FINAL ENVIRONMENTAL IMPACT STATEMENT FOR THE CATSKILL/DELAWARE UV FACILITY

4.15. WATER RESOURCES

4.15.1. Introduction

This section discusses the existing conditions and potential impacts of the proposed Catskill/Delaware Ultraviolet Light (UV) Disinfection Facility on the existing surface water, stormwater runoff, and groundwater resources. The study area encompasses the stormwater drainage basins that contribute runoff to the Eastview Site. The methodology used to prepare this analysis is presented in Section 3.15, Data Collection and Impact Methodologies, Water Resources.

4.15.2. Baseline Conditions

4.15.2.1. Existing Conditions

A complete description of the land uses at the Eastview Site and study area is presented in Section 4.2, Land Use, Zoning and Public Policy. The Eastview Site is bisected by Grasslands Road (Route 100C), which also serves as the border between the Town of Mount Pleasant (north parcel) and the Town of Greenburgh (south parcel) (Figure 4.15-1). The project site consists of varied slopes, low-lying areas adjacent to small streams, and gently sloping uplands. The Mine Brook corridor bisects the central portion of the project site (Figure 4.15-2). The elevations range from a low of 310 feet Mean Sea Level (MSL)[1] along the stream corridor, with a relatively low rise to a ridge west of Hammond House Road, approximately 320 feet to the west, and a rise to a ridge approximately 360 feet to the east. The proposed UV Facility would be situated on the eastern edge of the north parcel with water conduits extended onto the south parcel.

4.15.2.1.1. Site Geological Description

Regional Geology. Bedrock geology within the Eastview Site study area is largely determined by the geologic history of the Manhattan Prong of the New England Uplands, extending from New England through Westchester to the southern tip of Manhattan. The region's geology is characterized by extensively folded and faulted metamorphic and igneous types, resulting from complex geologic processes that began more than 1.3 billion years ago.

Two distinct geologic sequences underlie the Eastview Site: subcropping schist (Manhattan Formation) and limestone (Inwood Formation) (see Figure 4.15-3). The Manhattan Formation is the more predominant rock formation found on the Eastview Site and in the study area, consisting of metamorphic rock types dominated by garnetiferous quartz-biotite-plagioclase gneiss with abundant sillimanite. These rock types are of the Ordovician age and are often found folded with metamorphosed schists that are accentuated by altering thin layers of light and dark gray. On the western portion of the Eastview Site, geologic features include bedrock from the Inwood Marble sequence. This sequence exists on-site only to a small extent based on its mapped boundary with the neighboring Manhattan Formation. The Inwood Marble, of

[1] All elevations are units of feet above mean sea level, referred to the (vertical) North American Vertical Datum of 1988 (NAVD88). A vertical datum is a set of constants that defines a system for comparison of elevations.

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Note: Photograph is looking North.

Aerial View of the Eastview Site

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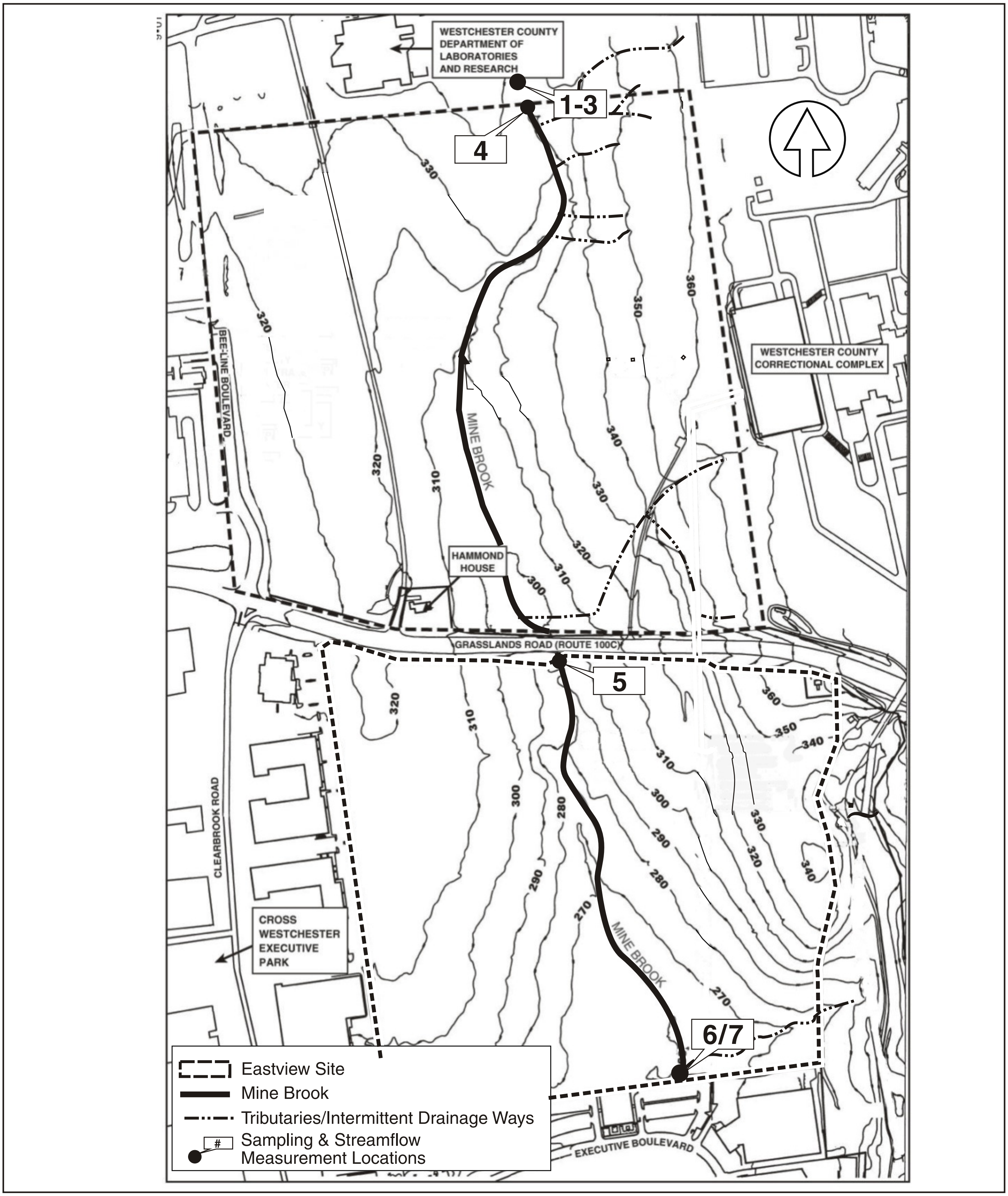
Figure 4.15-1



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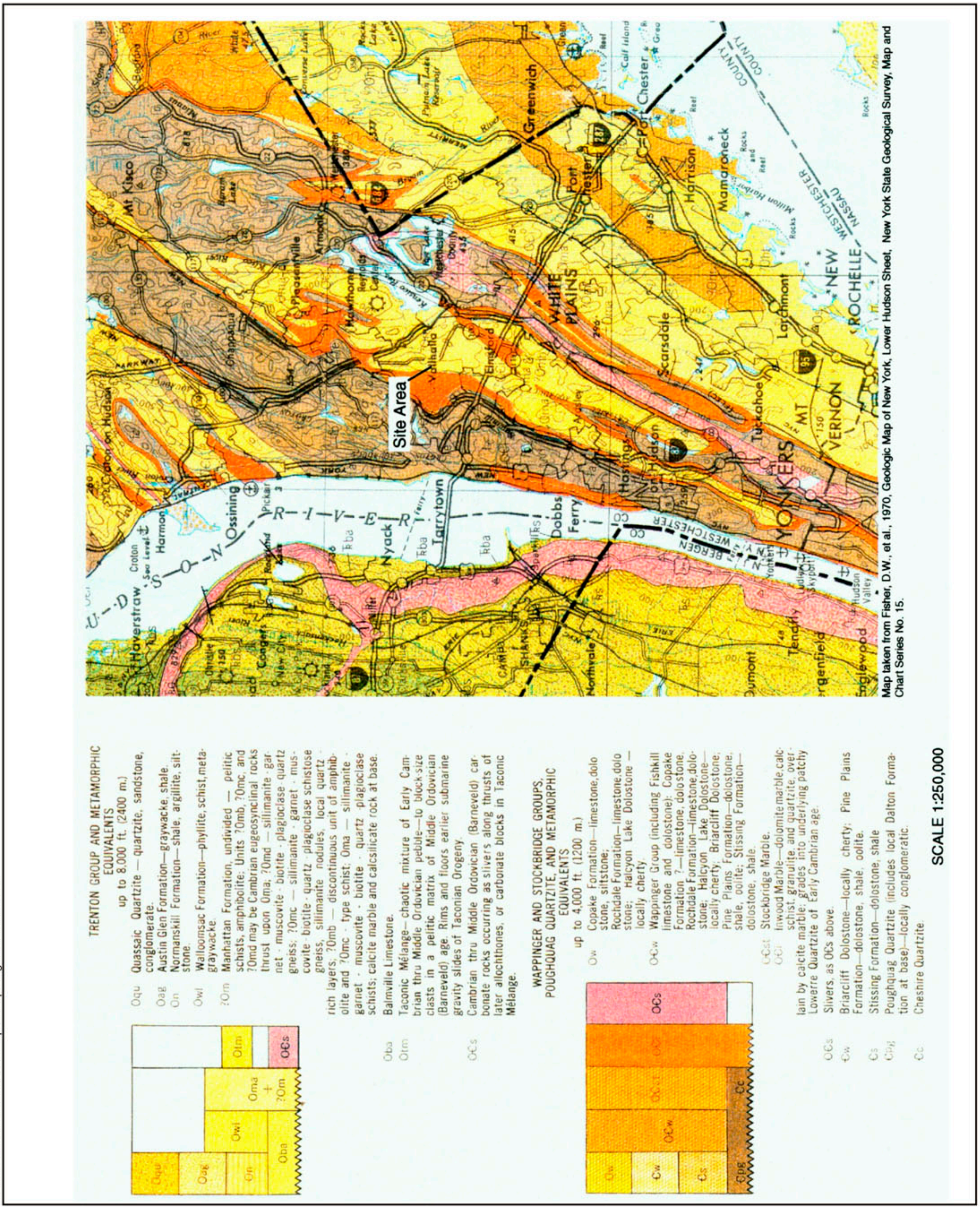
Not To Scale

Eastview Site Topography and Sampling Locations

Figure 4.15-2



Portion of NYSGS Bedrock Map of Westchester County Area

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Figure 4.15-3

Cambro-Ordovician age, is a medium to coarse grained marble ranging in composition from calcite to pure dolomite.

The marble does not often crop out abundantly and is usually expressed topographically by valleys and swamps that can become easily eroded. These Inwood Marble bands are commonly found between Manhattan Formation and Fordham Gneiss.

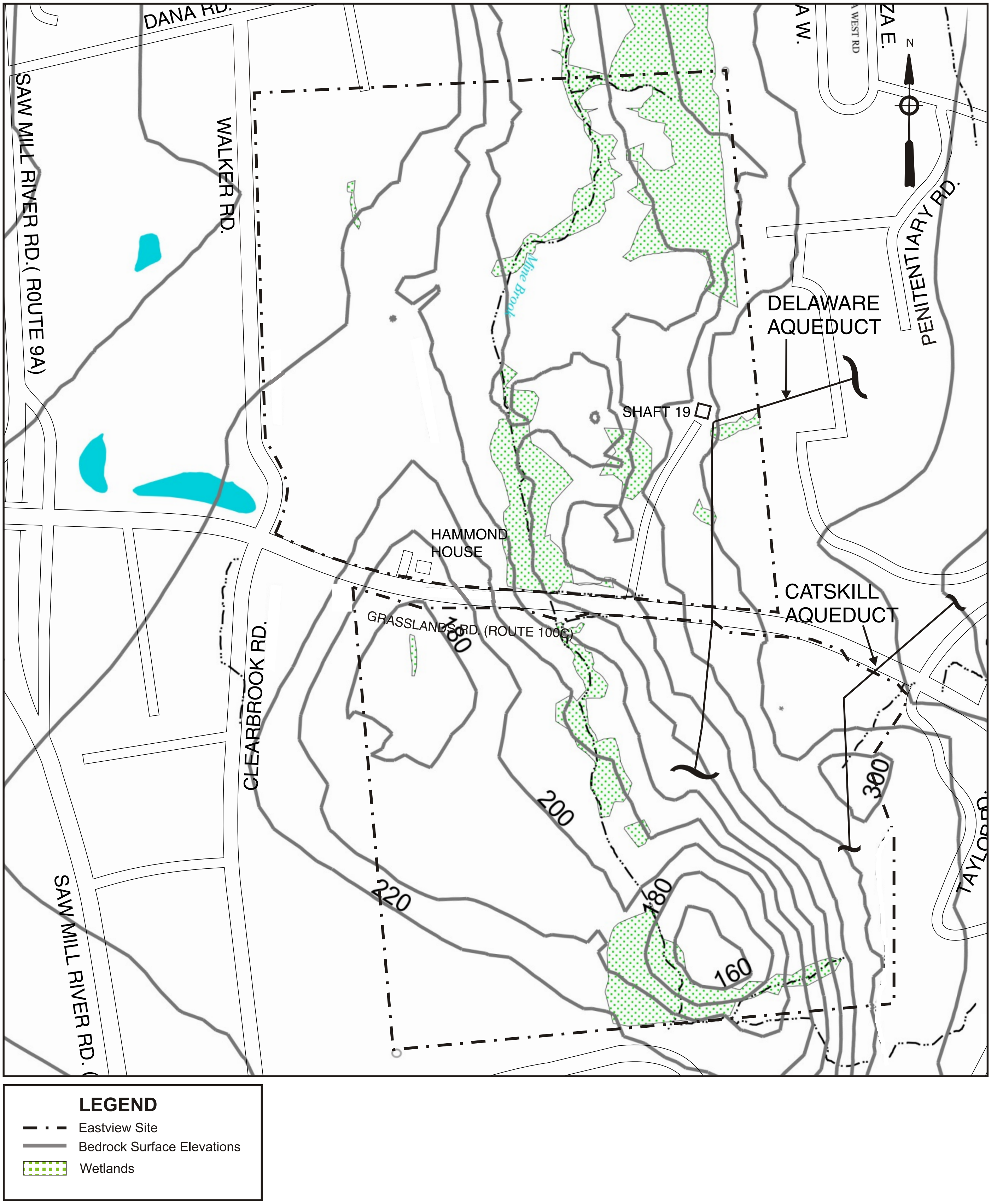
Westchester County has also been affected by the Pleistocene glaciation in which topographical features were modified through abrasion and deposition. Hills and ridges smoothed and scoured by glaciation are predominantly underlain by glacial till deposits. The Eastview Site's subsurface deposits consist of glacial till. Till is composed of unsorted deposits of debris varying in composition from rocks and boulders to clay sized particles. Stratified drift, unlike till, consists of water-sorted subsurface material derived from glacial outwash of clay, silt, sand, or gravel. Such deposits are limited to valley bottoms and sides and can be important groundwater recharge or discharge areas. No areas of stratified glacial deposits are mapped on-site.

Site Geology. As part of the preliminary engineering design efforts for the proposed UV Facility and the Croton project, several geotechnical and site investigations have been conducted on the Eastview Site since 1999. More than 100 borings and 40 wells have been installed at the Eastview Site. The purpose of these investigations was to examine subsurface conditions and to provide preliminary geotechnical engineering recommendations for the proposed facilities. The findings from earlier geotechnical investigations are presented in *Draft Subtask 9.4, Preliminary Design Geotechnical Report*, prepared by the NYCDEP in February 2000 and the Groundwater Model and Impacts Assessment Report, prepared by the NYCDEP in August 2001 and revised in May 2004. A summary of the findings is provided below.

The test borings typically encountered 3 to 8 inches of topsoil. Beneath the topsoil, an upper layer of naturally deposited inorganic soils was found. This layer of soil ranged in classification from brown to yellow brown, sandy silt to silty sand with various amounts of gravel. Soil densities ranged from loose to dense in this upper layer. Most of the soil was characterized as medium dense. Thickness of the upper soil ranged from 5 to 20 feet throughout the Eastview Site. The site is underlain by a lower layer of glacial till consisting of dense to very dense, gray to brown sand to sandy silt with occasional cobbles and boulders.

Brown sand and gravel fill were encountered below the topsoil near the Delaware and Catskill Aqueducts' structures at the Eastview Site. The thickness of the fill layer was recorded at 10 feet in depth (near Shaft 19) and 27 feet in depth (near the Catskill Aqueduct Connection Chamber). The fill layer is assumed to be related to the aqueduct construction activities during the early and mid-1900s.

The logs indicated that the contact between the till and the underlying bedrock is characterized by a layer of heavily weathered and decomposed bedrock. Below this zone, the bedrock is weathered and jointed, and generally of moderate to fair rock quality to depths of up to 100 feet below the top of rock. Bedrock surface elevations at the Eastview Site range from approximately 160 feet to 300 feet. Figure 4.15-4 shows the estimated bedrock surface elevations at the Eastview Site. Since portions of the bedrock are reportedly weathered, it is estimated that the



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Estimated Bedrock Surface Elevations at Eastview Site

Catskill/Delaware UV Facility

Figure 4.15-4

bedrock is at least as hydraulically conductive as the lower portion of the overlying till. As such, the site evaluation and the groundwater flow model developed for this analysis includes a representation of groundwater flow patterns in the bedrock.

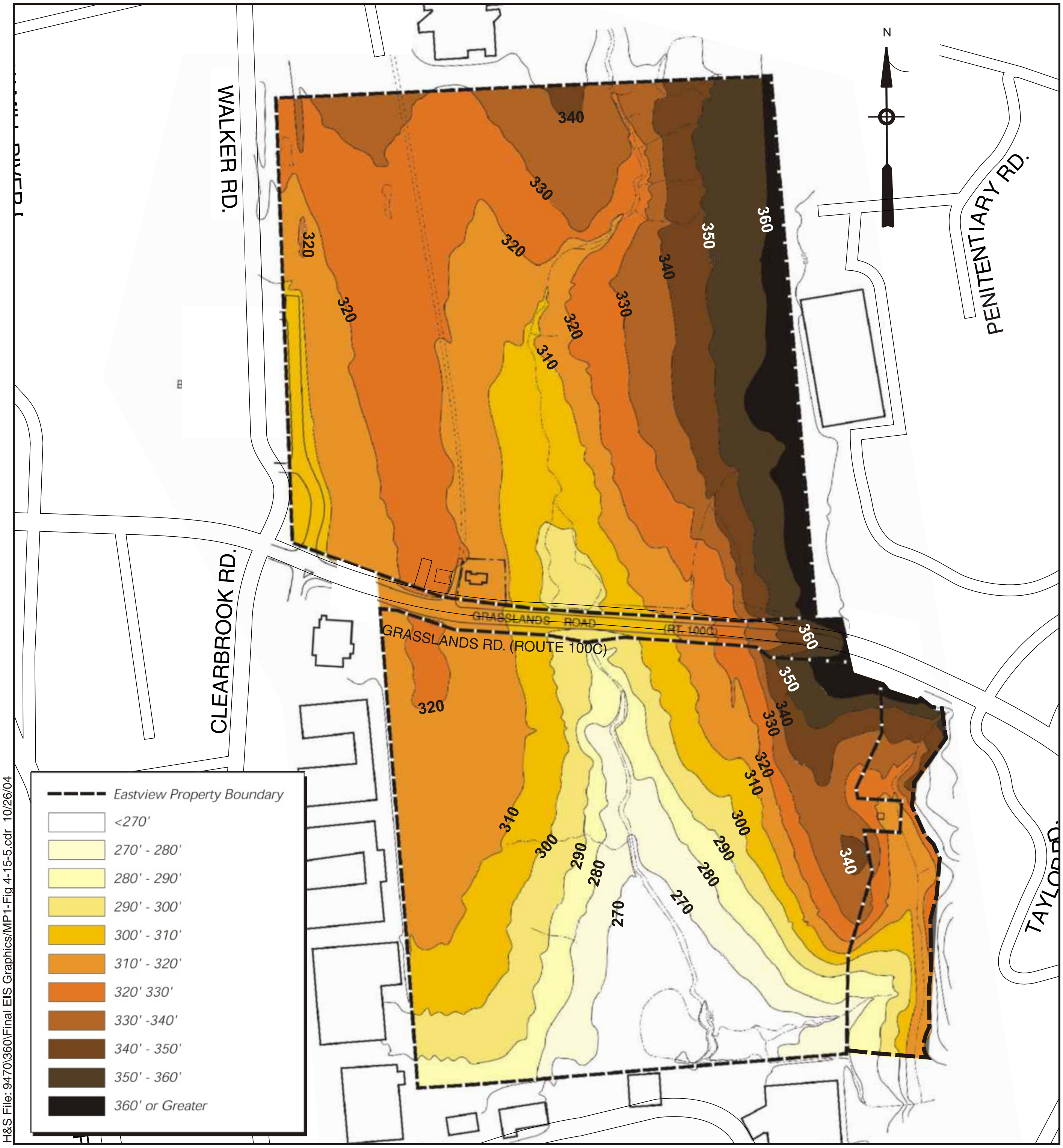
Topography. The Eastview Site's topography consists of varied slopes, low-lying areas adjacent to small streams, and gently sloping uplands. Elevations on the north parcel range from 310 feet along the stream corridor and rise to 360 feet east of the stream, with a relatively low rise of 320 feet to the west of the stream. Topography on the south parcel shows similar characteristics with elevations of 260 feet near the stream corridor, rising to 360 feet on the eastern border, and remaining low to the west of the corridor, with elevations of 320 feet.

The western portion of the north parcel is the most level area, but overall the Eastview Site is not heavily sloped. Generally, the topography slopes upward from the low lying stream. Areas on the western side of the corridor rise gently and remain lower in elevation than the steeper slopes found on the eastern side of the stream. The general topography of the Eastview Site is shown in Figure 4.15-5. In Figure 4.15-6, slopes on the Eastview Site are broken down into three ranges: 0-10 percent, 10-15 percent, and 15+ percent. Approximately 73 percent of the Eastview Site (112 acres) is characterized by the lowest slope range, 16 percent of the site (24 acres) falls within the middle range, and the remaining 11 percent (17 acres) contains the steepest slopes. As shown in Figure 4.15-6, steep slopes are predominantly found on the eastern side of the south parcel.

Surface Soil Classifications. The Federal Soil Conservation Service (SCS), part of the U.S. Department of Agriculture, identifies major classifications of soils that have similar characteristics, such as textures and drainage characteristics, into a series. Within each series, soils can differ in slope and other characteristics that affect their use. On the basis of these differences, soil series are further divided into phases. Different soil phases exhibit variable water storage, erosion potential, and other characteristics significant from a development perspective.

The Eastview Site contains eight separate soil phases, with four major soil series. The most prevalent soil type is the Paxton series. Other predominant soil types are described below. Figure 4.15-7 shows the spatial arrangement of all soil types found on the Eastview Site as documented by the SCS. Table 4.15-1 contains a complete list of soil names and their drainage characteristics.

Paxton Soils. One predominant soil type found on the Eastview Site and within the surrounding area is the Paxton series. Formed from dense glacial till, these soils are often found on broad ridges and upland hills. Soils in any series, including the Paxton series, can differ in texture from the surface layer to the underlying material. They can also differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. Two separate phases of the Paxton series were found on the Eastview Site: PnB (Paxton fine sandy loam, 2 to 8 percent slopes) and PnC (Paxton fine sandy loam, 8 to 15 percent slopes). The PnB phase was found throughout the site, whereas the PnC phase was found in a relatively small area toward the eastern part of the site, namely the portion of the property within the Town of Greenburgh. PnC soil has steeper slopes that increase its development limitations.



