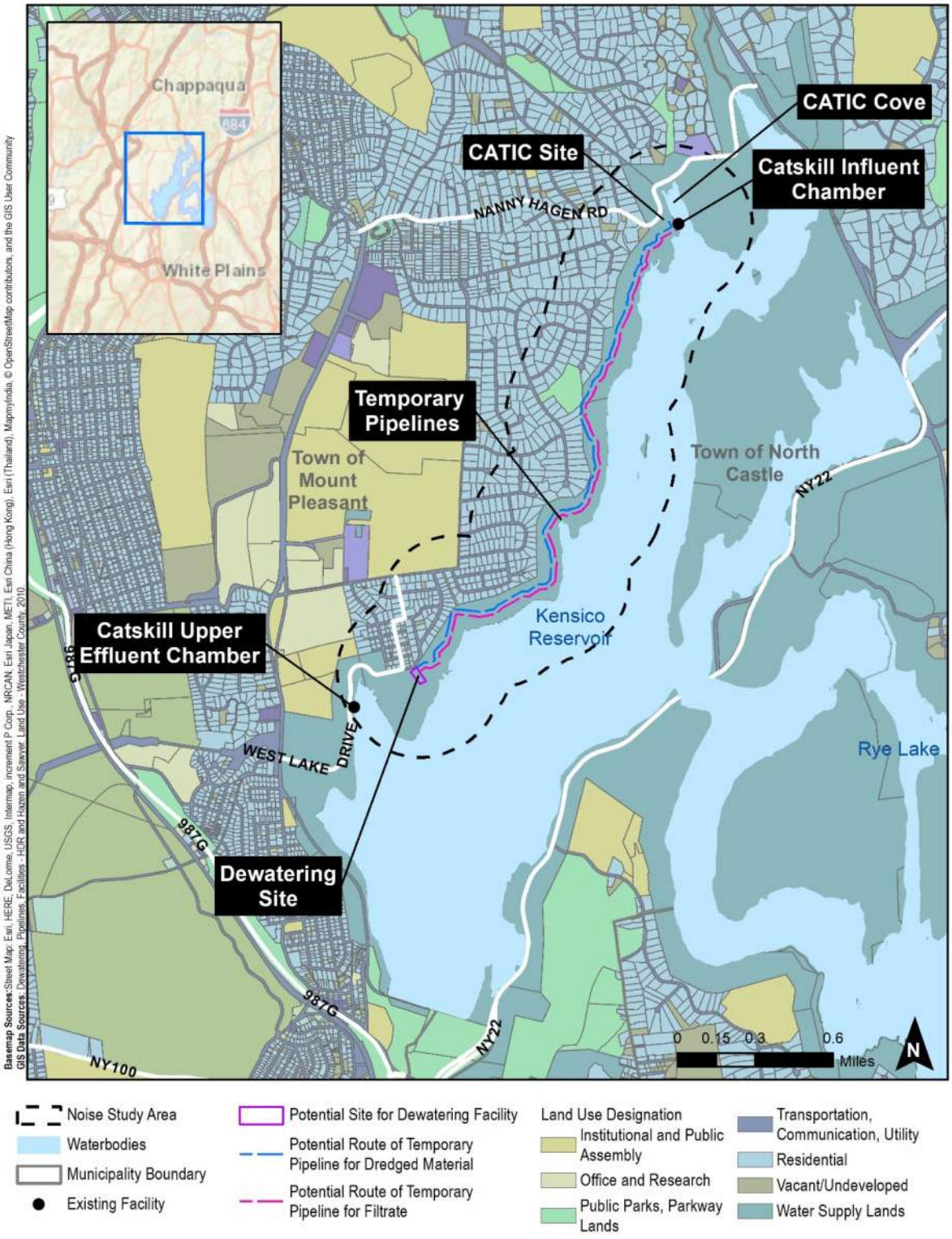

Figure 8.3-20
Kensico Reservoir Noise Study Area

Future construction, dredging, and dewatering activities would be conducted in compliance with applicable federal, State, and/or local requirements governing these activities. Construction would occur for up to approximately 34 months, Monday through Friday, and construction hours would be based on the applicable construction noise requirements, which limit typical construction to weekdays between the hours of 7 AM to 6 PM.

Potential noise from proposed construction, dredging, and dewatering activities, as well as construction activities for the KEC Project that may overlap, would be largely temporary and limited occurring during the construction period. Following completion of the dredging and dewatering activities, no long-term sources of new noise sources are anticipated. Upon further advancement of the design, extent, and duration of dredging, and development of a more detailed plan for dredging, additional environmental analyses would be completed, if necessary, including potential cumulative effects with work that may be associated with the KEC Project.

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