Topography Eastview Site

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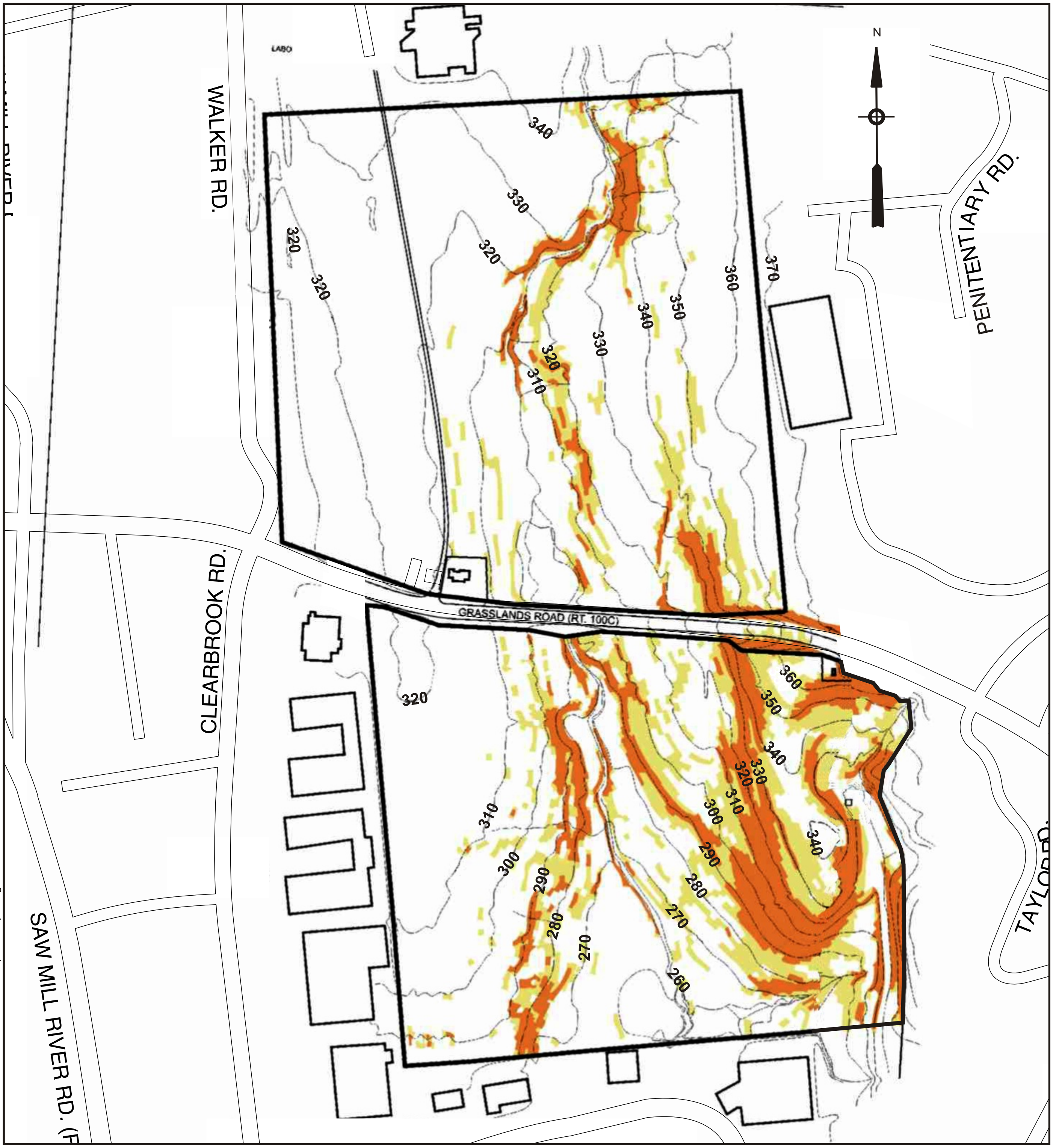
Figure 4.15-5



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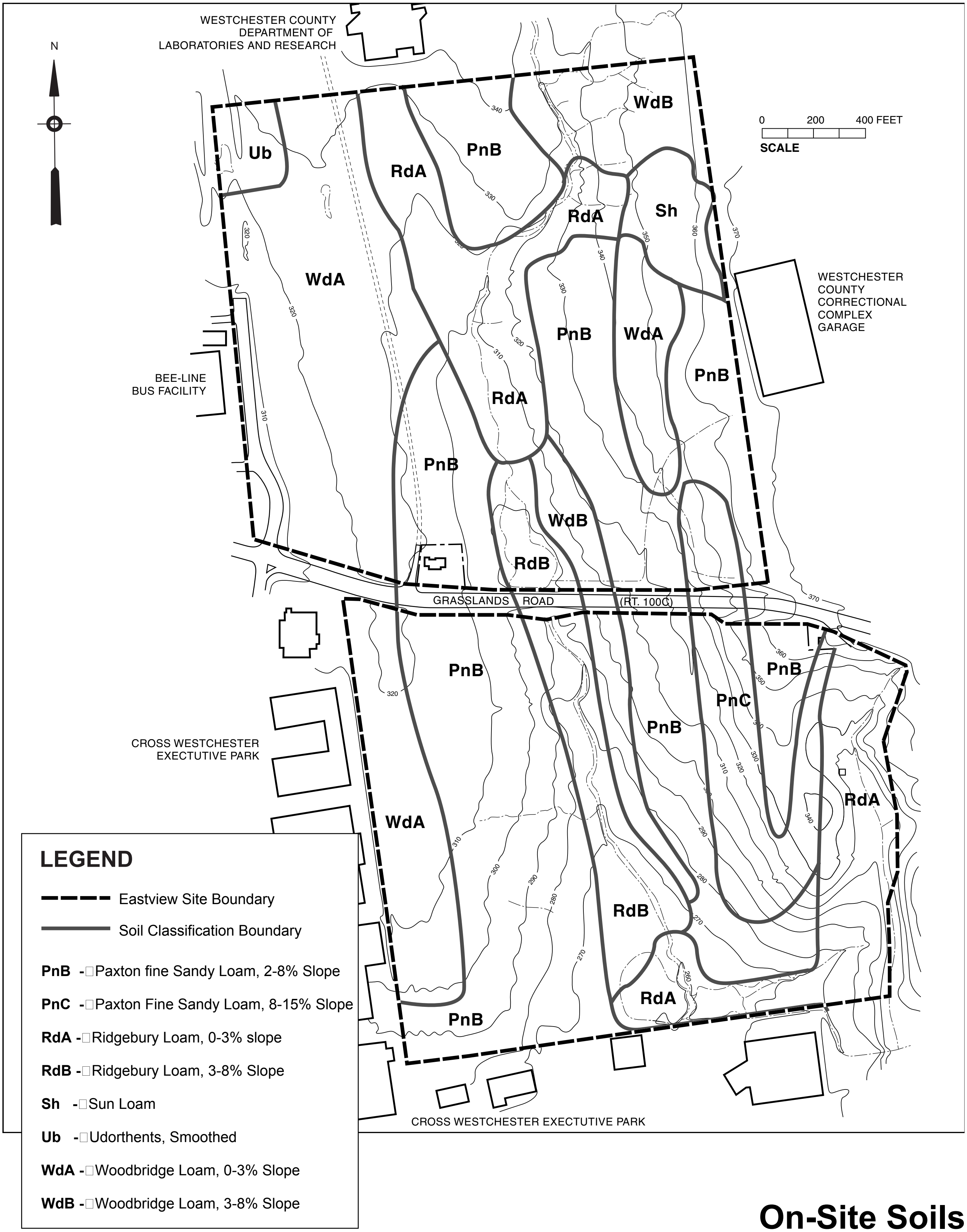
Eastview Property Boundary
0-10% Slope
10-15% Slope
15% Slope or Greater

Slope Analysis
Eastview Site

Catskill/Delaware UV Facility

Figure 4.15-6



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On-Site Soils
Eastview Site

TABLE 4.15-1. SURFACE SOILS

Symbol	Soil Series (Taxonomic Family)	Drainage Characteristics
PnB	Paxton fine sandy loam, 2 to 8 percent slopes Coarse – loamy, mixed, mesic Typic Dystrochrepts	Very deep, well drained, gently sloping. Water table perched above the dense substratum at a depth of 1.5 to 2.5 feet from February through April. Permeability is moderate in the surface layer and subsoil, and slow or very slow in the substratum. Available water capacity is moderate. Runoff is medium and the erosion hazard is slight.
PnC	Paxton fine sandy loam, 8 to 15 percent slopes Coarse –loamy, mixed, mesic Typic Dystrochrepts	Strongly sloping, very deep, and well drained. Water table perched above the dense substratum at a depth of 1.5 to 2.5 feet from February through April. Permeability is moderate in the surface layer and subsoil, and slow or very slow in the substratum. Available water capacity is moderate. Surface runoff is medium and the erosion hazard is moderate.
RdA	Ridgebury loam, 0 to 3 percent slopes Coarse – loamy, mixed, nonacid, mesic Aeric Haplaquepts	Very deep, nearly level, and poorly drained to somewhat poorly drained. Water table is 1.5 feet below the surface from November through May. Permeability is moderate to moderately rapid in the surface layer and the subsoil and slow or very slow in the substratum. Moderate available water capacity. Surface runoff is slow with a slight erosion hazard.
RdB	Ridgebury loam, 3 to 8 percent slopes Coarse – loamy, mixed, nonacid, mesic Aeric Haplaquepts	Gently sloping, very deep, and poorly drained to somewhat poorly drained. Water table 1.5 feet from the surface from November to May. Moderate available water capacity. Medium surface runoff and slight erosion hazard.
Sh	Sun loam Coarse – loamy, mixed, nonacid, mesic Aeric Haplaquepts	Very deep, nearly level, and poorly drained to very poorly drained. Water table is 1.0 to 0.5 feet below the surface from November through April. Permeability is moderate in the surface layer and slow or very slow in the subsoil and substratum. Surface runoff is very slow and the erosion hazard is none to slight.
Ub	Udorthents, smooth Udorthents	Very deep, excessively drained to moderately well drained soils that have been altered by cutting and filling. Permeability and other properties of Udorthents are so variable due to their genesis from human disturbance that on-site no standard characteristics are given in NYCS Soil Survey.
WdA	Woodbridge loam, 0 to 3 percent slopes Coarse – loamy, mixed, mesic Aquic Dystrochrepts	Nearly level, very deep, and moderately well drained. Water table is 1.5 to 2.5 feet below the surface from November through May. Permeability is moderate at the surface and slow or very slow in the substratum. Available water capacity is moderate. Surface runoff is medium and the erosion hazard is slight.
WdB	Woodbridge loam, 3 to 8 percent slopes Coarse – loamy, mixed, mesic Aquic Dystrochrepts	Gently sloping, very deep, and moderately well drained. Water table is 1.5 to 2.5 feet below the surface from November through May. Permeability is moderate in the surface layer and subsoil, and slow or very slow in the substratum. Available water capacity is moderate. Surface runoff is medium and the erosion hazard is moderate.

Source: U.S Department of Agriculture, *Soil Conservation Service. Soil Survey of Putnam and Westchester Counties, New York*. September 1994.

Paxton soils are very deep and well drained with gently sloping to moderately sloping characteristics. Available water capacity for this soil is moderate, and the depth to bedrock occurs at over 60 inches.

Runoff is medium, and erosion hazards range from slight to moderate depending on the soil phase. Many areas consisting of this soil are wooded, covered with brush, or have been used for farming.

Moderate limitations of the Paxton series are found on sites where basements are proposed due to seasonal wetness and slope constraints. In addition, septic tank absorption fields in the slow to very slow permeability of the substratum can negatively affect the soil's use. Roads may also experience restraint due to wetness, slope, and frost action. Severe limitations can occur with the building of small commercial buildings on PnC soil types where moderately steep sloped soils are a cause of constraint.

Paxton soils are well suited for the cultivation of crops. Paxton soils with 2 to 8 percent slopes (PnB), abundant on-site, are considered "Prime Farmland." Prime Farmland is defined by the U.S. Department of Agriculture as the "land that is best suited for food, feed, forage, fiber, and oilseed crops." Prime Farmland soils produce the highest yield of crops with minimal expenditure of energy and economic resources, and farming these soil types results in the least amount of harm done to the environment. This soil series is also classified under the New York State Classification System as having Class II and III land capability. These classifications suggest that these soils can have a highly productive crop yield with moderate limitations.

Ridgebury Soils. The Ridgebury soil series is often found adjacent to Paxton soils and is located on lower parts of hillsides, glaciated uplands, and along small drainage ways. These soils are very deep and are generally poorly drained to somewhat poorly drained, with slopes ranging from 0 to 8 percent. Soil properties consist of a moderate or moderately rapid permeability, with slow surface runoff and a slight erosion hazard. The water table is typically found within a depth of 1.5 feet from November through May, and the depth to bedrock is more than 60 inches.

Ridgebury soils were found along the small stream (e.g. Mine Brook) that runs through the Eastview Site. The Ridgebury loam, 0 to 3 percent slopes (RdA) and Ridgebury loam, 3 to 8 percent slopes (RdB) were predominant.

As a result of their wetness and slope permeability in the dense substratum, Ridgebury soils present "severe" limitations for site development, which may add to construction and design costs and to maintenance needs.[2] These limitations apply to such developments as shallow excavations, dwellings without basements, commercial buildings, lawns and landscaping – and could also apply to the larger scale, more intensive types of development associated with the proposed facility. Similarly, Ridgebury soils have a high potential for frost action presenting limitations for use in road construction.

[2] U.S. Department of Agriculture, *Soil Conservation Service, Soil Survey of Putnam and Westchester Counties, New York*, September 1994.

Sun Soils. Sun loam (Sh) is less prevalent on the Eastview Site. As shown in Figure 4.15-7, only a small area of this type of soil was found on the northeastern portion of the north parcel. Sun loam is a very deep, nearly level, and poorly drained to very poorly drained soil. It is often found in small depressions or along drainage ways. This soil has a very high water table level (0.5 to 1.0 feet below the surface) due to its slow to very slow permeability in the subsoil. Sun series soils have severe limitations for building site developments and septic absorption fields due to this wetness. Sun soils are on the list of hydric (e.g. wetland) soils developed by the National Technical Committee for Hydric Soils (NTCHS).

Woodbridge Series. Soils in the Woodbridge series consist of very deep, moderately well drained soils found mostly on the lower part of hillsides in the uplands. These soils are derived for schist, gneiss and granite formed from compacted glacial till. Woodbridge loam with slopes ranging from 0 to 3 percent (WdA) occurred predominately along the western portion of the Eastview Site. Woodbridge loam with slopes between 3 to 8 percent (WdB) was found near the central and northeastern portions of the Eastview Site. Moderate permeability and a high water table (1.5 to 2.5 feet below the surface) cause seasonal wetness in some areas of this soil type. Runoff is rated as medium to a slight erosion hazard, and the depth to bedrock is greater that 60 inches.

This soil type is considered Prime Farmland and is well suited for the cultivation of crops. The Woodbridge series is classified as a Class II in the NYS Classification System, showing this soil's capability for producing a high crop yield with only moderate limitations. In contrast, the SCS's *Soil Survey of Putnam and Westchester Counties* indicates that this soil type may have "severe" site development constraints that may be overcome with the proper engineering. In addition, severe frost action can be anticipated when using this soil for roadway development.

4.15.2.1.2. Surface Water

The surface waters in the study area consist of Mine Brook, the north/south flowing stream bisecting the study area, and its smaller unnamed tributaries (many of them intermittent) (Figure 4.15-1 and 4.15-2). Mine Brook enters the study area at the northern property boundary through four closely spaced culverts and one principle tributary that convey flows from developed land on the Westchester County Grasslands Reservation (Valhalla Campus) located to the north, west and east of the Eastview Site. As the Mine Brook flows through the study area, it picks up surface water from smaller tributaries on-site and groundwater. The primary tributaries shown in Figure 4.15-2 also serve as conduits for stormwater runoff during storm events.

Stream Flows. Stream flow measurements were collected along Mine Brook, at selected gauging sites (see Figure 4.15-2). The stream flow measurements provided the basis for estimating groundwater discharge, or baseflow, which represents the groundwater contribution to surface water flows. The stream flow measurements were typically collected after a period of little or no precipitation, to obtain representative measurements. Stream flows were measured during dry flow periods (versus storm driven flows) from August 2000 through December 2001 as part of earlier site studies, and again in December 2003 as part of the proposed UV Facility investigations. Stream flow monitoring was not conducted in 2002 and most of 2003. Table

4.15-2, presents the stream flow measurements and Figure 4.15-8 shows the time history of measured stream flow values at Sites 5, 6 and 7.

The data shows that the drainage basin for the station on Route 100C (Site No.5) has an "average" base flow of about 13 inches per year, whereas the Executive Drive station (Site Nos. 6 and 7 combined) further downstream has about 17 inches per year of "average" baseflow. Increased baseflow at the downstream station could be due to several factors including: higher direct recharge rate in the south parcel; lateral and vertical groundwater inflow from bedrock; enhanced flow along the bedrock contact/fault zone; and measurement or calculation error associated with streamflow data readings and analyses. Table 4.15-2, presents the stream flow measurements and Figure 4.15-8 shows the time history of measured stream flow values and Sites 5, 6 and 7.

Water Quality. Mine Brook is classified by New York State Department of Environmental Conservation (NYSDEC) as a Class C stream, indicating that the NYSDEC has determined that its best use is for fishing, and other uses except primary contact recreation and shell fishing for market purposes. NYSDEC water quality standards for Class C streams are presented in Table 4.15-3. In order to assess existing water quality within the surface waters of the Eastview Site, samples were taken at six sampling locations along Mine Brook and its tributaries in October 2000. Figure 4.15-2 shows each of the six sampling locations (Sites 1 – 6) and Table 4.15-4 shows the measured concentrations of each pollutant at the six stream sampling locations. Laboratory analyses were conducted for those parameters used to gauge water quality, including pH, 5-day biochemical oxygen demand (BOD_5), fecal coliform, oil and grease, turbidity, nitrate-nitrogen, total phosphorus, total suspended solids (TSS), and total dissolved solids (TDS).

Also listed is each parameter's composite index number as per the National Sanitation Foundation's Water Quality Index (NSF-WQI). Composite index values greater than 70 generally indicate good water quality. Parameters which yielded index values characteristic of good water quality include pH, dissolved oxygen saturation, turbidity, and total phosphorus. Although oil and grease is not a measurement incorporated into the NSF-WQI, it is notable that no quantifiable concentrations of oil and grease were detected in any of the water samples.

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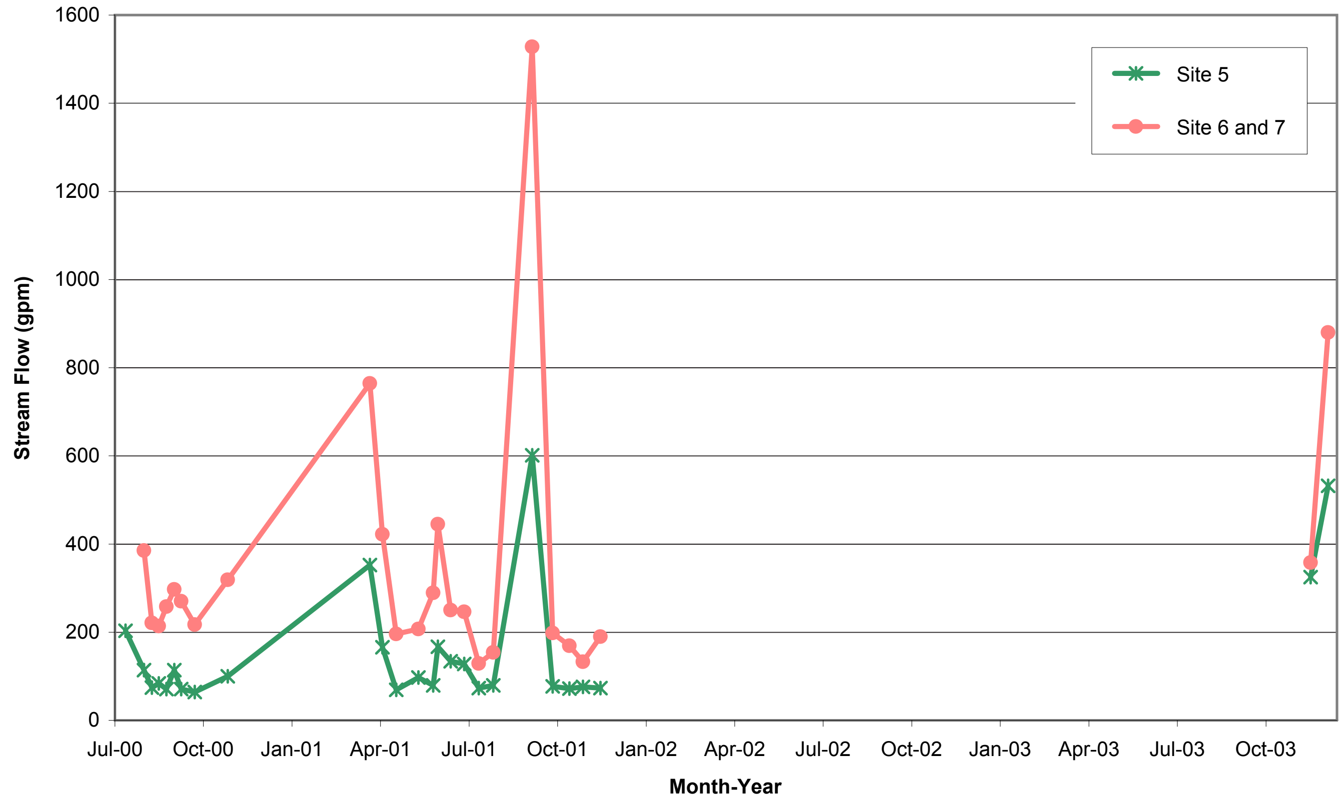


Measured Stream Flow Time History At Stations Along Mine Brook

Catskill/Delaware UV Facility

Figure 4.15-8

TABLE 4.15-2. STREAMFLOW MEASUREMENT (MINE BROOK)

Date	Prior Rainfall (inches)	Number of Dry Days	Stream flow (gpm)					
			No.1	No.2	No.3	No.4	No.5	Nos.6&7
8/03/00	0.83 (7/31)	1	-	-	-	-	203	-
8/22/00	0/39 (8/18)	3	-	12	6	-	114	385
08/30/00	0.22 (8/23)	6	2	8	6	-	74	221
09/06/00	0.12 (9/2)	3	1	6	7	62	84	214
09/14/00	0.62 (9/13)	0	1	7	8	55	71	258
09/22/00	1.61 (9/19)	2	2	13	5	92	114	297
09/29/00	0.16 (9/26)	2	2	13	9	51	71	270
10/13/00	0.16 (9/26)	16	2	12	9	34	64	217
11/16/00	0.28(11/14)	1	2	15	13	52	100	319
04/11/01	0.06 (4/8)	2	46	28	2	140	352	764
04/24/01	0.05 (4/21)	2	4	10	13	55	166	422
05/08/01	0.05 (4/21)	16	4	6	18	66	69	196
05/31/01	2.64 (5/21–/29)	1	3	5	6	56	97	207
06/15/01	0.01 (6/14)	0	4	7	12	53	79	289
06/20/01	2.69 (6/17)	2	3	27	13	73	167	445
07/03/01	0.71 (7/1)	1	2.3	9	6	89	134	250
07/17/01	0.41 (7/11)	5	1.6	6	13	51	128	246
08/01/01	0.13 (7/26)	5	1.4	6	15	48	73	129
08/16/01	1.16 (8/10–/15)	0	0.7	4	4	48	79	154
9/25/01	1.94(9/20-9/24)	0	15.8	66	49	138	601	1,528
10/16/01	0.59 (10/13 –10/16)	2	1.4	40	5	92	77	198
11/2/01	0.01(10/25)	7	2.4	6	6	82	72	169
11/16/01	0.02(11/15)	0	0.7	10	15	104	76	133
12/4/01	0.01(12/1)	2	1.1	5	7	43	73	190
12/4/03	0.89 (11/28-11/29)	4	4.1	6	-	71	325	358
12/22/03	3.52 (12/11-12/17)	4	7.6	30	4	202	532	880
		Average	5	14	10	76	154	350
		Maximum	46	66	49	202	601	1528
		Minimum	1	4	2	34	64	129
		Drainage Area					1.02E + 07	1.76E + 07
		Average					13	17
		Maximum					49	73

TABLE 4.15-3. NYSDEC WATER QUALITY STANDARDS (6 NYCRR PART 703) FOR A CLASS C WATER BODY

Parameter	Units	Standard
Temperature	°C	N/A
Dissolved Oxygen	mg/L	> 4.0 mg/L (min daily avg > 5.0 mg/L)
DO Saturation	%	N/A
BOD_5	mg/L	
Fecal Coliform	cfu/100 mL	< 200 cfu/100 mL
Nitrate-Nitrogen	mg/L	None in amounts that would result in growths of algae, weeds and slimes that would impair the waters for their best usages.
Oil & Grease	mg/L	No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease.
pH		6.5 < pH < 8.5
Total Dissolved Solids	mg/L	< 500 mg/L
Total Phosphorous	mg/L	None in amounts that would result in growths of algae, weeds and slimes that would impair the waters for their best usages.
Total Suspended Solids	mg/L	None from sewage, industrial wastes or other wastes that would cause deposition or impair the waters for their best usages.
Turbidity	NTU	No increase that would cause a substantial visible contrast to natural conditions.

These results indicate that several parameters exceed concentrations that are considered indicative of good water quality. Most significantly, concentrations of fecal coliform and total dissolved solids indicate that water quality is impaired. Other parameters were not significantly degraded, although nitrate and BOD_5 levels were also found to be somewhat depressed below the preferred conditions in a freshwater stream.

The origin of the elevated fecal coliform counts is not pinpointed by the samples that were collected. However, the highest counts were found in the most upstream (e.g. northern) samples on the Eastview Site and the lowest counts were found at the downstream end of the study area. This trend may indicate that a loading source for fecal coliform is located off-site. TDS concentrations also exhibited a decline (i.e. improvement) toward the downstream end of the Eastview Site. The data indicate that the stream water quality entering the Eastview Site is somewhat degraded and that the on-site wetlands along the Mine Brook corridor and the associated vegetation help improve water quality. The presence of dry weather flows from the stormwater culverts that drain into the study area from Grasslands Reservation indicates that some infiltration of sewer flows into the stormwater system may be occurring.

TABLE 4.15-4. WATER QUALITY SAMPLING RESULTS, OCTOBER 2000

Parameter	Sampling Points						
	Units	**WQ-1**	**WQ-2**	**WQ-3**	**WQ-4**	**WQ-5**	**WQ-6**
Temperature	ºC	18.8	17.7	13.7	12.9	14.1	15.1
Dissolved Oxygen (DO)	mg/l	7.8	6.3	8.7	10.0	8.9	10.4
DO Saturation	Percent	84.0	65.0	84.1	94.3	86.5	103.3
BOD_5	mg/l	<4	<4	<4	<4	<4	<4
Fecal Coliform	cfu/100 ml	**6800**	**670**	**1110**	**350**	**620**	**210**
Nitrate-Nitrogen	mg/l	1.60	2.10	1.60	1.20	1.00	1.00
Oil & Grease	mg/l	<1.6	<1.5	<1.5	<1.6	<1.6	<1.5
PH	SU	7.40	7.50	7.70	7.50	7.60	7.60
Total Dissolved Solids	mg/l	**615**	**576**	**533**	**546**	296	348
Total Phosphorus	mg/l	0.16	0.29	0.10	0.08	0.05	0.06
Total Suspended Solids	mg/l	<3.0	34	<3.0	<3.0	3.2	3.6
Turbidity	NTU	2.8	0.5	0.9	2.6	0.9	1.1
NSF-WQI	0-100	**56.9**	**56.4**	**60.2**	**63.7**	**65.5**	**68.9**

Notes:
Measurements shown in bold do not meet the Class C stream water quality standards.
mg/l= milligrams per liter
NTU = Nephelometic Turbidity Units

4.15.2.1.3. Stormwater Runoff

This section describes the baseline conditions for stormwater runoff and surface water condition existing on the Eastview Site. Based on the existing conditions these features and their responses were simulated using numerical modeling.

Model Description. Existing stormwater runoff and routing at the Eastview Site was simulated using the InfoWorks modeling software. InfoWorks combines a relational database with geographical analysis to provide a single environment to integrate asset planning with detailed and accurate modeling. The system provides fast, accurate and stable modeling of key elements of stormwater conveyance and open channel flow. The software incorporates full solution modeling of backwater effects and reverse flow, detention ponds, complex pipe connections and complex ancillary structures such as culverts, orifices and weirs. The selected model is described is Section 3.15, Data Collection and Impact Methodologies, Water Resources. In addition, model results are presented in Appendix H.

Model Setup. Collection of existing data and information on watershed and stream corridor characteristics is critical for modeling the Mine Brook watershed and effectively simulating the stream's response to a variety of storm conditions. The parameters that define the characteristics of the Mine Brook watershed and stream corridor are described below.

The Mine Brook watershed under existing conditions was delineated based on topographic survey data identifying two-foot contour intervals. The two-foot contours were first converted into a digital elevation model, and then a Geographical Information System (GIS) (Arc View 3-D Analyst) was used to delineate drainage areas, and determine slopes and hydraulic lengths. In addition to the overall area of each basin, the area of various cover types in each basin was determined with GIS in order to facilitate an assessment of infiltration and runoff rates for each cover type. For the existing conditions model, the acreages of wetland, wooded, grass, brush, and impervious areas were approximated using the GIS database.

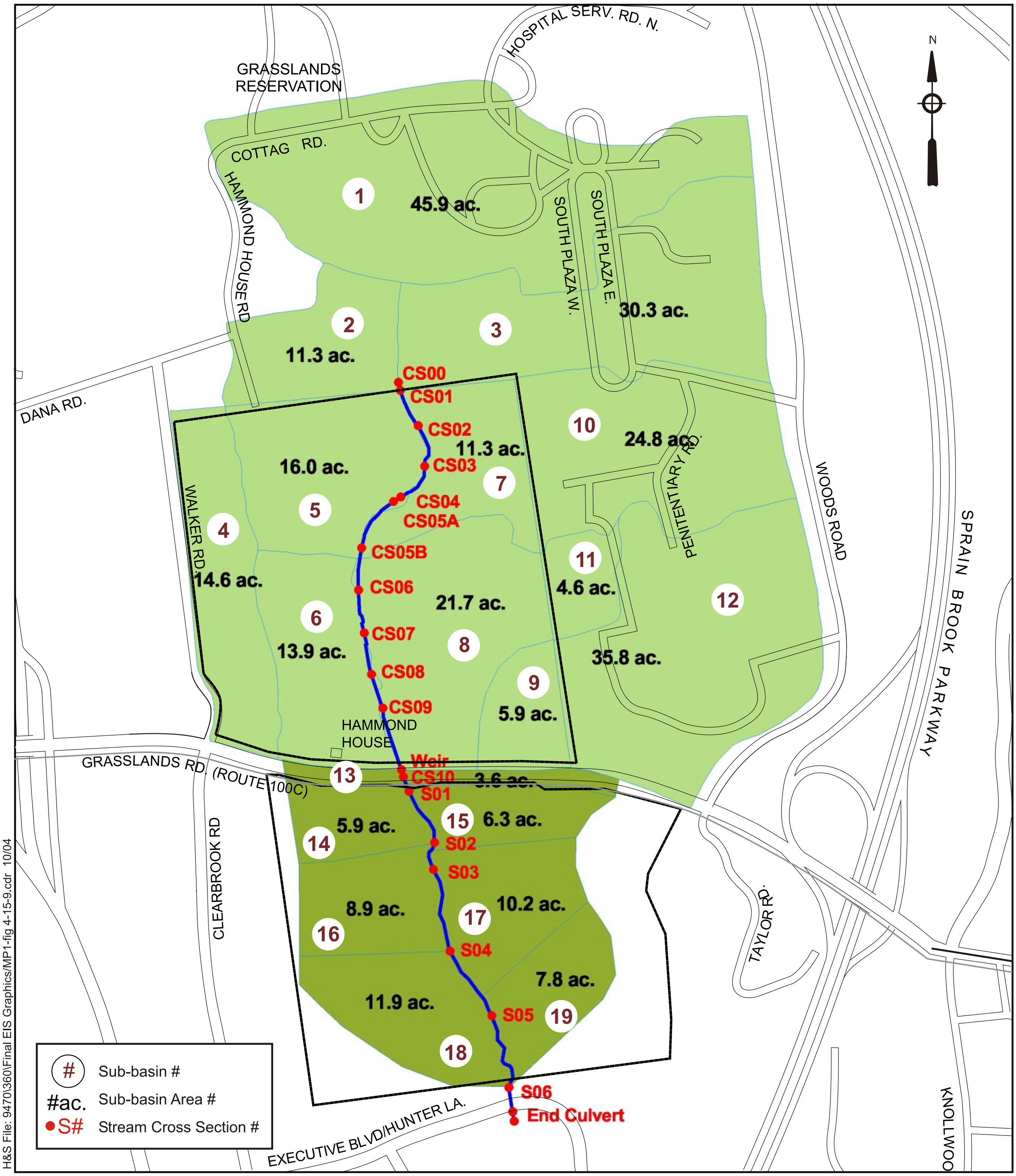
Furthermore, to hydraulically model the flow patterns of the stream, representative cross-sections of the stream were generated using existing topographical information and supplemented by field surveys as needed.

As noted, in order to model stormwater flows the Mine Brook drainage area including the Eastview Site was divided into nineteen sub-catchments or basins (Figure 4-15-9). Stormwater runoff volumes and rates were estimated for both on-site and off-site areas within the Mine Brook watershed so that the contributions of stormwater from the adjacent Grasslands Reservation and office parks northeast of the Eastview Site could be assessed. These off-site areas currently discharge stormwater through a system of subsurface drainage conduits, thereby using the Eastview Site for both stormwater detention and conveyance. These off-site flows make up a majority of the stormwater that enters Mine Brook under existing conditions. Stormwater runoff from development in the Grasslands Reservation (Basin 1) enters Mine Brook via three closely spaced culverts, located approximately 500 feet north of the Eastview Site. A fourth culvert, located on the west side of Mine Brook (Basin 2) delivers storm runoff from the Public Health Laboratory on Dana Road. On-site, several unnamed tributaries to Mine Brook originate in the swampy area at higher elevations in the eastern portion of the site (Basin 7).

In order to simulate the rainfall runoff characteristics of the Mine Brook drainage corridor, a 24-hour duration, with Type III rainfall distribution was used to model each of the five storm events. This is the most common type of storm in New York City and is typical of eastern coastal areas of the U.S. where large 24-hour rain events are typically associated with tropical storms. The 24-hour design storms that were modeled included the 3-month (1.5 inches), the 2-year (3.3 inches), the 5-year (4.3 inches), the 10-year (5.0 inches), and the 100-year (7.2 inches).[3]

For each of the modeled storms existing peak flows, 24-hour routed runoff volumes and maximum water surface elevations were estimated at a number of locations along the Mine Brook Corridor. Figure 4.15-10 shows these locations along the stream corridor. Assessment of peak flow rates is important because an increase in peak flows could result in erosion along drainage paths in both upland and wetland areas. While analysis of the 3-month storm is not required from a regulatory basis, this return period along with a 2-year storm represents storm events that would provide water at frequent enough intervals to support a water dependent wetland. Although the proposed facility would utilize the 100-year 24-hour design storm (7.2 inches) for the stormwater detention design to meet the Town of Mount Pleasant requirements, a more frequent 5-year design storm was analyzed for potential water resource impacts because this more common storm is anticipated to have a greater influence on natural resources.

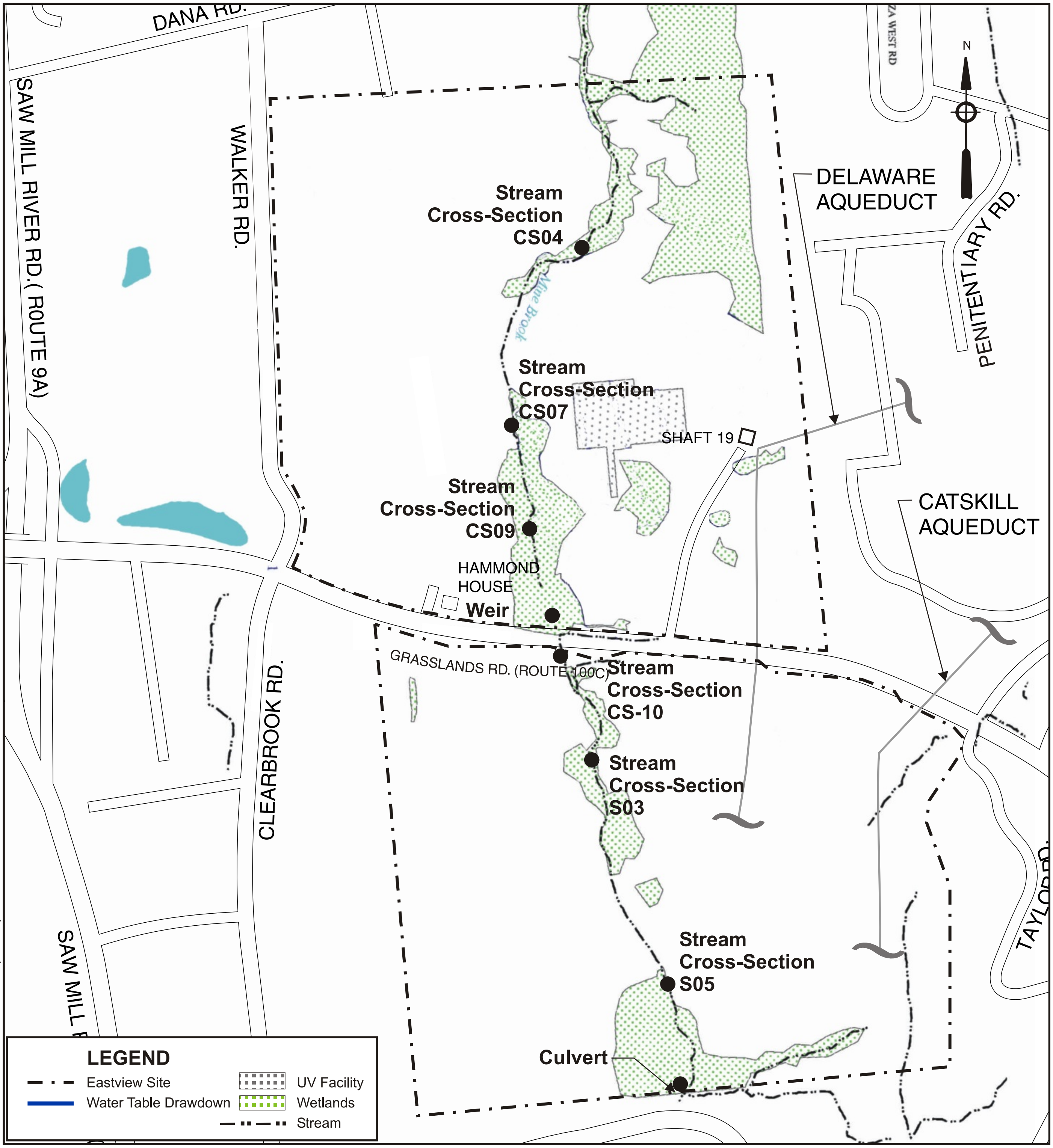
[3] This rainfall data is from the U.S. Weather Bureau. 1961. Technical Paper No. 40-Rainfall Frequency Atlas of the United States (TP 40).



Mine Brook Watershed Sub-basins with the "InfoWorks" Model Network

Catskill/Delaware UV Facility

Figure 4.15-9



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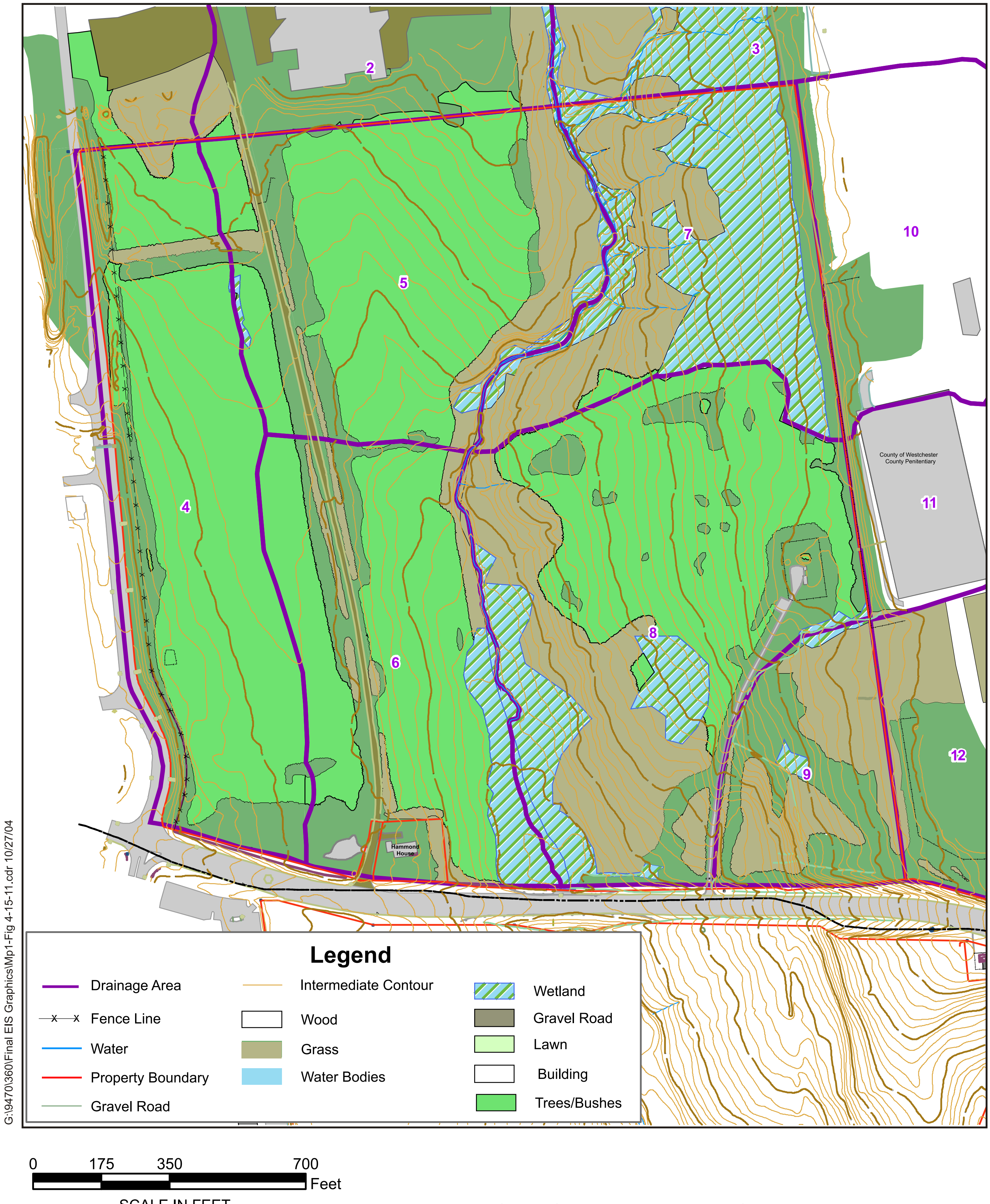
Cross-Section Locations Along the Mine Brook Corridor

Figure 4.15-10

Existing Stormwater Runoff. The Eastview Site is almost entirely encompassed by the Mine Brook watershed. Based on the topography, the overall watershed draining to Mine Brook including the Eastview Site was subdivided into 19 basins with Mine Brook forming the boundary between Basins 5 and 6 to the west, and Basins 7 and 8 to the east (Figure 4.15-10). In addition to the off-site basins, delineations for on-site basins are presented in Figure 4.15-11. The sub-basins were defined to help characterize on-site stormwater flow.

Each basin within the Eastview Site receives storm flow from off-site with the exception of Basin 4 on the western side of the study area. The six off-site basins within the Mine Brook watershed were delineated to provide an estimate of the stormwater runoff entering the study area. Basins 1 and 2 discharge more or less directly into Mine Brook, while runoff from Basins 3, 10, and 11 flows overland to the border of the Eastview Site. The majority of Basin 12 discharges to the roadside ditch along Route 100C, while a small portion flows on-site (Basin 9). Most of the runoff from Basin 9 appears to be intercepted by a series of man-made ditches that run generally parallel to and east of the Shaft No. 19 access road. The simulated existing stormwater runoff characteristics in the basins are summarized in Table 4.15-5. Stream inverts and water surface elevations during modeled storm events are presented in Figure 4.15-12.

Table 4.15-5 summarizes the peak runoff flow, total routed runoff volume and the water surface elevations at a number of cross-sections along the Mine Brook drainage corridor for the 3-month, 2-year, 5-year, 10-year and 100-year storm events under existing conditions. The model indicates that within the Eastview Site during the 2-year storm, the peak flow in upper Mine Brook is approximately 90.5 cubic feet per second (cfs) with a total runoff volume of 20.0 acre-feet. The majority of this runoff comes from off-site and on-site basins. Of the on-site basins, Basin 7, which contains several wetland streams tributary to Mine Brook, and Basin 8, which is the largest on-site basin, are the major contributors. The model simulations confirm that stormwater runoff from within the Eastview Site is not the primary source of water supporting the hydrology of Mine Brook but includes a significant contribution of stormwater runoff from off-site (upstream) basins. Figure 4.15.12 (A and B) presents the stream invert profile along with the maximum water surface elevations for the various storms modeled (location points are presented in Figure 4.15-10). As illustrated by the profile the sections of streams with a significant slope are more channelized while the gentler sloped and flatter sections demonstrate more floodplain and adjacent area ponding.



On-Site Basins for North Parcel Eastview Site

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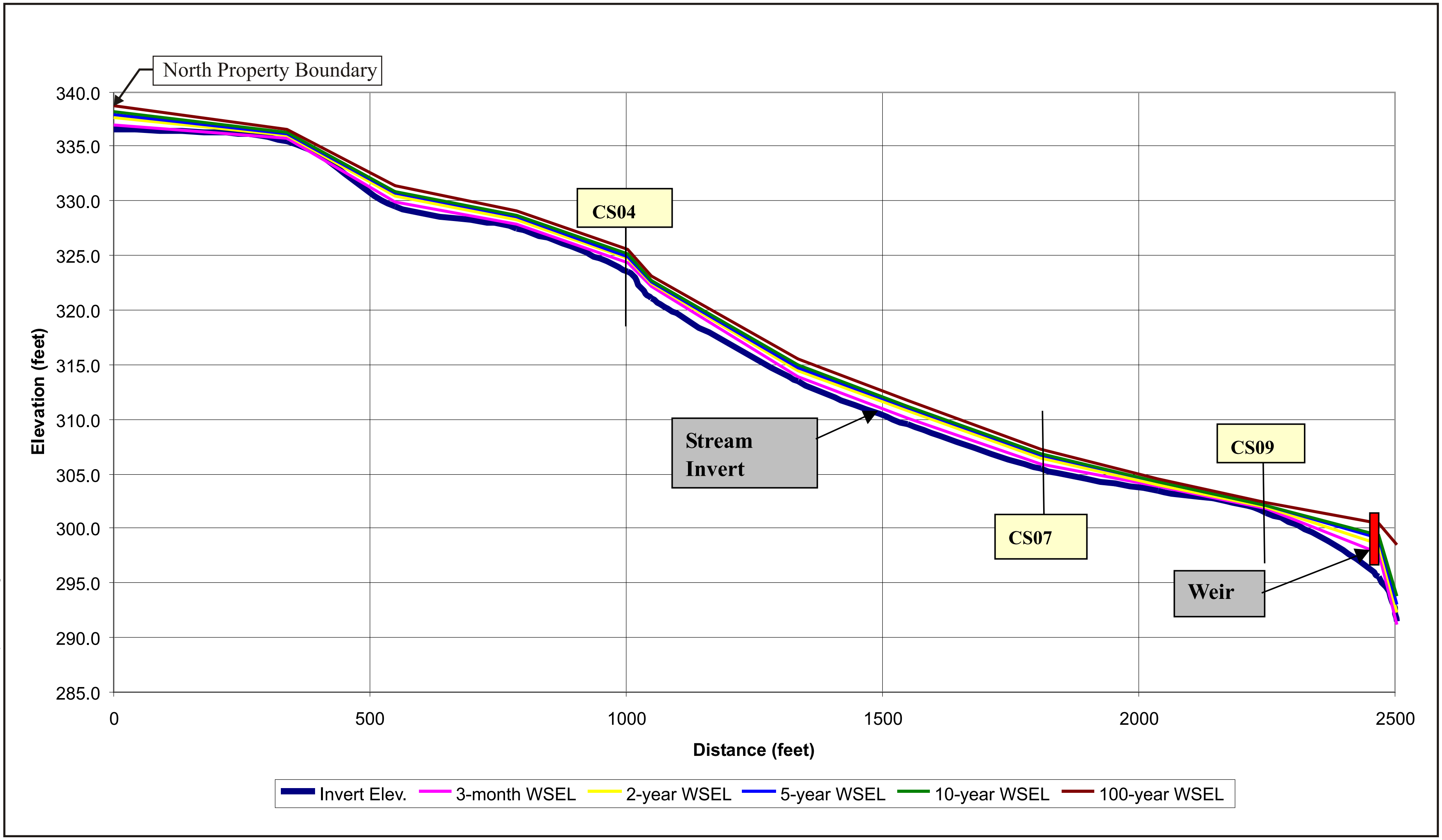
Figure 4.15-11

TABLE 4.15-5. RUNOFF CHARACTERISTICS IN 3-MONTH, 2-YEAR, 5 YEAR, 10 YEAR AND 100YEAR STORM EVENTS (EXISTING CONDITIONS)

STORM EVENT	CROSS-SECTION NO.	PEAK FLOW RATE (cfs)	ROUTED RUNOFF VOLUME (acre-ft)	WATER SURFACE ELEVATION (ft)
3-MONTH STORM	CS-04	12.9	6.8	324.3
	CS-07	16.3	8.0	305.8
	CS-09	17.7	8.9	301.8
	WEIR (@ 100C)	21.7	10.8	297.8
	CS-10	21.7	10.8	288.7
	S03	24.0	11.4	278.5
	S05	26.0	12.3	265.5
	END CULVERT	26.0	12.3	258.1
2-YEAR STORM	CS-04	90.5	20.0	324.7
	CS-07	112.6	24.3	306.4
	CS-09	132.8	28.6	302.0
	WEIR (@ 100C)	164.4	35.9	298.6
	CS-10	164.3	35.9	289.9
	S03	176.8	38.1	279.8
	S05	169.3	42.3	265.7
	END CULVERT	169.3	42.3	260.4
5-YEAR STORM	CS-04	155.4	28.5	324.9
	CS-07	192.2	34.7	306.7
	CS-09	231.3	41.5	302.1
	WEIR (@ 100C)	286.7	52.3	299.1
	CS-10	286.6	52.3	290.7
	S03	305.4	55.5	280.5
	S05	278.1	62.2	265.8
	END CULVERT	278.1	62.2	261.7
10-YEAR STORM	CS-04	206.0	34.7	325.1
	CS-07	253.3	42.2	306.8
	CS-09	308.5	50.9	302.1
	WEIR (@ 100C)	382.9	64.2	299.4
	CS-10	382.9	64.2	291.6
	S03	408.4	68.2	280.9
	S05	338.0	76.6	265.9
	END CULVERT	338.0	76.6	262.7
100-YEAR STORM	CS-04	382.8	54.8	325.5
	CS-07	468.6	66.7	307.2
	CS-09	577.6	81.8	302.4
	WEIR (@ 100C)	715.9	103.5	300.5
	CS-10	716.0	103.5	297.7
	S03	766.0	110.0	281.6
	S05	522.4	124.4	266.7
	END CULVERT	522.4	124.4	266.0



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Existing Water Surface Elevations (WSELs) for 3 month, 2-year, 5-year, 10-year and 100-year Return Frequency Storm Events

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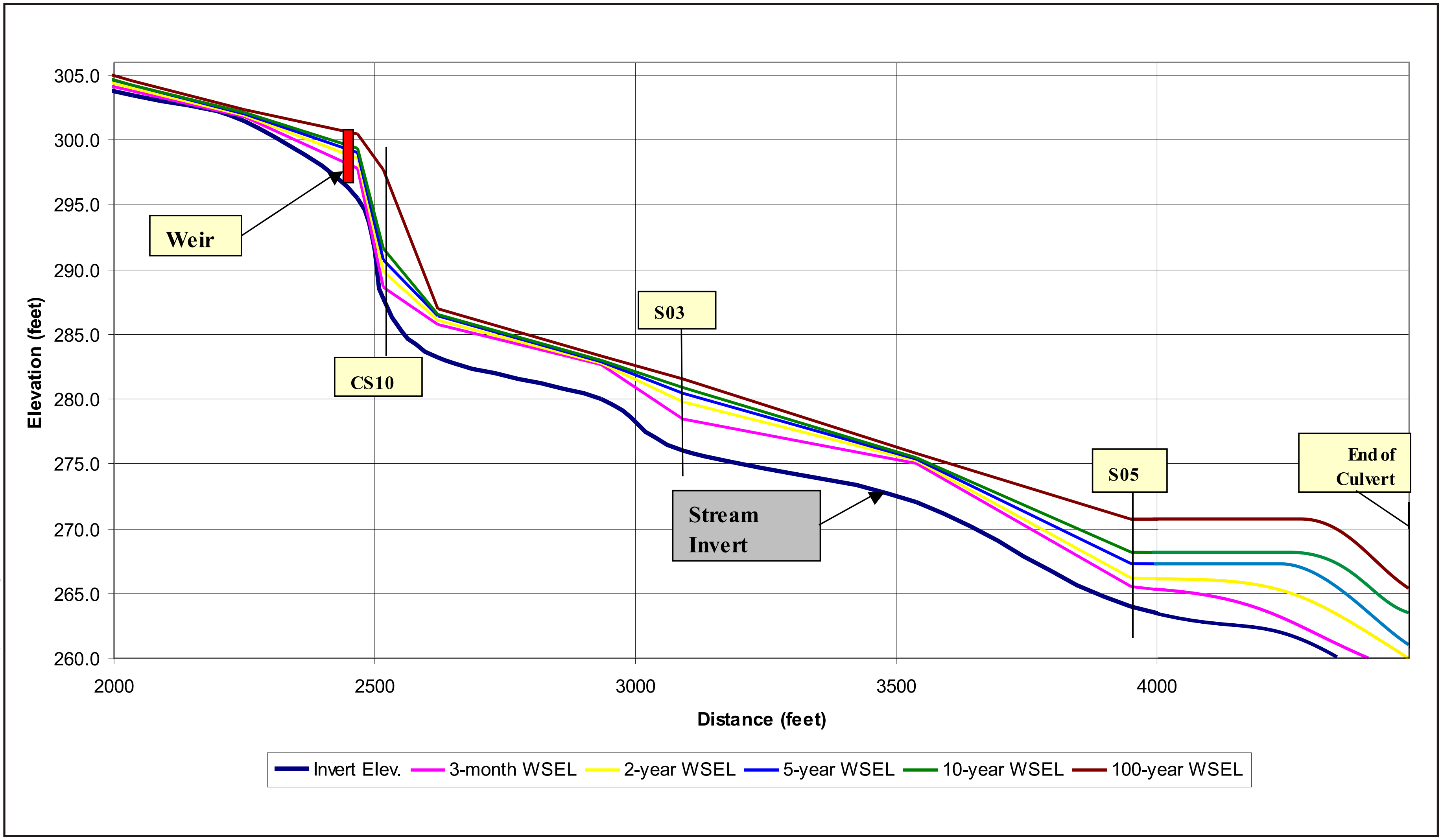
Figure 4.15-12a



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Existing Water Surface Elevations (WSELs) for 3 month, 2-year, 5-year, 10-year and 100-year Return Frequency Storm Events

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Figure 4.15-12b

4.15.2.1.4. Groundwater

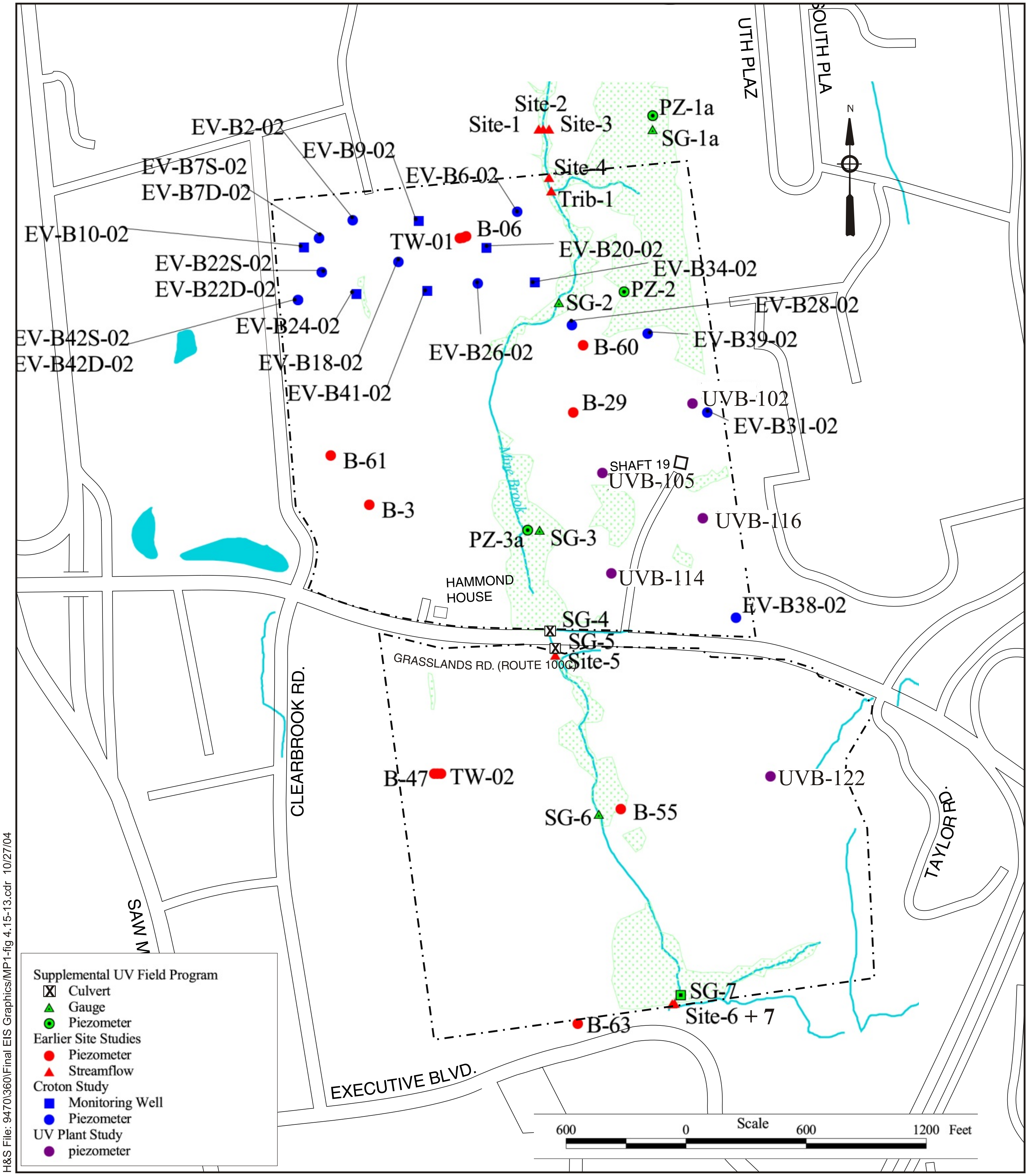
The groundwater system beneath the Eastview Site consists of two units: bedrock and soil overburden. The bedrock consists of subcropping schist below most of the site and limestone on the western portion. Outcrops and shallow subcrops of the bedrock formations surfaces are generally found to be weathered and are likely to have relatively high permeability compared to the deeper intact, and less weathered bedrock. The limestone formation is likely to have higher bulk permeability than the schist due to its tendency for solution weathering and weakness in the limestone. A detailed discussion of the regional geological description is presented above in Section 4.15.2.1.1, Existing Conditions, Site Geological Description.

The land surface elevations and the streams and wetlands near the site influence local shallow groundwater flow patterns (see Figures 4.15-1 and 4.15-2.). In general, the water table elevations represent a muted reflection of the ground surface elevations. Therefore, groundwater flow patterns in the shallow overburden can be described by the surface water drainage patterns. High groundwater elevations exist in the upland area east of the Eastview Site and on the eastern portion of the site, where gradients are relatively steep. The lowest groundwater elevations are along the Saw Mill River (see Figure 4.15-2). In between, groundwater gradients are not as steep as on the eastern portion of the site. Mine Brook, which flows north-to-south across the mid-section of the Eastview Site, influences the local shallow groundwater flow patterns at the site. East of this stream as well as north of the site, surface water drainage and groundwater inflows feed the shallow groundwater flow system, with much of this inflow coming from off-site areas, including Grasslands Reservation that borders the project site to the west, north and east of the north parcel.

There is a minor groundwater divide that runs north-to-south within the site west of Mine Brook, with groundwater east of the minor divide flowing toward Mine Brook and west of the divide toward the Saw Mill River. The groundwater flow at the southern extent of the site, on the western side of Mine Brook, is radial toward both surface water bodies (i.e. Mine Brook and the Saw Mill River). The Hammond House, located in the southwestern portion of the north parcel, utilizes an on-site well to obtain water for the household.

Shallow groundwater is believed to discharge locally to Mine Brook and its tributaries and associated wetlands. Wetlands away from Mine Brook appear to be somewhat perched, with groundwater rising and falling seasonally below the shallowest wetland soils. Deeper groundwater in the overburden and bedrock may flow beneath higher elevation (e.g. small) tributaries and Mine Brook and ultimately discharge to downstream stretches of Mine Brook as well as the Saw Mill River.

Groundwater Monitoring. Groundwater elevations have been monitored at the Eastview Site since June 1999. Twenty-four overburden wells and 13 bedrock wells have been installed, to date. Figure 4.15-13 shows the monitoring well locations at the Eastview Site and Table 4.15-6 presents the well construction and groundwater elevation data for the Eastview Site.



Monitoring Well Locations at Eastview Site

Catskill/Delaware UV Facility

Figure 4.15-13

TABLE 4.15-6. WELL CONSTRUCTION DETAILS AND GROUNDWATER ELEVATION DATA AT THE EASTVIEW SITE

Well No.	Project	NORTHING NYS State Plane East NAD-83 (Feet)	EASTING NYS State Plane East NAD-83 (Feet)	Ground Elevation (Feet NAVD 1988)	Well Depth (Feet)	Formation Screened	December 4, 2003 Water Level Elevation (Feet NAVD 1988)	December 22, 2003 Water Level Elevation (Feet NAVD 1988)
UVB-102	UV Facility	818570	682980	360.00	95	Rock	355.79	357.54
UVB-105	UV Facility	818258	682578	344.00	100	Rock	328.98	341.42
UVB-114	UV Facility	817811	682620	320.00	80	Rock	316.56	317.07
UVB-116	UV Facility	818058	683028	358.00	116	Rock	354.92	356.14
UVB-122	UV Facility	816905	683332	337.00	50	Rock	317.47	322.05
UVPZ-1a	UV Facility	819877	682752	355.16	5	Wetland Soils	355.31	355.35
UVPZ-2	UV Facility	819087	682753	350.34	5	Wetland Soils	350.14	350.26
UVPZ-3a	UV Facility	818295	682235	301.15	5	Wetland Soils	300.76	300.99
EV-B2-02	Croton	819384	681463	331.86	52	Till	324.46	326.18
EV-B6-02	Croton	819423	682197	340.31	51	Till	334.61	335.01
EV-B7S-02	Croton	819305	681313	330.19	230	Decomposed Rock	316.96	316.68
EV-B7D-02	Croton	819305	681313	330.19	230	Schist	306.25	308.20
EV-B18-02	Croton	819199	681667	325.04	52	Till	322.40	323.21
EV-B22S-02	Croton	819153	681324	327.22	230	Decomposed Rock	320.83	321.91
EV-B22D-02	Croton	819153	681324	327.22	230	Schist	315.22	314.61
EV-B26-02	Croton	819104	682020	325.36	52	Till	323.14	323.66
EV-B28-02	Croton	818917	682441	330.78	96	Till	327.68	327.35
EV-B31-02	Croton	818530	683047	361.29	80	Gneiss	355.89	356.72
EV-B38-02	Croton	817613	683176	359.87	80	Gneiss	348.32	350.04
EV-B39-02	Croton	818881	682779	351.45	27	Till	349.63	349.92
EV-B42S-02	Croton	819029	681218	320.87	230	Decomposed Rock	302.57	305.73
EV-B42D-02	Croton	819029	681218	320.87	230	Schist	301.27	307.96
EV-B9-02	Croton	819382	681756	327.03	145	Till	325.22	325.83
EV-B10-02	Croton	819263	681244	327.08	52	Till	320.12	322.39
EV-B20-02	Croton	819261	682058	331.98	52	Till	329.40	329.77
EV-B24-02	Croton	819055	681479	327.50	52	Till	323.67	324.36
EV-B34-02	Croton	819108	682276	332.40	85	Till	324.75	325.08

TABLE 4.15-6. WELL CONSTRUCTION DETAILS AND GROUNDWATER ELEVATION DATA AT THE EASTVIEW SITE

Well No.	Project	NORTHING NYS State Plane East NAD-83 (Feet)	EASTING NYS State Plane East NAD-83 (Feet)	Ground Elevation (Feet NAVD 1988)	Well Depth (Feet)	Formation Screened	December 4, 2003 Water Level Elevation (Feet NAVD 1988)	December 22, 2003 Water Level Elevation (Feet NAVD 1988)
EV-B41-02	Croton	819069	681796	321.38	82	Till	319.63	320.55
EV-BH7-02	Croton	819209	679193	197.91	100	Schist	--	191.68
EV-BH9-02	Croton	819203	678432	194.92	100	Schist	--	187.07
EV-BH10-02	Croton	819121	677454	198.36	100	Till	--	184.16
B-59	Early Studies	819307	681955	332.74	55	Till	326.57	330.42
B-60	Early Studies	818827	682491	338.07	20	Till	333.21	336.53
B-61	Early Studies	818334	681367	319.96	31	Till	312.94	313.64
B-62	Early Studies	816915	681845	323.17	20	Till	318.80	322.60
B-63	Early Studies	815800	682474	266.16	34	Till	--	262.90
TW-01	Early Studies	819305	681940	332.30	20	Till	326.36	329.84
TW-02	Early Studies	816915	681861	322.79	20	Till	318.40	321.93
B-06	Early Studies	819312	681969	329.83	20	Till	325.62	327.98
B-29	Early Studies	818527	682448	328.17	45	Till	--	
B-32	Early Studies	818115	681538	321.26	20	Till	316.24	317.66
B-47	Early Studies	816914	681832	320.80	38	Till	312.07	313.76
B-55	Early Studies	816758	682663	279.50	20	Till	--	279.84

Historical data suggest that groundwater elevations may fluctuate up to 15 feet over the course of the year at some wells, or between extreme hydrologic conditions. The greatest water level fluctuations were observed in wells that were screened in till and located west of Mine Brook. Groundwater elevations at wells near Mine Brook, or within or close to wetland areas fluctuate less. This is because groundwater elevations at these locations appear to be strongly influenced by nearby surface water, and the hydraulic controls on the surface water bodies, including conveyance channels and structures.

Shallow groundwater originates from direct infiltration of precipitation to the water table, and also from infiltration in areas where surface runoff has been redirected. The latter may be the case in the north parcel where drainage systems divert storm runoff from parking lots and other paved areas. There does not appear to be a significant lateral source of groundwater influx within the overburden aquifer formation from north of the model area, where the aquifer is believed to extend. It is possible that groundwater inflow to the overburden may also occur in the site area from lateral and vertical flow from the bedrock formations.

Reports describing aqueduct construction indicated that groundwater under artesian pressure exists in the bedrock, and it may originate from bedrock recharge areas that are beyond the local surface watershed. According to some references, drilling and tunnel construction for the NYC aqueducts showed that groundwater flow might be enhanced in the fracture zones. The “crush zone” about 2,000 feet south of the Delaware Aqueduct Shaft No. 19, near streamflow measurement Sites 6 and 7, is one such location that was explored significantly with drilling and tunnel construction. Significant inflow into the tunnel occurred in this location, approximately 750 gpm initially, until dissipated by grouting and pressure relief.

Precipitation and Groundwater Recharge. Precipitation infiltration is the primary source of shallow groundwater recharge. According to historical precipitation data collected at Westchester Airport (1974 – 2000), average annual precipitation is 49.6 inches. Average monthly precipitation is 4.1 inches, and ranges from 3.1 to 4.8 inches.

Drought condition information for New York State was obtained from a national drought-tracking center for the 1895-2001 time period. The Palmer Drought Severity Index (PDSI), which is used by New York State as one component in a system of evaluating drought, was used as an indicator of hydrological conditions during the times when different field programs were conducted at the Eastview Site. For instance, groundwater elevations measured in late summer and early fall in 2002 reflect dry conditions based on the PDSI. A review of the water level time history graphs for wells monitored during this period shows that water level elevations were approximately 3 to 5 feet lower than those measured in later fall 2002 and 2003, when the PDSI indicated average to wetter-than-average hydrologic conditions.

Groundwater recharge estimates were developed based on stream flow measurements, precipitation data, and literature values. USGS studies of till deposits in the New England area have estimated an average rate of groundwater recharge of about 7 inches per year (Hansen and Lapham, 1991; Morrissey, 1983). Analysis of the stream flow data suggested an areal groundwater recharge rate of 10 to 15 inches per year.

Hydraulic Conductivity. Hydraulic conductivities of the geologic materials were estimated through field testing, data evaluation, and model calibration. Prior studies at the Eastview Site provided grain size data and rising head test data to estimate till hydraulic conductivity values. Additional hydraulic testing was performed during the Croton project investigations to evaluate the hydraulic conductivity of the till and bedrock.

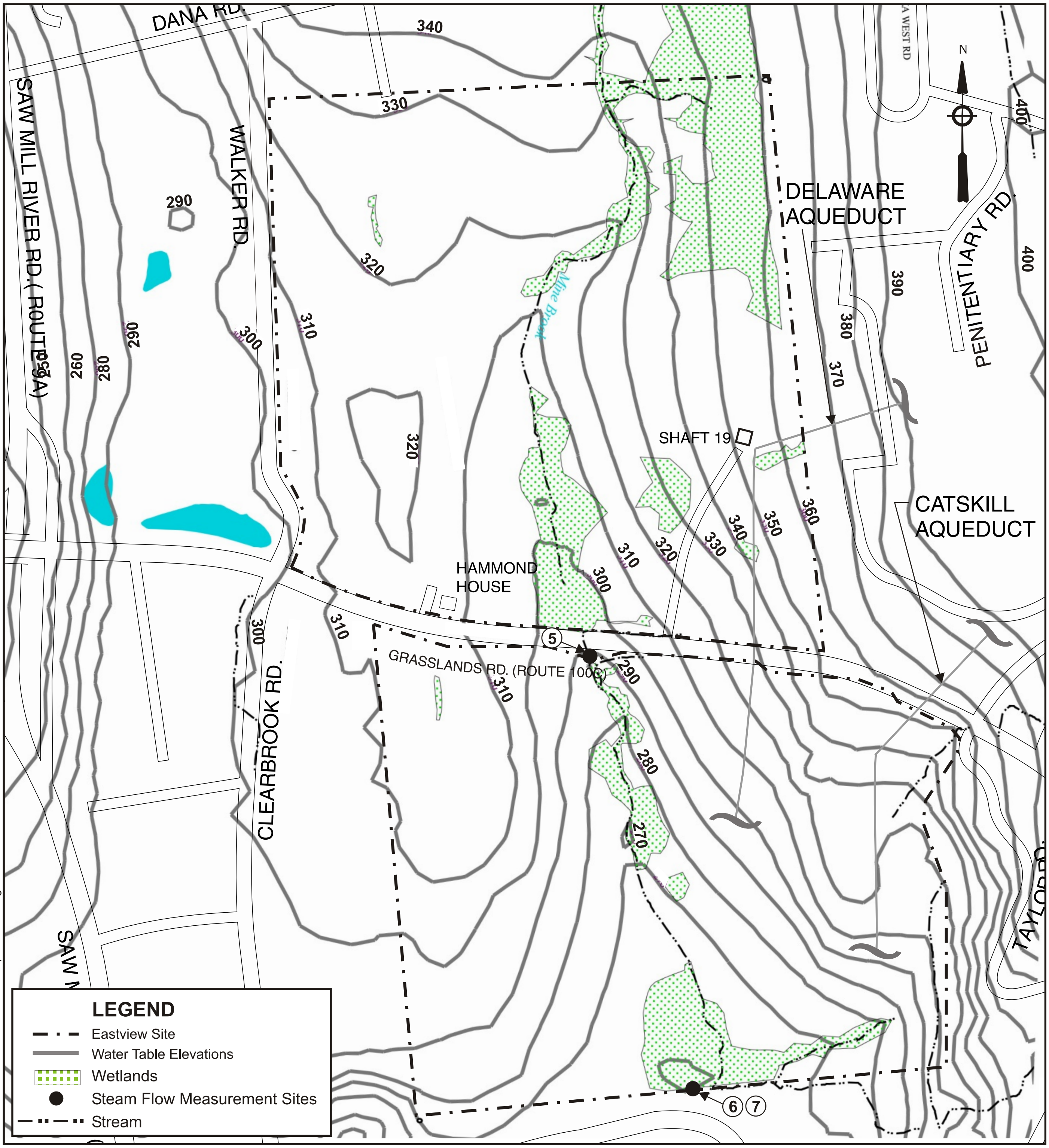
The estimated hydraulic conductivity of the till, based on the rising head tests, ranged from 0.01 to 0.17 feet per day. Since most of the wells tested appear to be screened in the till, these hydraulic conductivity estimates are believed to represent the hydraulic properties of the till, and not the surficial veneer layer. The hydraulic conductivity of the veneer layer was not tested but estimated based on the description of the sediments, as listed in the boring logs.

Hydraulic conductivity tests were conducted in bedrock and overburden borings during the Croton project investigations. The estimated hydraulic conductivity values derived from these tests ranged from 0.005 to 3 feet per day for the till and 0.008 to 4.8 feet per day for the bedrock.

These hydraulic conductivity estimates were used as a basis for adjusting aquifer properties during model calibration. Hydraulic conductivity estimates were improved through model calibration.

Groundwater Modeling. A numerical groundwater flow model was developed to simulate groundwater flow patterns at the site and surrounding area under existing conditions. The selected model is described in Section 3.15, Data Collection and Impact Methodologies, Water Resources. In addition, model results are presented in Appendix H.

Model Calibration. First, a steady state calibration was performed using groundwater elevation measurements (see Figure 4.15-13 for location of data collection points) collected in December 2003 and minimum stream flow measurements at Site 5, 6 and 7 as calibration targets (see Figure 4.15-2 for stream flow measurement locations). Minimum stream flow measurements were used because these are believed to represent the groundwater base flow component of stream flow. Since the groundwater flow model does not simulate the surface water portion of stream flow, the low flow measurements are more appropriate for model calibration targets. Simulated steady state water table elevations are shown in Figure 4.15-14. Table 4.15-7 summarizes the comparison between model simulation results and observed data. More complete documentation of model calibration is presented in Appendix H. Following steady state calibration, the model was used to simulate transient hydrologic conditions for the period 1999 to present. The transient simulations were performed to check the groundwater flow model aquifer properties. Water level data at some wells showed a wide range of fluctuation. In addition, the drought index and precipitation data showed that a relatively representative range of dry, wet, and average conditions occurred during the period of on-site monitoring.



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Simulated Water Table Elevations at Eastview Site Existing Conditions

Catskill/Delaware UV Facility

Figure 4.15-14

TABLE 4.15-7. GROUNDWATER ELEVATIONS AND STREAM FLOW RATES COMPARISON OF SIMULATED AND OBSERVED HEADS

Formation	Well	Simulated Groundwater Elevation	Observed Groundwater Elevation	Difference
Bedrock	EV-B7D-02	306.497	306.25	0.247
Bedrock	EV-B22D-02	304.424	315.22	-10.796
Bedrock	EV-B42D-02	299.292	301.27	-1.978
Bedrock	UVB-102	354.751	355.786	-1.035
Bedrock	UVB-114	316.857	316.564	0.293
Bedrock	UVB-116	349.231	354.922	-5.691
Bedrock	UVB-122	321.96	317.474	4.486
Bedrock	EV-B7S-02	309.561	316.96	-7.399
Bedrock	EV-B22S-02	307.443	320.83	-13.387
Bedrock	EV-B31-02	357.371	355.89	1.481
Bedrock	EV-B38-02	343.004	348.32	-5.316
Bedrock	EV-B42S-02	301.433	302.57	-1.137
Bedrock	EV-BH7-02	189.086	191.68	-2.594
Bedrock	EV-BH9-02	186.609	187.07	-0.461
Bedrock	UVB-105	328.208	328.976	-0.768
Overburden	B-59	326.593	326.57	0.023
Overburden	B-60	331.667	333.21	-1.543
Overburden	B-61	310.767	312.94	-2.173
Overburden	B-06	327.599	325.62	1.979
Overburden	B-32	316.409	316.24	0.169
Overburden	B-47	310.943	312.07	-1.127
Overburden	EV-B2-02	325.612	324.46	1.152
Overburden	EV-B6-02	332.219	334.61	-2.391
Overburden	EV-B9-02	326.63	325.22	1.41
Overburden	EV-B10-02	321.582	320.12	1.462
Overburden	EV-B18-02	322.906	322.4	0.506
Overburden	EV-B20-02	327.635	329.4	-1.765
Overburden	EV-B24-02	322.038	323.67	-1.632
Overburden	EV-B26-02	323.037	323.14	-0.103
Overburden	EV-B28-02	328.554	327.68	0.874
Overburden	EV-B34-02	327.302	324.75	2.552
Overburden	EV-B39-02	350.297	349.63	0.667
Overburden	EV-B41-02	321.115	319.63	1.485
Overburden	UVPZ-1a	355.618	355.312	0.306
Overburden	UVPZ-2	349.448	350.142	-0.694
Overburden	UVPZ-3a	301.719	300.76	0.959
Overburden	B-62	314.568	318.8	-4.232
Overburden	TW-01	326.989	326.36	0.629
Overburden	TW-02	314.462	318.4	-3.938

TABLE 4.15-7a. GROUNDWATER ELEVATIONS AND STREAM FLOW RATES COMPARISON OF SIMULATED AND OBSERVED HEADS

Groundwater Elevations (Feet)			
Formation	**Number of Wells**	**Mean Difference Between Simulated and Observed Heads**	**Standard Deviation**
Bedrock	15	-2.94	4.77
Overburden	24	-0.23	1.79

Streamflow (gpm)			
Site	**Observed Minimum Flow**	**Simulated**	
Site 5	60-80	78	
Site 6 and 7	130-150	144	

Transient simulations of groundwater conditions were conducted for the 1999 to 2003 period. Monthly groundwater recharge was specified based on monthly precipitation values. No groundwater recharge was applied from June to September, because it is believed that groundwater recharge during these growing season months is limited because of evapotranspiration. Annual recharge for the simulation period was estimated to range from about 10 to 15 inches. A few of the transient simulation (groundwater elevation) results are shown in Figure 4.15-15 (A through C) as an example. Complete transient simulation results for all the site wells are included in Appendix H.

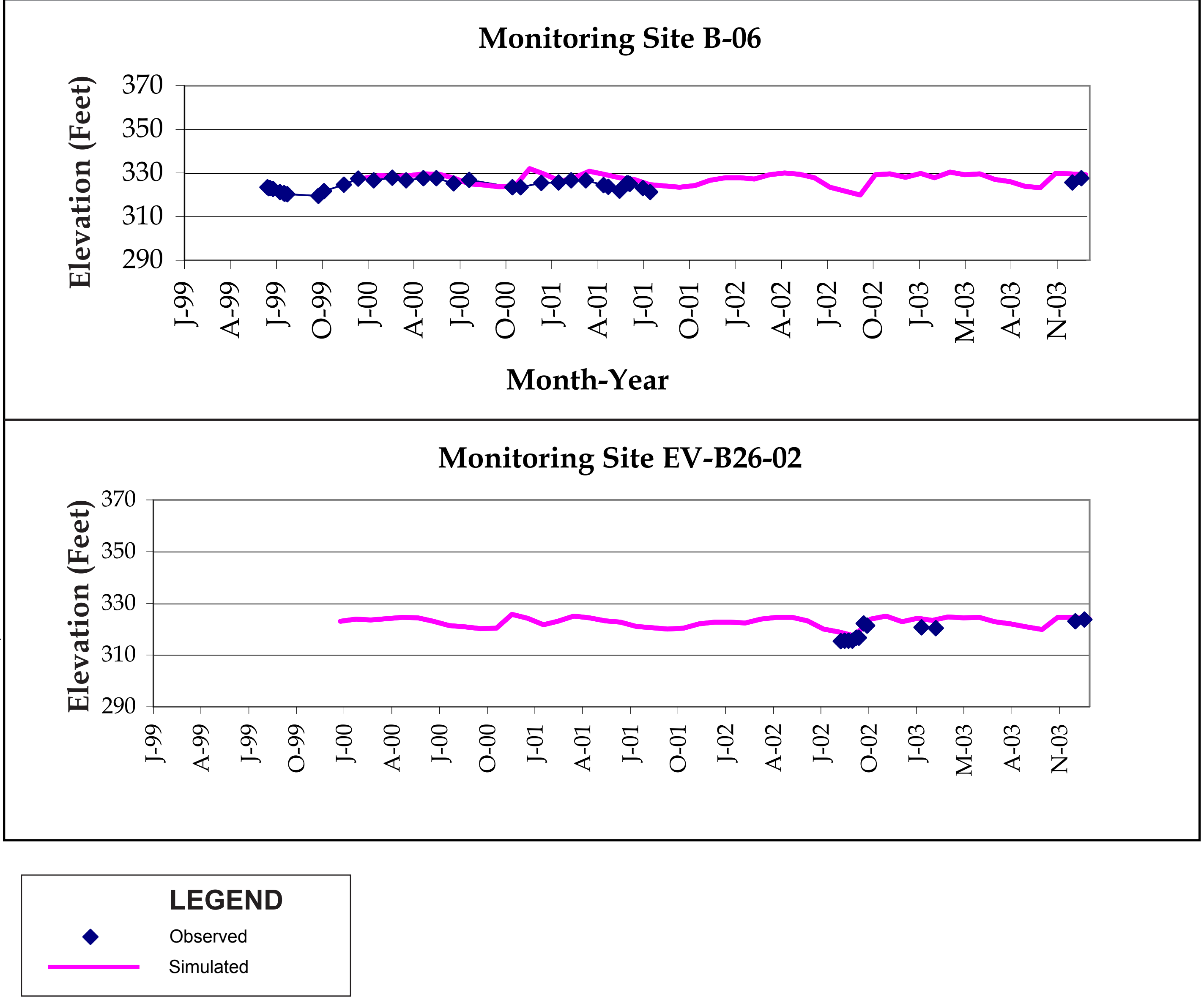
Overall the transient simulation results indicate that the model can represent the seasonal groundwater fluctuations observed at the site, as well as the groundwater baseflow to Mine Brook. As such, the model can be used as a tool to evaluate potential groundwater seasonal fluctuations under construction conditions, and to evaluate whether changes in depths to groundwater that may result from construction dewatering would adversely affect site wetlands.

Existing Groundwater Conditions. Steady state and transient simulations were performed using long-term average groundwater recharge rates. The steady state simulation results represent long-term average conditions while the transient simulation results represent average changes in monthly groundwater elevations that occur. These are based on changes in monthly groundwater recharge associated with typical, annually averaged precipitation and hydrological variations.

Figure 4.15-14 presents simulated steady state water table elevation contours under the existing conditions. The simulated steady state groundwater base flow rates at Sites 5, 6/7 are 78 gpm and 144 gpm, respectively. Site 5 is located where Mine Brook flows through the culvert beneath Grasslands Road (Route 100C), and thus the flows measured there represent the complete groundwater and surface water drainage from the north parcel and its contributing off-site areas. Site 6/7 is located on the south parcel, in the area where a tributary joins Mine Brook. The Site 6/7 flow-measurement is derived from two separate flow stations (Sites 6 and 7) with the combined flow representing the total flow in Mine Brook at the southernmost on-site station. Flows from Site 6/7 therefore provide the best available data for describing the total groundwater and surface water drainage from the Eastview Site, before Mine Brook flows off-site towards its ultimate discharge into the Saw Mill River.

Wetlands vegetation requires a shallow depth to water to thrive because the root zones of many wetlands plants do not extend more than a few feet below land surface. In order to minimize impacts to wetlands, it is desirable to maintain a maximum depth to water of two feet during the April to June growing period in locations where the water table is within two feet of the land surface during baseline conditions. Figure 4.15-16 shows the locations of the wetland assessment points and Figure 4.15-17 (A through F) presents transient simulation results for these locations within the delineated wetland areas during existing conditions. The graphs show monthly values of simulated depths to water. These baseline condition results are compared to transient simulation results from construction and post-construction scenarios to identify locations where depths to water are predicted to change from within two feet of land surface to greater than two feet below land surface.

GROUNDWATER ELEVATION WEST OF MINE BROOK



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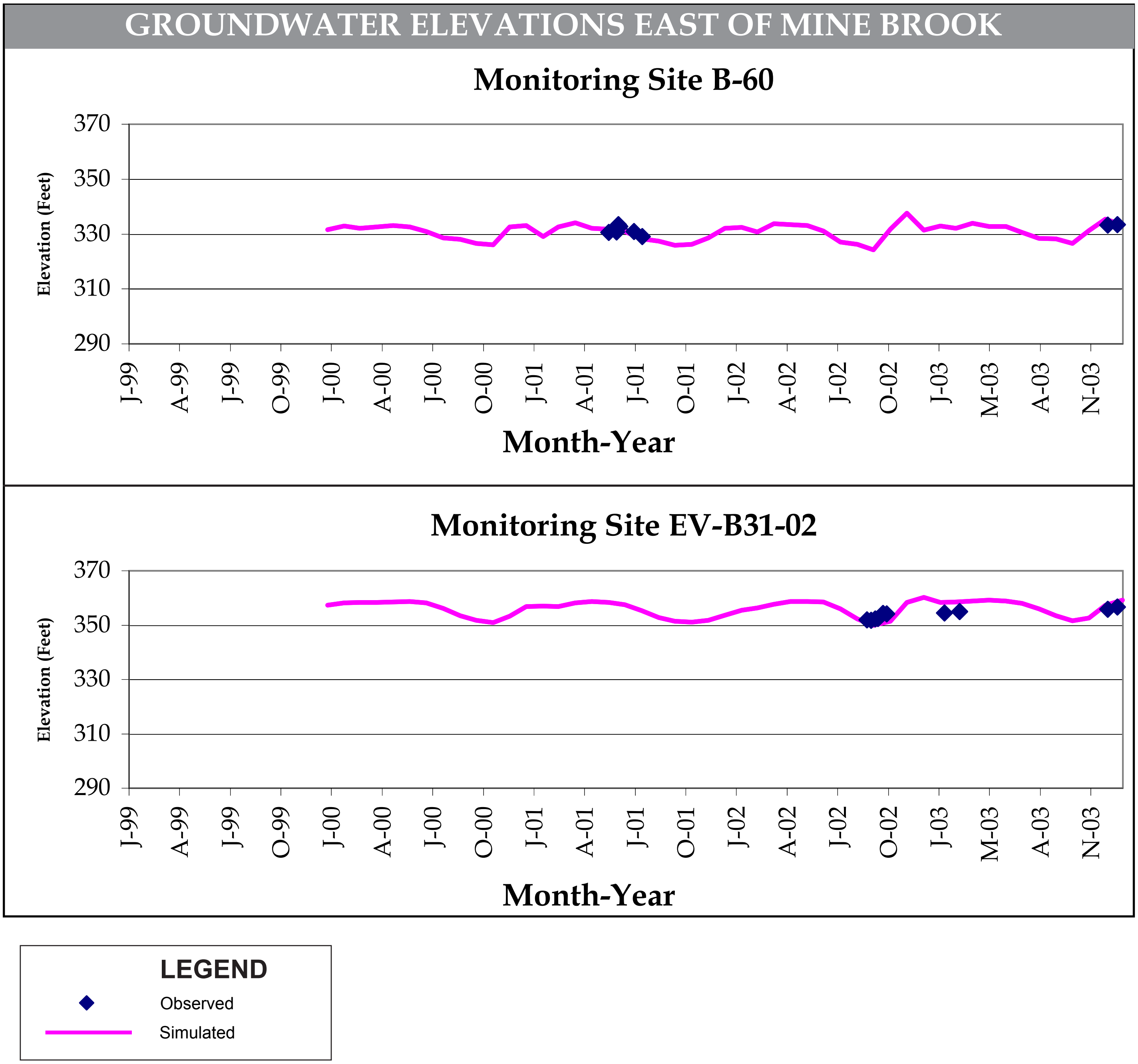
Groundwater Evaluations
Eastview Site

Catskill/Delaware UV Facility

Figure 4.15-15a



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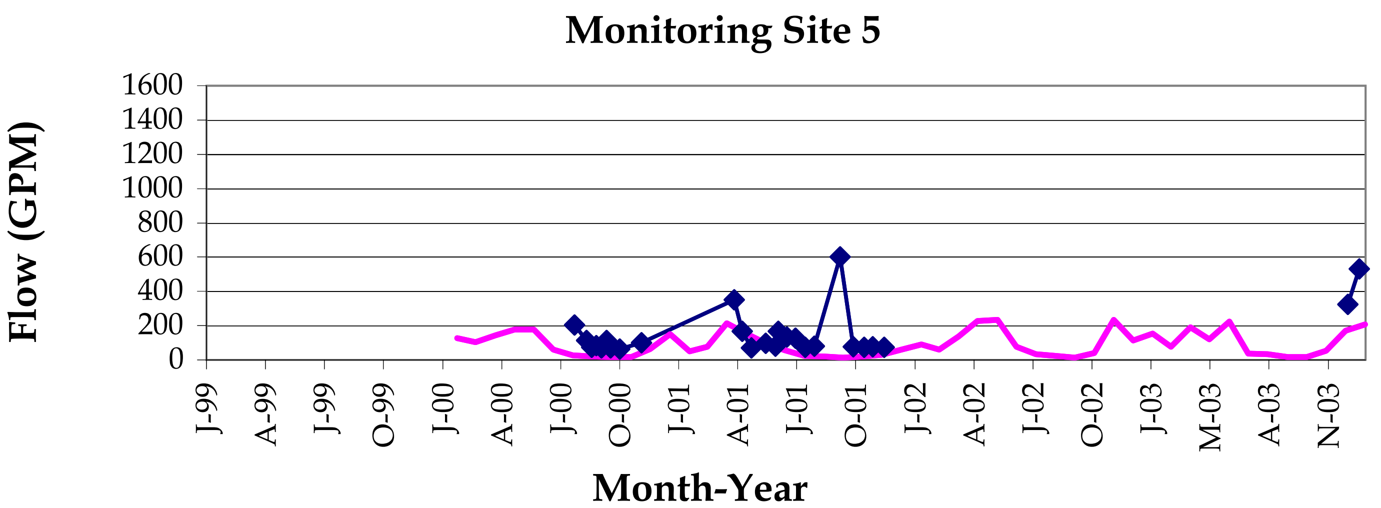
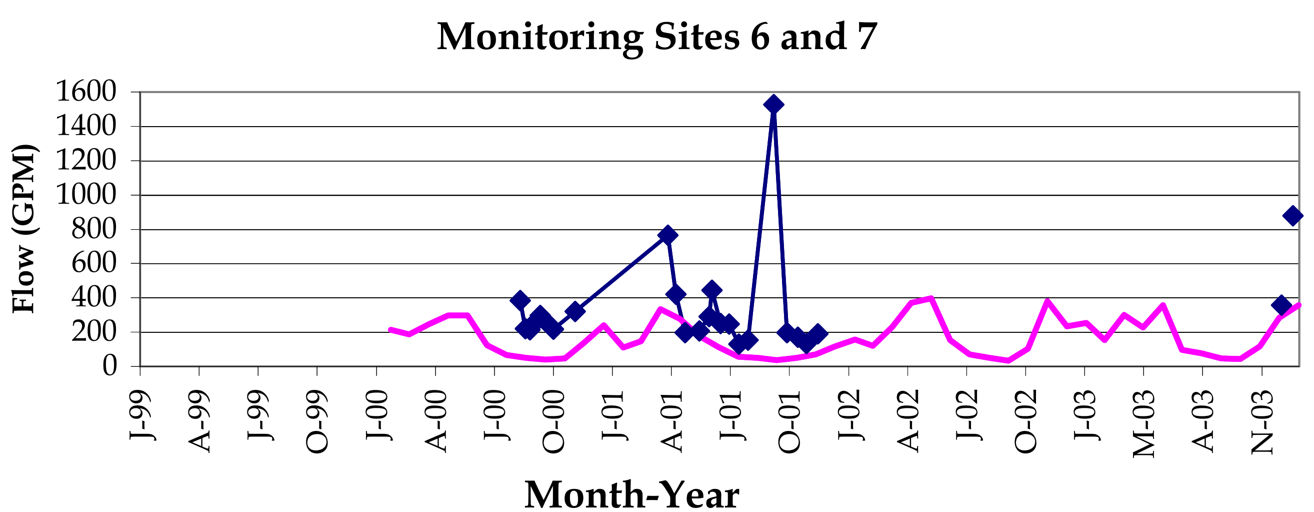
Groundwater Evaluations
Eastview Site

Catskill/Delaware UV Facility

Figure 4.15-15b

STREAM FLOW





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LEGEND

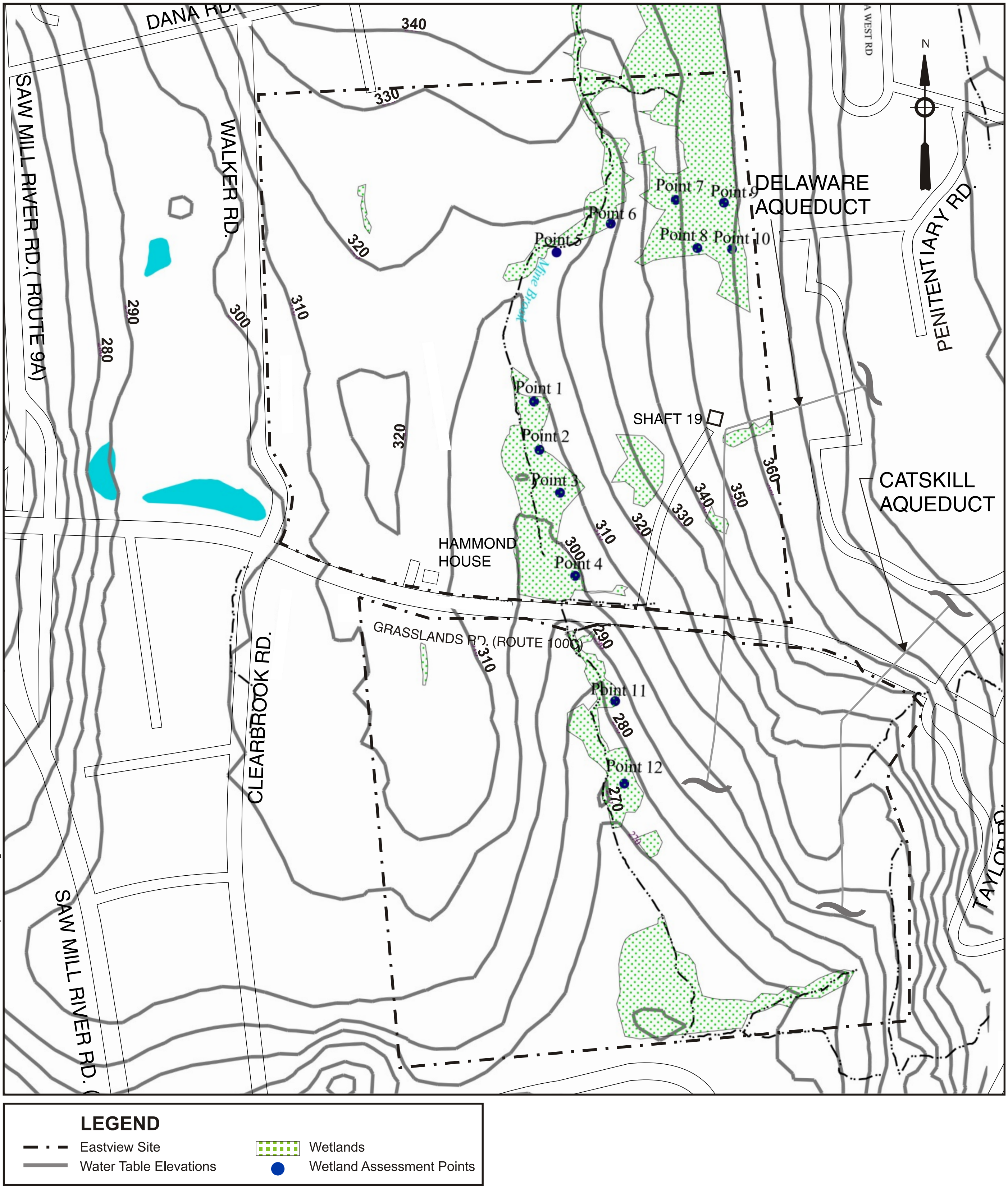
Observed

Simulated

Groundwater Evaluations
Eastview Site

Catskill/Delaware UV Facility

Figure 4.15-15c



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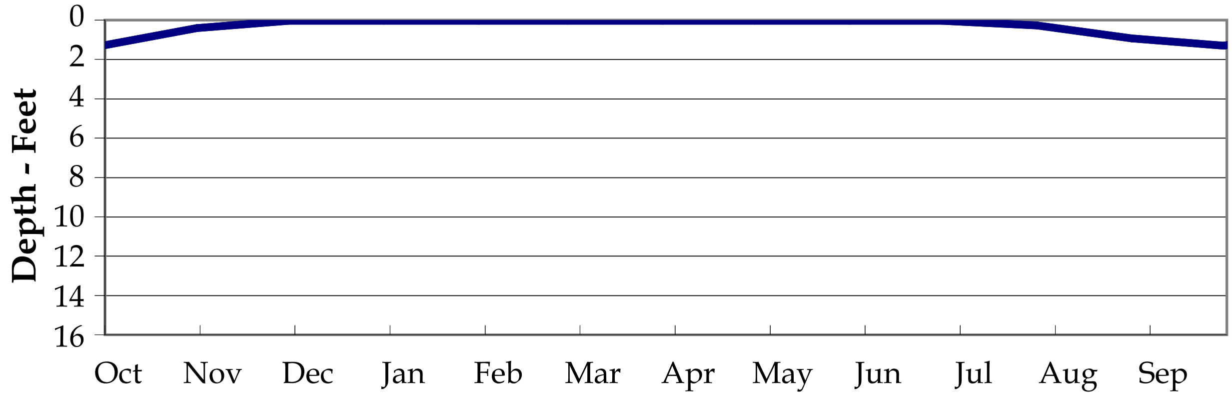
Simulated Water Table Elevations with Wetland Assessment Points During Existing Conditions

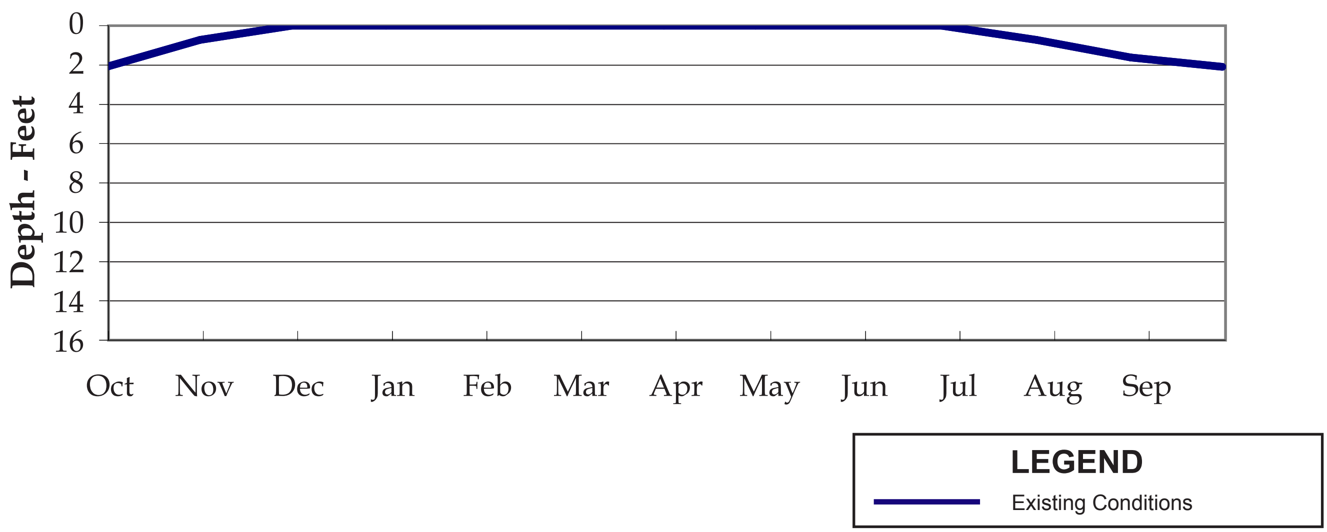
Catskill/Delaware UV Facility

Figure 4.15-16

WETLAND ASSESSMENT POINT 1



WETLAND ASSESSMENT POINT 2



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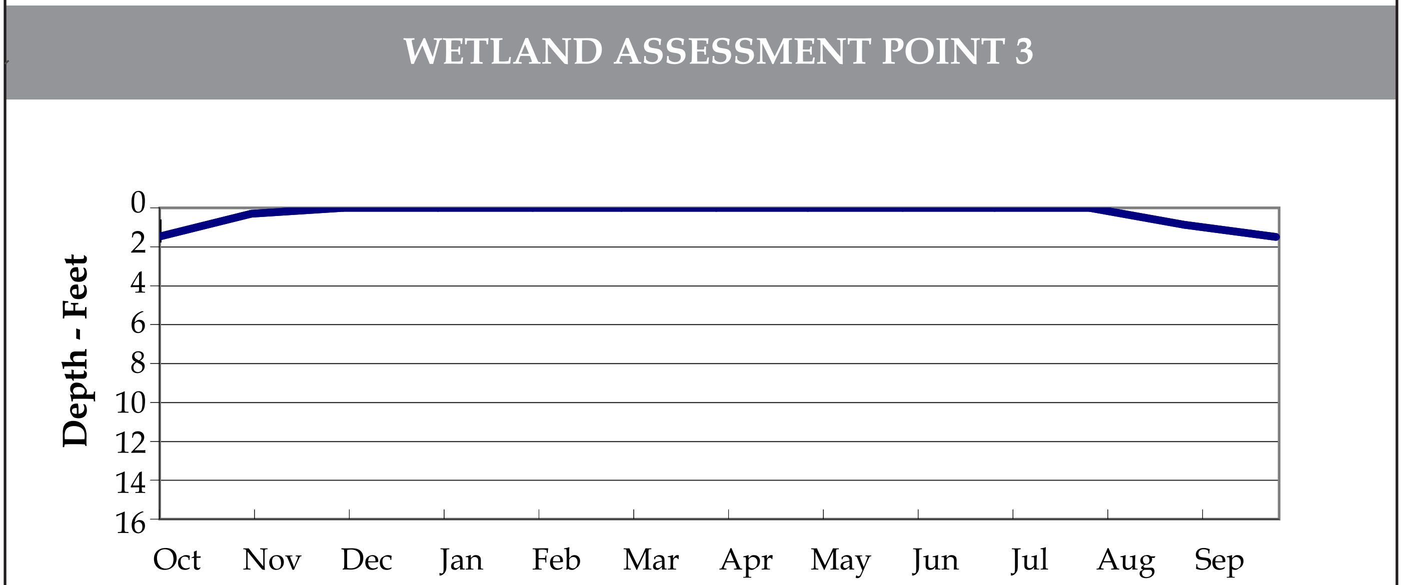
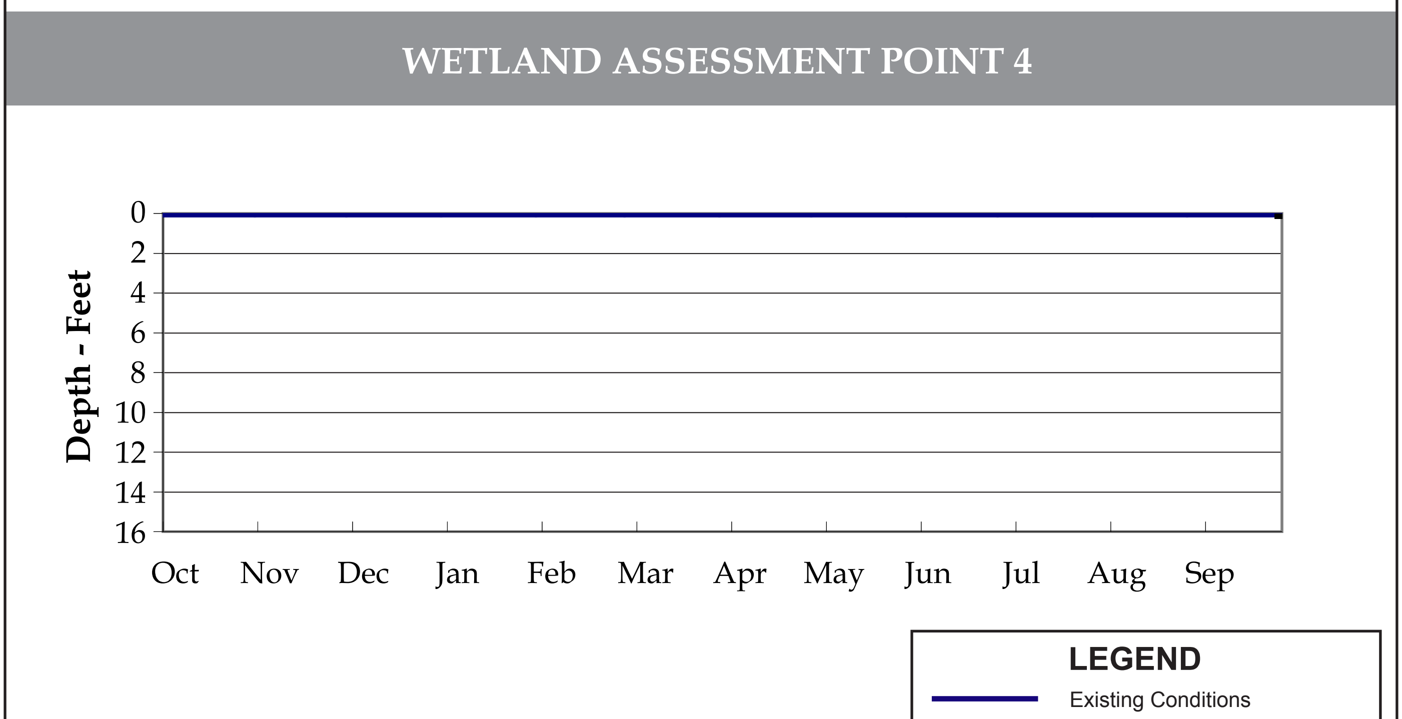
Simulated Monthly Depths to Water within Delineated Wetland Areas (Existing Conditions) at Wetland Assessment Points 1-2

Catskill/Delaware UV Facility

Figure 4.15-17a





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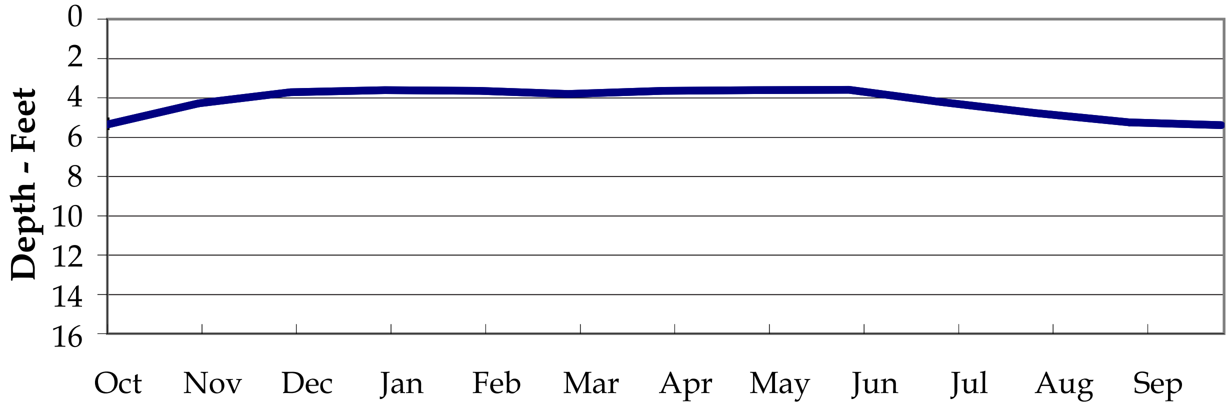
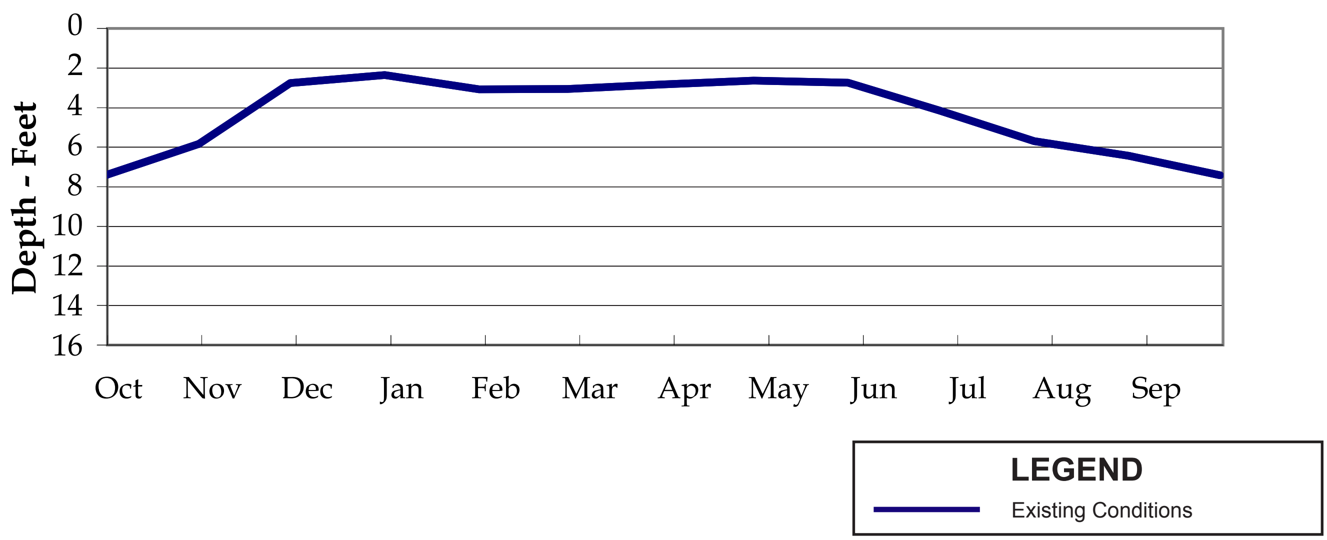
Simulated Monthly Depths to Water within Delineated Wetland Areas (Existing Conditions) at Wetland Assessment Points 3-4

Figure 4.15-17b

WETLAND ASSESSMENT POINT 5



WETLAND ASSESSMENT POINT 6



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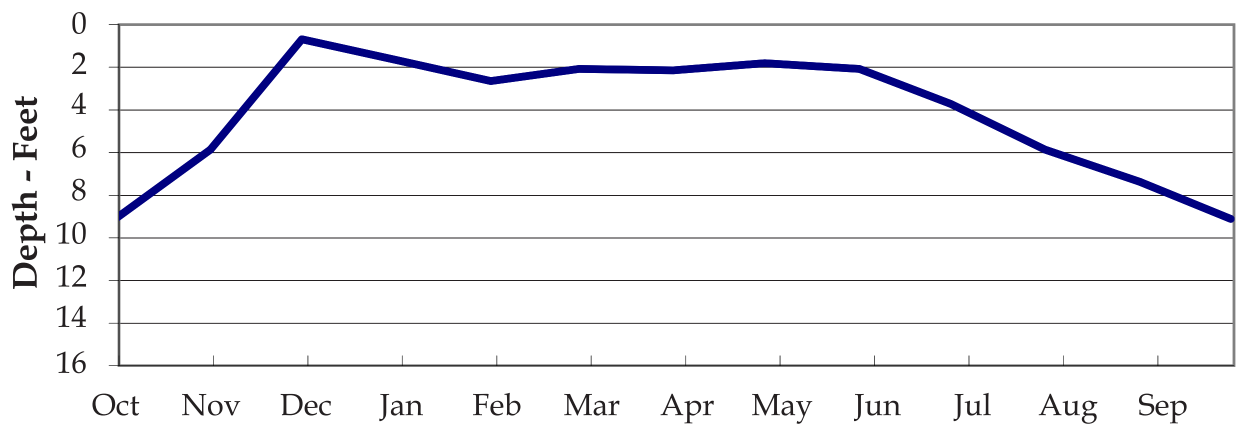
Simulated Monthly Depths to Water within Delineated Wetland Areas (Existing Conditions) at Wetland Assessment Points 5-6

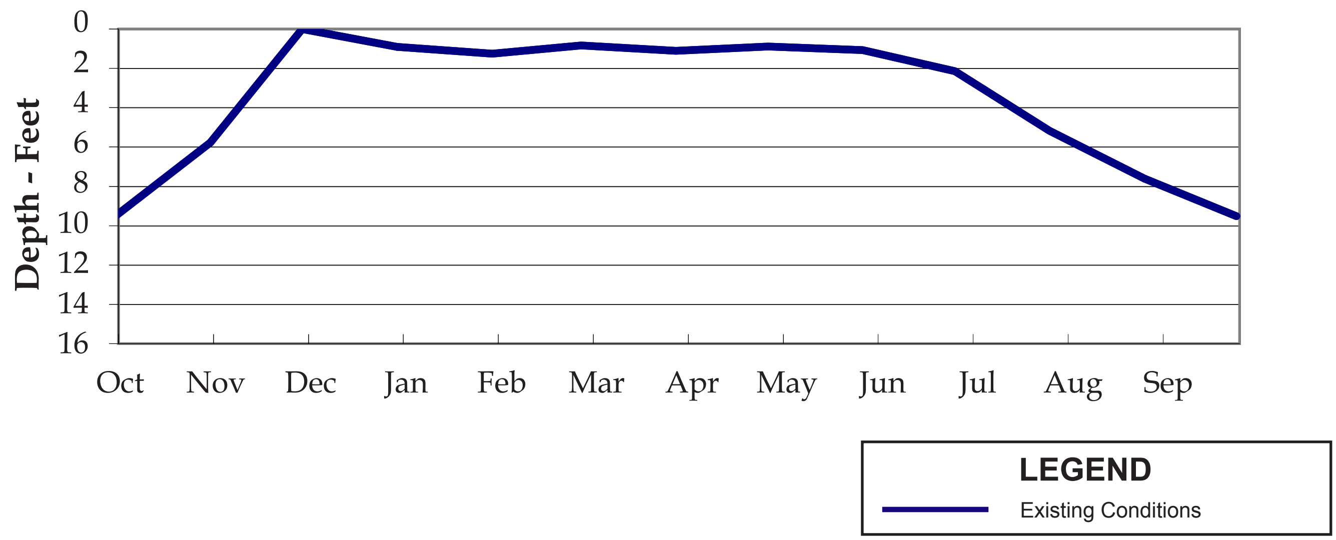
Catskill/Delaware UV Facility

Figure 4.15-17c

WETLAND ASSESSMENT POINT 7



WETLAND ASSESSMENT POINT 8

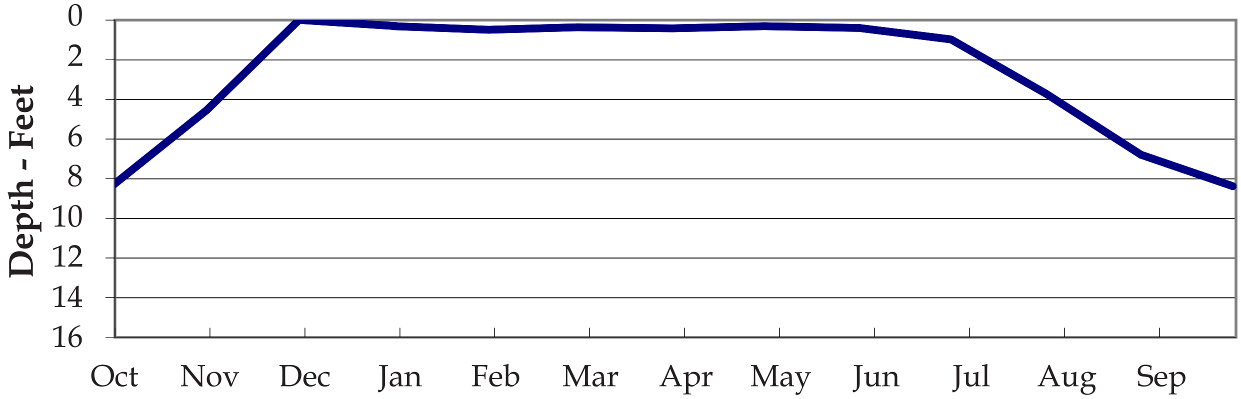


Simulated Monthly Depths to Water within Delineated Wetland Areas (Existing Conditions) at Wetland Assessment Points 7-8

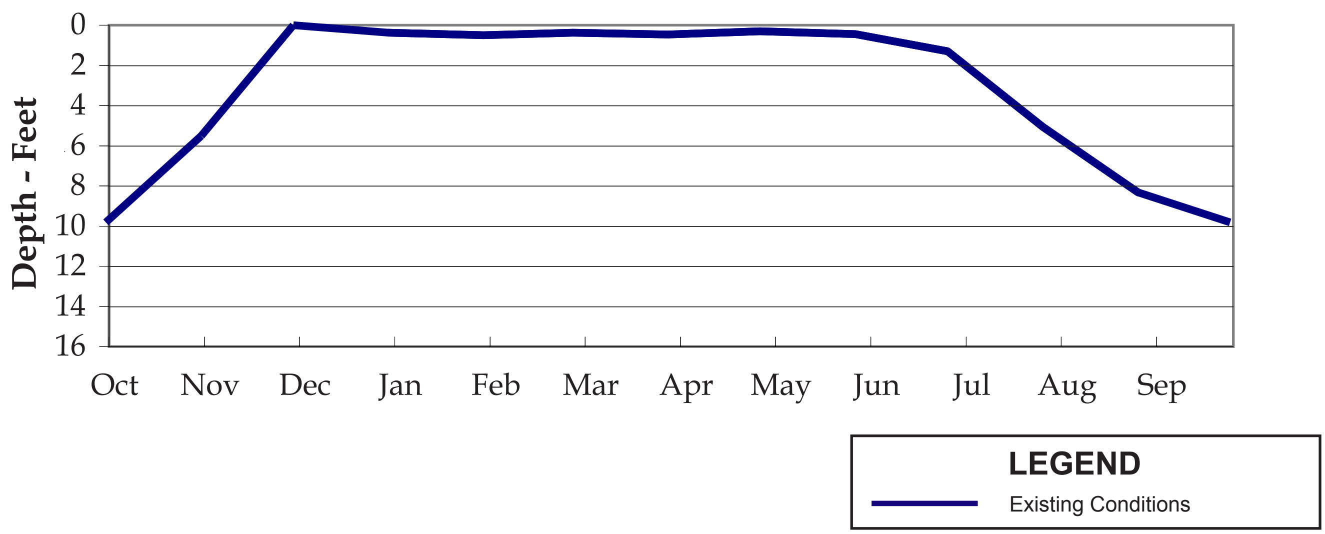
Catskill/Delaware UV Facility

Figure 4.15-17d

WETLAND ASSESSMENT POINT 9

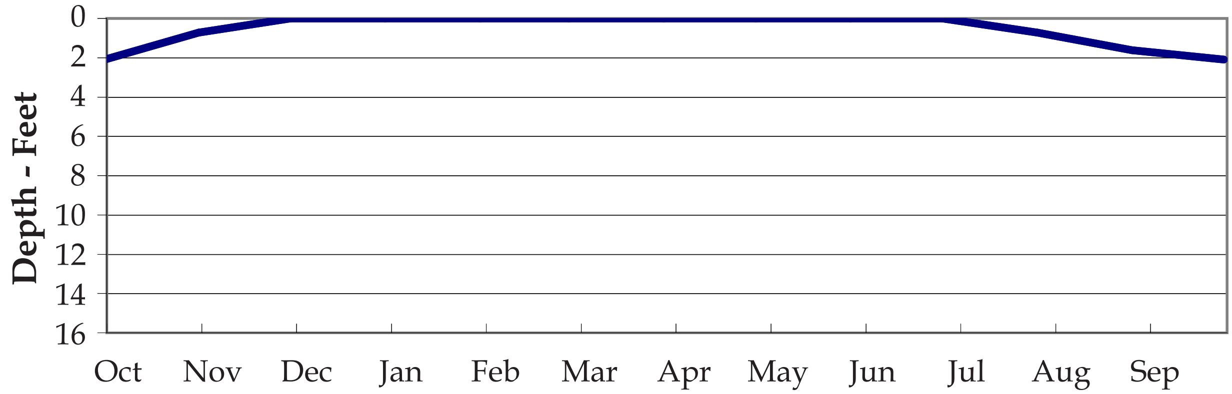


WETLAND ASSESSMENT POINT 10

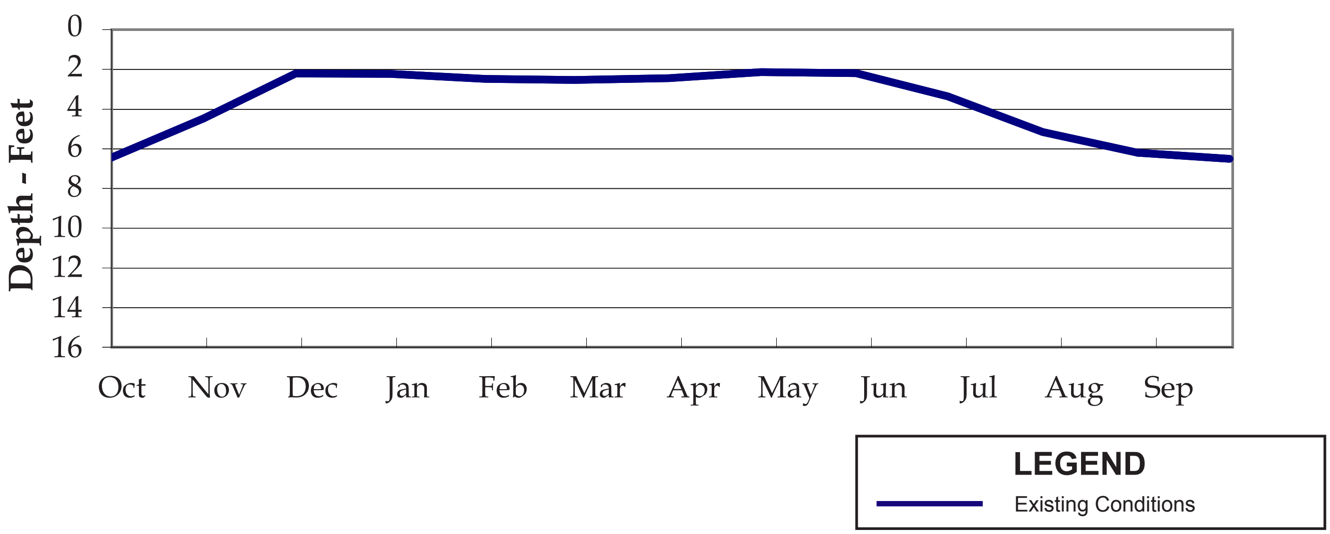


Simulated Monthly Depths to Water within Delineated Wetland Areas (Existing Conditions) at Wetland Assessment Points 9-10

WETLAND ASSESSMENT POINT 11



WETLAND ASSESSMENT POINT 12



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Simulated Monthly Depths to Water within Delineated Wetland Areas (Existing Conditions) at Wetland Assessment Points 11-12

Figure 4.15-17 (A through F) indicates that the simulated water table for baseline conditions is close to or at the land surface all year round in the wetland assessment points immediately west of the proposed UV Facility footprint and construction area (Points 1-4). This is to be anticipated, because of the proximity of these locations to Mine Brook, and since the shallow groundwater is discharging laterally and vertically in this zone.

Northwest of the proposed footprint in an area labeled the northwest wetland, for purposes of assessing groundwater related impacts, two wetland assessment points namely 5 and 6 were defined. These locations are very close to, or just beyond the edge of the delineated wetland zone along Mine Brook. The simulated water table is approximately four feet below the surface during April to June, indicative of the slightly uphill locations of these wetland assessment points. The water table is deeper (than at wetland assessment points 1 through 4) because 5 and 6 are located in transition areas between wetland and upland conditions.

Four wetland assessment points were defined for the "northeast" wetland, which is the large wetland zone directly north of the proposed UV Facility. This wetland area is separated from Mine Brook, and appears to be largely fed by surface water drainage from off-site. At wetland assessment points 7 and 8, the simulated water table elevation is within approximately two feet of the land surface during April to June. Note especially that the simulated water table depth at wetland assessment point 7 is very close to 2 feet below land surface, and thus right at the limit of the criterion used for defining impacted conditions. In contrast, at Points 9 and 10, which represent the two eastern Points, the simulated water table is at or just below ground surface. This contrast results from water that feeds this wetland area from the east, causing water table elevations to be higher in the eastern portion of the wetland.

Evaluation Points 11 and 12 were defined for assessing groundwater table conditions in the wetlands near Mine Brook and south of Route 100C. The simulated water table elevations are close to the land surface during April to June at Point 11, but at Point 12, the depth to water is simulated to be very close to the criterion of two feet. However, Points 11 and 12 are both relatively distant from the proposed facility and the Croton project locations, and groundwater related impacts at Points 11 and 12 are not anticipated to be significant.

In summary, based on groundwater model simulations it is estimated that during baseline conditions that water table is within two feet of the land surface at the wetland assessment Points that are either relatively close to Mine Brook or along the eastern portion of the northeast wetland. At the other Points, the simulated water table is either right at the two-foot criterion or already below that depth.

4.15.2.2. Future Without the Project

The Future Without the Project conditions were developed for the anticipated peak year of construction (2008) and the anticipated year of operation (2010) for the proposed facility. The anticipated peak year of construction is determined by the peak number of workers.

For each year, two scenarios are assessed: one in which the NYCDEP Croton project (Croton project) is not located on the Eastview Site and another in which the Croton project is located on the site, specifically in the northwest corner of the north parcel. By the peak construction year, two additional NYCDEP projects could be located on the Eastview Site, namely a Police Precinct and an East-of-Hudson Administration/Laboratory Building. The Police Precinct has been approved by the Town of Mount Pleasant and would be located in the southwest corner of the north parcel. The Administration/Laboratory Building is less certain, however, as the Eastview Site is one of several properties currently being considered as a possible site, and no siting decision has been made. In addition to these projects, NYCDEP's Kensico-City Tunnel may be under construction at the Eastview Site starting in 2009. Therefore, the 2010 analysis year considers the possibility of this project. All of these NYCDEP projects are analyzed to the extent to which information is available. They are all separate actions from the proposed facility and would undergo their own independent environmental reviews.

The Future Without the Project, under both scenarios, considers that structures currently located on-site would remain, including Hammond House and Shaft No. 19. Grasslands Reservation, which bounds the site to the north, west and east, has planned several developments that are anticipated to be completed before year 2008. An increase in the impervious ground cover at the Grasslands Reservation would be minimal and therefore the potential stormwater runoff impacts on surface water and groundwater conditions added to the Eastview Site are anticipated to remain similar to the Existing Conditions.

4.15.2.2.1. Without the Croton Project at Eastview Site

As previously mentioned, by the 2010, several projects could share the Eastview Site. These include the planned construction of a NYCDEP Police Precinct, the Kensico-City Tunnel (KCT) project, and the possibly an East-of-Hudson Administration/Laboratory Building. The police precinct site would consist of a precinct building, and the KCT shaft site would occupy approximately one-half acre. The staging areas for these projects could overlap with each other. The location and size of KCT project has not been determined. These projects may impact the surface water, stormwater and groundwater systems. These potential impacts would be assessed as part of this project and within their own environmental reviews.

Surface Water. Under the Future Without the Project (without the Croton project), no changes are anticipated to the Mine Brook. The construction of the NYCDEP Police Precinct and the potential Administration/Laboratory Building would not be situated on the Eastview Site in areas that would conflict with the existing flow patterns to the brook. In addition, construction activities would not impact the brook and measures would be installed to protect the brook from runoff or disturbance.

Stormwater Runoff. The potential introduction of developments at the Eastview Site would increase impervious surfaces. Stabilization and structural best management practices would be included in the project designs to dissipate peak flows to reduce on-site erosion, and maintain total storm volumes to avoid significant adverse impacts by these projects on surface water and wetland hydrology.

Groundwater. The proposed developments at the Eastview Site under this scenario would not alter or modify any groundwater regimes or flow patterns. The assessment of future conditions without the project was completed using the methodology described to evaluate the existing conditions. Groundwater conditions for the Future Without the Project are not anticipated to change significantly from current site conditions.

A steady state simulation of the Future Without the Project was performed to serve as the "baseline" for computing changes that result from construction and post construction or operation activities. Transient simulation of "baseline" conditions provided a similar basis, with a focus on the growing season for wetland impacts evaluations, or April through June.

The steady-state baseline simulation consisted of running the existing conditions model with an average groundwater recharge rate of 10 inches per year. Simulated water table elevations and simulated groundwater base flow to Mine Brook were mapped and tabulated.

The transient baseline simulation was conducted by adjusting monthly groundwater recharge based on historical precipitation and drought index records. For the transient simulations of future without the project, an annual recharge rate of approximately 10 inches per year was applied. This value is at the low end of the range of estimated groundwater recharge rates for the period of 1999 to 2003; however, this annual groundwater recharge rate was selected to produce conservative results in terms of wetland area water table elevations and drawdowns.

4.15.2.2.2. With the Croton Project at Eastview Site

In this scenario, the Croton project would be constructed on the north parcel, in the northwest section of the Eastview Site. By 2008, the Croton project would be under construction. The Croton project construction area would take up approximately 30 acres. By 2010, the Croton project would include one building located in the northwest corner of the 83-acre parcel. The main treatment building would be 65 feet high above grade and cover a rectangular footprint of approximately 262,000 square feet on a 12 acres area in the northwest corner of the Eastview Site.

Surface Water. During the construction of the Croton project, early installation of erosion control measures and other stormwater BMPs such as temporary detention basins and surface water collectors would prevent potential untreated-stormwater runoff and equipment wash water to enter Mine Brook. An erosion and sediment control plan would be prepared as part of the overall Stormwater Pollution Prevention Plan developed in conformance with the NYSDEC General Permit. The typical erosion control measures would include staked haybales, sediment control and reinforced silt fences, temporary sediment traps and filters and other IESC approved measures. The three areas of excavation around which the erosion control measures would be implemented include: (1) the excavation of the building footprints; (2) the excavation of tunnels and shafts that would include the cut and cover activity for the treated water tunnel to Delaware Shaft No. 19; and (3) the excavation of the mitigation wetland south of the main process building. In addition, during the excavation and construction phases, the dewatering effluent would also be treated in the same fashion as stormwater runoff prior to discharge into Mine Brook.

A section of Mine Brook immediately east of the Croton project's excavation area and along the cut and cover treated water tunnel would potentially experience some streamflow reduction as water that would otherwise have been part of the base flow in Mine Brook would be dewatered and discharged downstream. Water from the (project introduced) stormwater detention basin would be used to maintain the pre-construction flow in Mine Brook south of the detention basin. The upstream reaches of Mine Brook are supplied primarily by storm drains that discharge from the Grasslands Reservation to the north.

During operation, there may be a decrease in flow in a section of the stream due to the Croton project underdrain system. This would persist in a limited stream section between the Croton facility and the stormwater detention basin. Water from the stormwater detention basin would be used to maintain the pre-construction flow in the downstream sections of Mine Brook, south of the stormwater detention basin. The potential removal of groundwater fed baseflow from the upper reaches of Mine Brook, as a result of the Croton project underdrain system would represent a reduction of less than four percent of the total flow.

Stormwater Runoff. During construction of the Croton project, the stormwater controls for construction would incorporate measures specified by Westchester County,[4] New York State[5] USEPA,[6] and NYCDEP. Stabilization and best management practices (BMPs) such as temporary stormwater detention basins would be included in the project design to dissipate peak flows to avoid on-site erosion, and that total storm volumes would be maintained on surface water, and wetland hydrology.

Table 4.15-8 presents the proposed conditions with the Croton project. As illustrated the routed runoff volume and the water surface elevations in the proposed conditions are very similar to the existing conditions (refer back to Table 4.15-5) for all locations upstream and downstream of the proposed on-line storage indicating no significant change to the surface water characteristics for those reaches of Mine Brook. During operation of the Croton project, the stormwater management plan would provide long-term control and treatment of stormwater runoff from the site, to the maximum extent practicable. This includes landscaping to provide proper stabilization of the site, providing treatment of stormwater runoff from all impervious services, and maintaining flows to adjacent natural resource areas at or near the existing conditions rates and volumes. Figure 4.15-18 (A and B) presents the stream invert profile along with the maximum water surface elevations for the various storms modeled for the Croton project scenario (locations points are presented in Figure 4.15-10). As illustrated by the profile the

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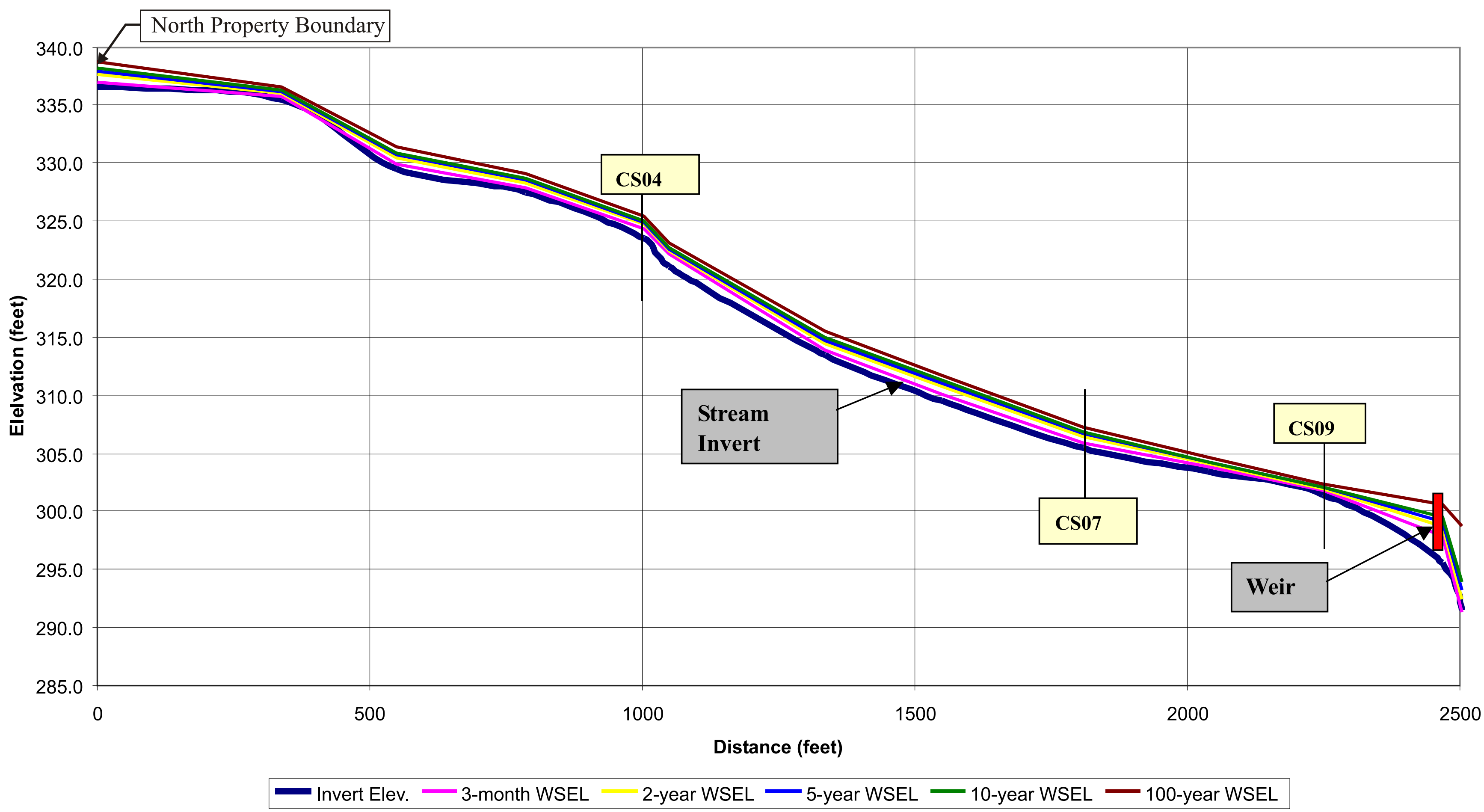
[4] Westchester County Department of Planning. 1984.

[5] New York State Department of Environmental Conservation. State Pollution Discharge Elimination System (SPDES). 2003.

[6] Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices (EPA B32-R-92-005)

TABLE 4.15-8. RUNOFF CHARACTERISTICS IN 3-MONTH, 2-YEAR, 5 YEAR, 10 YEAR AND 100YEAR STORM EVENTS (FUTURE WITH THE CROTON PROJECT)

STORM EVENT	CROSS-SECTION NO.	PEAK FLOW RATE (cfs)	ROUTED RUNOFF VOLUME (acre-ft)	WATER SURFACE ELEVATION (ft)
		With CROTON PROJECT	With CROTON PROJECT	With CROTON PROJECT
3-MONTH STORM	CS-04	13.0	6.7	324.3
	CS-07	19.4	8.9	305.9
	CS-09	21.2	9.9	301.8
	WEIR (@ 100C)	26.1	12.0	297.8
	CS-10	26.1	12.0	288.7
	S03	28.1	12.6	278.6
	S05	27.5	13.5	265.5
	END CULVERT	27.5	13.5	258.2
2-YEAR STORM	CS-04	89.6	19.4	324.7
	CS-07	123.2	26.2	306.5
	CS-09	144.7	30.7	302.0
	WEIR (@ 100C)	180.0	38.6	298.7
	CS-10	180.0	38.6	290.0
	S03	192.4	40.8	279.9
	S05	172.7	45.0	265.6
	END CULVERT	172.7	45.0	260.5
5-YEAR STORM	CS-04	152.2	27.5	324.9
	CS-07	204.3	37.0	306.7
	CS-09	245.5	44.1	302.1
	WEIR (@ 100C)	306.7	55.7	299.2
	CS-10	306.6	55.6	290.9
	S03	325.4	58.8	280.6
	S05	275.4	65.6	265.7
	END CULVERT	275.4	65.6	261.8
10-YEAR STORM	CS-04	200.4	33.3	325.1
	CS-07	263.5	44.8	306.9
	CS-09	321.5	53.8	302.1
	WEIR (@ 100C)	402.8	67.9	299.5
	CS-10	402.8	67.9	291.7
	S03	428.9	71.9	280.9
	S05	331.0	80.3	265.8
	END CULVERT	331.0	80.3	262.8
100-YEAR STORM	CS-04	367.1	52.3	325.5
	CS-07	480.3	70.1	307.2
	CS-09	589.1	85.5	302.4
	WEIR (@ 100C)	733.1	108.2	300.6
	CS-10	733.1	108.2	298.0
	S03	781.1	114.8	281.6
	S05	513.6	129.2	266.7
	END CULVERT	513.6	129.2	265.9



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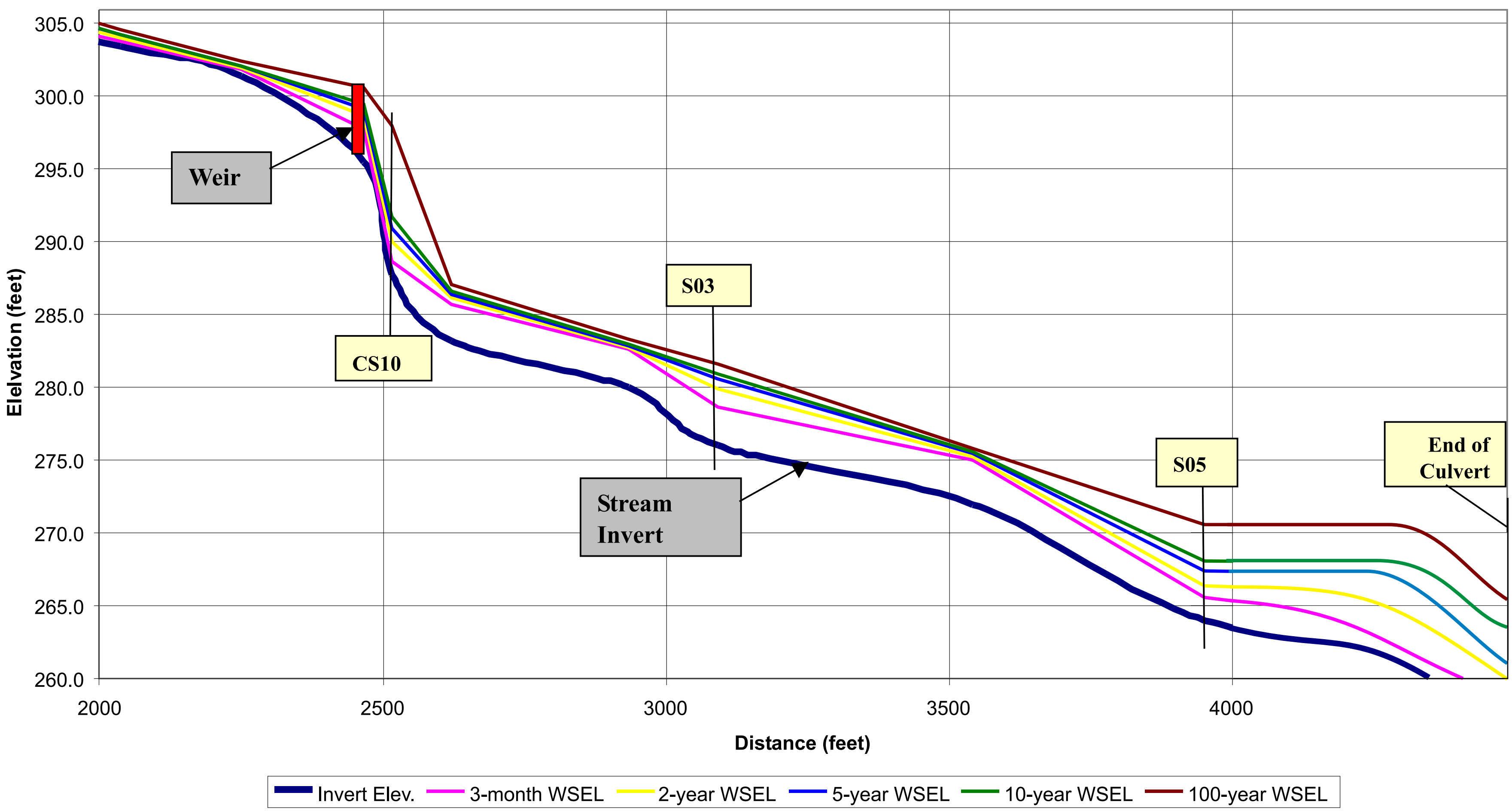
WSELs for Future with Croton Project for 3-month, 2-year, 5-year, 10-year and 100-year Return Frequency Storm Events

Catskill/Delaware UV Facility

Figure 4.15-18a



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WSELs for Future with Croton Project for 3-month, 2-year, 5-year, 10-year and 100-year Return Frequency Storm Events

Catskill/Delaware UV Facility

Figure 4.15-18b

sections of streams with a significant slope are more channelized while the gentler sloped and flatter sections demonstrate more floodplain and adjacent area ponding.

The key component of the stormwater management plan would be the (project introduced) stormwater detention basin. Flows from the northwestern section of the site that would directly enter the stream would be directed to the project detention basin. In addition, the runoff from the main facility roof, as well as the perimeter and access roads, and main parking area, would be collected via a storm drainage system and directed to a stormwater detention basin. The detention basin would be located to the southeast of the Croton project. In addition to providing temporary storage of storm runoff from the Croton project, the detention basin would also flows in Mine Brook so that flows do not exceed the existing conditions.

Additional facilities associated with the Croton project include a vehicle inspection facility in the western part of the site adjacent to Walker Road, an electrical substation located south of the main process building, and the Delaware Aqueduct Shaft No. 19 access road from the Croton project. Stormwater runoff from the substation roof and the vehicle inspection facility would be directed to vegetated swales. These swales would provide infiltration surfaces to replenish the groundwater adjacent to the roadways.

Groundwater. The groundwater related impacts associated with the Croton project construction are based on reported results in the *Final Supplemental Environmental Impact Statement for the Croton Water Treatment Plant*.[7] These results are based on earlier groundwater modeling efforts completed using a different groundwater flow model formulation and model inputs. Earlier groundwater flow modeling efforts completed for the Croton project do not differ significantly from more recent groundwater modeling studies completed for the UV Facility design in terms of assessing potential groundwater related impacts.

During construction, the Croton project would require dewatering for elements that would be constructed partially or completely below the water table: 1) the main treatment building; 2) the raw water pumping station and associated shaft; 3) the treated water shaft, located just southwest of the pumping station shaft; 4) the raw and treated water conduits in bedrock, between the New Croton Aqueduct and the shafts; and 5) the treated water conduits from the Croton project to Shaft No. 19 of the Delaware Aqueduct, on the east side of the Eastview Site. The dewatering that would be required during construction would affect the groundwater system to varying degrees. The creation of impervious surfaces during construction would also affect the groundwater system somewhat, since water that would otherwise have infiltrated and become recharge would instead be removed by the stormwater control system.

The dewatering for the Croton project construction can be thought of as a precursor to the long-term dewatering associated with the permanent underdrains that would be installed beneath the structure. The dewatering during construction would lower the water table about 2.5 feet lower than the permanent underdrains (elevation 313.5 feet versus 316 feet), but the limited duration of the period between the excavation and the construction of the underdrains would offset the slightly greater drawdowns.

[7] NYCDEP, Final Supplemental Environmental Impact Statement for the Croton Water Treatment Plant project, June 2004.

During operation, the water table beneath the eastern section of the footprint of the main treatment building would be maintained at elevation of approximately 316 feet MSL, since the bottom of the building slab is proposed to be at an elevation of 317 feet MSL. The underdrains within a stone layer would slope toward localized sumps, from which the water would be directed to the stormwater detention basin or the overflow swale (a 20-feet wide grass-lined channel). This permanent lowering of the water table may locally decrease streamflow in Mine Brook. Its associated wetlands would not be affected because the wetlands all border the stream and are near the elevation of the stream. The water level in the stream controls the water level in the adjacent land and would not change as a result of the small diversion to the underdrain system.

The raw water pumping station and associated vertical shaft, with a combined depth of 212 feet below existing grade, would extend from the ground surface to an elevation of 118 feet MSL. Since they would not be designed for permanent dewatering, the groundwater levels would rise following construction to a new equilibrium elevation similar to that found under existing conditions. The only net change to the groundwater system caused by the pumping station and the associated vertical shaft would be that the westward-flowing groundwater would have to pass around what would essentially be an impermeable vertical column, 212 feet deep and about 125 feet in diameter. However, loose soils and fill surrounding the vertical column could carry significant more groundwater than the native sediments, and thus would offset the blockage effect from the vertical column.

The groundwater model for the Croton project was run to steady state conditions assuming: 1) underdrains beneath the footprint of the Croton project at an elevation of 316 feet MSL; 2) the pumping station and associated vertical shaft simulated as a low permeability wall across all three model layers; 3) no recharge within the footprint of the Croton project; and 4) precipitation from the 10 acres of impermeable surface area associated with the Croton project recharged at the detention basin. Model results predicted that the underdrains beneath the Croton project would produce large drawdowns at the eastern end of the main treatment building, while the detention basin would cause groundwater mounding and flooding in that part of the site. The effects of the pumping station and the associated vertical shaft were small.

In the northeast corner of the Croton project, model results predicted that the underdrains would cause the water table to decline by about 14 feet, from an elevation of 330 to 316 feet MSL. At the northwest corner of the Croton project, the net drawdown is about four feet. Even though the drains would be above the water table beneath most of the western part of the Croton project, the removal of water by the drains beneath the eastern part of the plant would nevertheless cause a net decline in the water levels in the down gradient area.

4.15.3. Potential Impacts

4.15.3.1. Potential Project Impacts

The first full year of operation for the proposed UV Facility is anticipated to be 2010. Therefore, potential project impacts have been assessed by comparing the Future With the

Project conditions against the Future Without the Project at Eastview Site for the year 2010 for both of these scenarios.

4.15.3.1.1. Without the Croton Project at Eastview Site

Surface Water. The impacts to the surface water features within the Eastview Site are described based on three factors: direct impacts due to encroachment/grading and excavation, impacts induced by changes to stormwater runoff and impacts induced by changes to groundwater.

The proposed UV Facility footprint and the temporary construction areas would encroach into several of the surface water driven wetlands previously identified on the north parcel. The anticipated direct disturbance of the surface water features and the associated wetlands would be approximately 1.5 acres. These surface water and wetland encroachments include the filling of a 0.13 acre isolated wetland to the west of Mine Brook, a 0.2 acre impact on the north eastern wetland system along with the associated surface drainage features that drain to Mine Brook. A 0.05 acre forested wetland along with drainage swale along Route 100C and the three additional wetlands (1.11 acres) and the associated drainage ditches would be filled and eliminated as they are within the building footprint of the UV Facility.

Mine Brook was modeled and simulations were conducted for a variety of storm conditions to evaluate the potential stormwater impacts on the stream. Table 4.15-9 presents the comparison of the existing and proposed conditions. As illustrated the routed runoff volume and the water surface elevations in the proposed conditions are very similar to the existing conditions for all locations upstream and downstream of the proposed on-line storage. This indicates that no significant change to the surface water characteristics are anticipated for those reaches of Mine Brook. At the proposed on-line storage just upstream of the weir and north of Route 100C the water surface elevations for all the storms are higher in the proposed conditions since the weir elevations were modified to optimize upstream storage. However the extent of open water for the more frequent storms was maintained and this was achieved by additional excavation and some regrading. These modifications were necessary to remove the phragmites monoculture and replace it with microtopography that supports vegetative diversity while still maintaining a surface water feature comparable to the existing conditions with an enhanced wetland component.

Groundwater induced impacts to surface water were modeled for this project using a predicted average outflow of 27 gpm. All of this flow would otherwise have been part of the base flow in Mine Brook under existing conditions. The decrease in streamflow would persist in a 450 linear feet section of the stream between the access way crossing and the weir at Route 100C. This groundwater outflow would be redirected into Mine Brook via the facility foundation drain that would outlet just upstream of Route 100C to maintain base flows downstream of Route 100C in the south parcel. In addition, the decrease in streamflow upstream of the weir would be partially mitigated by reconstructing the weir and optimizing the upstream on-line storage of the drainage corridor. The added detention of water during wet weather on a consistent basis would augment the recharge characteristics thereby maintaining a water balance, more or less similar to the existing conditions.

TABLE 4.15-9. COMPARISION OF RUNOFF CHARACTERISTICS IN 3-MONTH, 2-YEAR, 5 YEAR, 10 YEAR AND 100YEAR STORM EVENTS (UV FACILITY ONLY)

STORM EVENT	CROSS-SECTION NO.	PEAK FLOW RATE (cfs)		ROUTED RUNOFF VOLUME (acre-ft)		WATER SURFACE ELEVATION (ft)	
		EXISTING	PROPOSED PROJECT	EXISTING	PROPOSED PROJECT	EXISTING	PROPOSED PROJECT
3-MONTH STORM	CS-04	12.9	10.7	6.8	6.3	324.3	324.3
	CS-07	16.3	13.6	8.0	7.4	305.8	305.8
	CS-09	17.7	8.1	8.9	7.6	301.8	301.9
	WEIR (@ 100C)	21.7	8.4	10.8	11.4	297.8	300.8
	CS-10	21.7	8.1	10.8	11.4	288.7	288.4
	S03	24.0	8.8	11.4	11.9	278.5	277.8
	S05	26.0	9.4	12.3	12.4	265.5	265.5
	END CULVERT	26.0	9.4	12.3	12.4	263.4	257.7
2-YEAR STORM	CS-04	90.5	82.5	20.0	18.9	324.7	324.7
	CS-07	112.6	101.2	24.3	22.4	306.4	306.4
	CS-09	132.8	100.8	28.6	24.6	302.0	302.1
	WEIR (@ 100C)	164.4	131.8	35.9	36.0	298.6	301.6
	CS-10	164.3	131.8	35.9	36.0	289.9	289.1
	S03	176.8	141.1	38.1	38.1	279.8	279.7
	S05	169.3	135.9	42.3	42.0	266.1	265.6
	END CULVERT	169.3	135.8	42.3	41.9	265.5	260.0
5-YEAR STORM	CS-04	155.4	144.1	28.5	27.0	324.9	324.9
	CS-07	192.2	174.7	34.7	32.1	306.7	306.7
	CS-09	231.3	189.0	41.5	35.6	302.1	302.3
	WEIR (@ 100C)	286.7	247.3	52.3	52.5	299.1	302.0
	CS-10	286.6	247.2	52.3	52.5	290.7	289.7
	S03	305.4	264.1	55.5	55.7	280.5	280.3
	S05	278.1	238.6	62.2	61.9	267.3	265.7
	END CULVERT	278.1	238.6	62.2	61.9	266.4	261.3
10-YEAR STORM	CS-04	206.0	191.7	34.7	32.8	325.1	325.0
	CS-07	253.3	231.9	42.2	39.1	306.8	306.8
	CS-09	308.5	254.7	50.9	43.7	302.1	302.5
	WEIR (@ 100C)	382.9	335.8	64.2	64.5	299.4	302.2
	CS-10	382.9	335.9	64.2	64.5	291.6	290.1
	S03	408.4	358.8	68.2	68.4	280.9	280.7
	S05	338.0	306.1	76.6	76.6	268.2	265.8
	END CULVERT	338.0	306.1	76.6	76.6	266.8	262.2
100-YEAR STORM	CS-04	382.8	360.0	54.8	52.1	325.5	325.5
	CS-07	468.6	431.6	66.7	61.9	307.2	307.2
	CS-09	577.6	483.5	81.8	70.0	302.4	303.1
	WEIR (@ 100C)	715.9	638.5	103.5	104.9	300.5	302.9
	CS-10	716.0	638.6	103.5	104.8	297.7	291.6
	S03	766.0	683.0	110.0	111.3	281.6	281.5
	S05	522.4	489.8	124.4	125.3	270.7	266.4
	END CULVERT	522.4	489.8	124.4	125.3	267.8	265.3

In addition to the facility foundation drain, an emergency overflow may be required at the UV Facility to provide a means of alleviating flood conditions that could result from catastrophic failure of process piping and UV equipment inside the building. While the potential for an overflow condition at the UV Facility is considered extremely remote, provision to reduce flooding within the proposed facility would be included as a safety measure for employees working at the facility and as a preventative measure to reduce potential damage to UV equipment. This emergency overflow from the UV Facility would be discharged to Mine Brook just upstream of Route 100C on the Eastview Site. In an emergency scenario due to the catastrophic failure of a process train, a total volume of approximately 1.5 acre-ft with a maximum flowrate of 50,000 gpm (112 cfs) could occur. This instantaneous discharge would equate to a peak flow rate generated at the culvert crossing on Route 100C from a 1 to 2 year storm (see Table 4.15-5. Existing Runoff Characteristics). The total volume discharged (1.5 acre-ft) is 15 percent of the runoff generated at the culvert crossing on Route 100C from a 3-month storm. These peak flows and volumes, which may be discharged in an emergency condition would not have a significant impact on the existing stream corridor of Mine Brook.

Stormwater Runoff. The stormwater management plan would provide long-term control and treatment of stormwater runoff from the Eastview Site. The key components of the stormwater management plan are stormwater collection and detention. With the proposed UV Facility, approximately 9 acres of the site would be occupied by the facility infrastructure such as buildings, offices, roads, parking areas and other associated impervious areas. As part of the stormwater management plan, a fully-functional storm sewer collection system was designed to protect the infrastructure from storm-related flooding damage. The stormwater collection system for the Eastview Site was modeled using concepts and data presented in various reference manuals, including H.R. Malcom's Elements of Urban Stormwater Design (EOUSD), the USDA's Urban Hydrology for Small Watersheds (TR-55), and the Westchester County Stormwater Management Handbook.

Based on the conceptual design site plan a storm sewer network was laid out. Once the storm pipes and catch basins were placed on the plan, they were then sized according to the amount of flow that they would be required to convey. The flow rate to each individual catch basin was calculated using the Rational Method. For this project, most pipes were designed for the 10-year storm except "Critical path" pipes, which were designed for the 25-year storm. Critical path pipes are defined as the main collector pipes of the storm sewer network, which convey off-site flows through the site as well as on-site runoff. These pipes were designed for a larger design storm to account for any unanticipated flows that may drain to the associated catch basins from off-site. With the storm sewer network in place, the runoff would be directed to a stormwater detention basin.

The Town of Mount Pleasant requires the on-site detention of stormwater runoff generated from a 100-year 24-hour duration storm (7.2 inches of rainfall) so that the post-developed peak runoff flows do not exceed the pre-developed peak runoff flows.

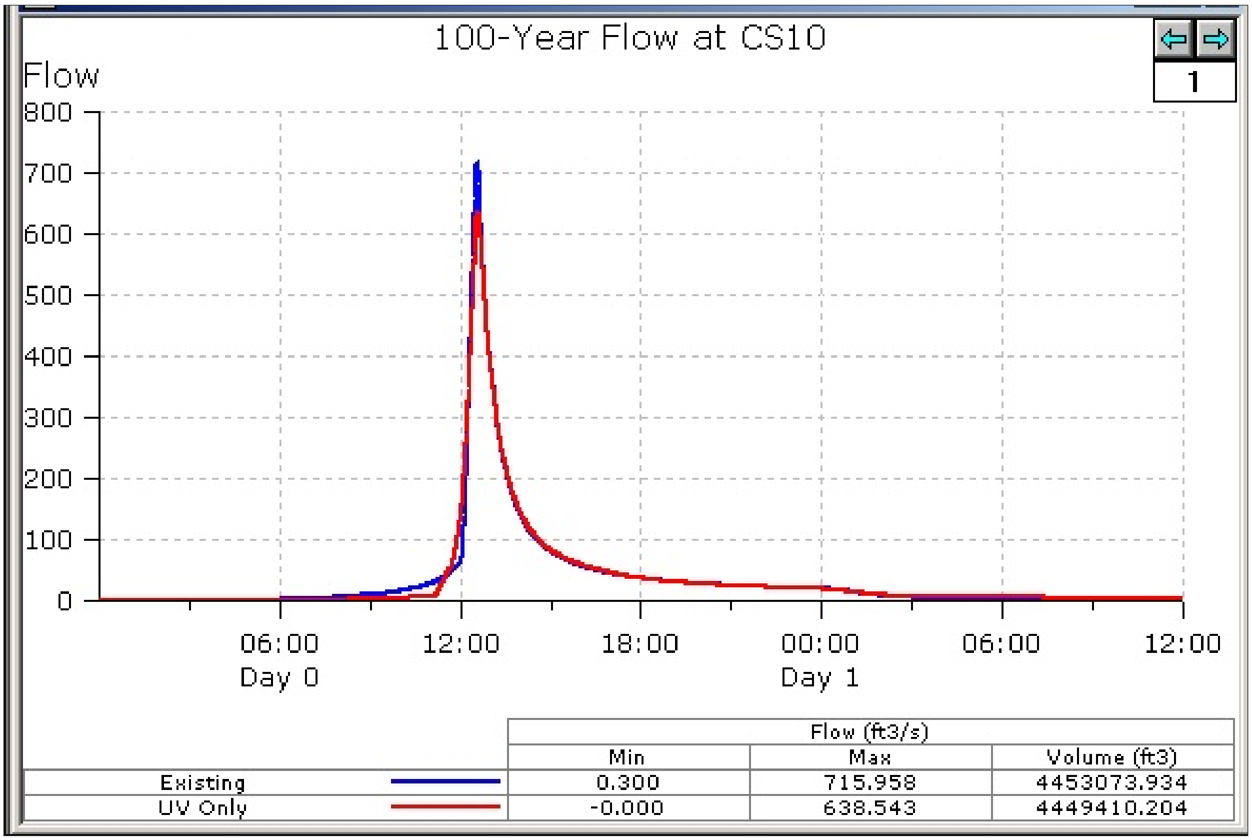
Approximately 4.5 acre-ft of stormwater storage would be needed to meet these requirements. This was achieved by designing a Best Management Practices (BMP) that utilized the existing topographic features and optimized the available on-line storage. The degraded reed grass marsh upstream of Route 100C presented a unique opportunity to expand and enhance the existing wetland while providing the necessary storage and natural attenuation of stormwater flows. The proposed BMP, consisting of a pretreatment forebay, extended detention wetland, and a created stream channel, would attenuate the adverse impacts of the untreated stormwater runoff by attenuating peak flows and reducing pollutant loads to downstream reaches. The pretreatment forebay is located just south of the facility and is adequately sized to detain stormwater volumes up to the 3-month storm. The pretreatment forebay can also provide for the water quality treatment by way of removal of sediment, nutrients, and bacteria. Approximately 80 percent sediment removal can be achieved, as would 50 percent removal of nutrients, such as phosphorus and nitrogen.

Once the water surface elevation in the forebay exceeds that of the weir (El. 301), the flow spills over the weir into a newly created stream segment, and flows towards an existing wetland. It must be noted that an existing phragmites marsh exists at the site of the proposed enhanced wetland. Historical data suggests that the existing phragmites coverage has doubled in the last three to four years and if not addressed correctly, would impact the upstream forested wetlands by converting them to a monoculture reed marsh.

Under the proposed project, the existing reed marsh would be removed, the area excavated and regraded, and the weir north of Route 100C reconstructed to optimize the upstream storage and creation of a diversely vegetated wetland. The enhanced wetland, consisting of a low and high marsh, would be diversely vegetated with native species, such as *Soft Rush, Pickerel Weed, Lizard Tail, Spicebush, New England Aster,* and *Sensitive Fern.* Opportunities would be taken to increase vegetative diversity, wherever feasible, while keeping with the context of the native community. The construction of a multi-stage weir along with the culvert replacement would allow the flow to be stored and released gradually to the downstream areas to reduce erosion. This measure would also meet the Town of Mount Pleasant stormwater detention requirements. Figure 4.15-19 shows the 100-year pre-developed and post-developed peak flows over time and illustrates the attenuation provided by the proposed BMP to meet the Town of Mount Pleasant stormwater detention requirements. Figure 4.15-20 (A and B) presents the stream profile and compares the water surface elevations for the 5-year and 100-year storms (location points are presented in Figure 4.15-10). No significant change to the water surface (floodplain) elevations is observed across the stream profile, except the area just upstream of the weir. This difference is localized and contained within the on-line storage extent and occurs due to the modification and raising the weir to optimize the upstream storage and sustain the enhanced wetland.

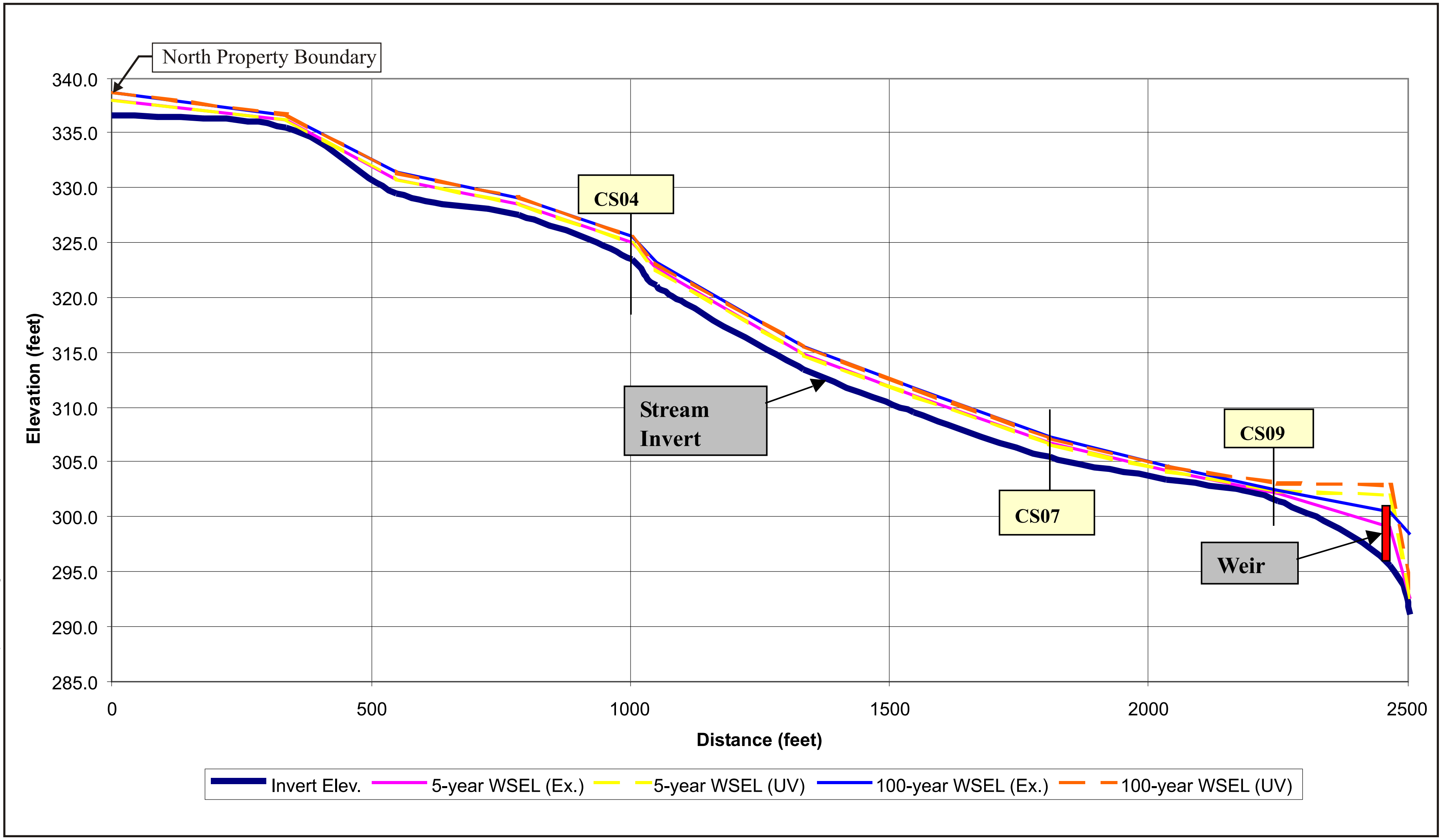
Groundwater. Groundwater flow model simulations were performed by assuming that the main disinfection building would have a perimeter underdrain set at 300 foot elevation. No dewatering or underdrains were simulated for the other proposed buildings associated with the proposed facility, as these structures would not require sub-slab drainage.

Steady state and transient simulations of groundwater condition in the vicinity of the proposed facility were performed by not allowing the groundwater elevation to exceed 300 foot elevation. Simulated long-term average water table elevations, water table drawdowns, dewatering flow rates and groundwater base flow to Mine Brook were used to evaluate potential changes.



100 year Pre-Developed and Post-Developed Peak Flows for the UV Facility Alone

Figure 4.15-19



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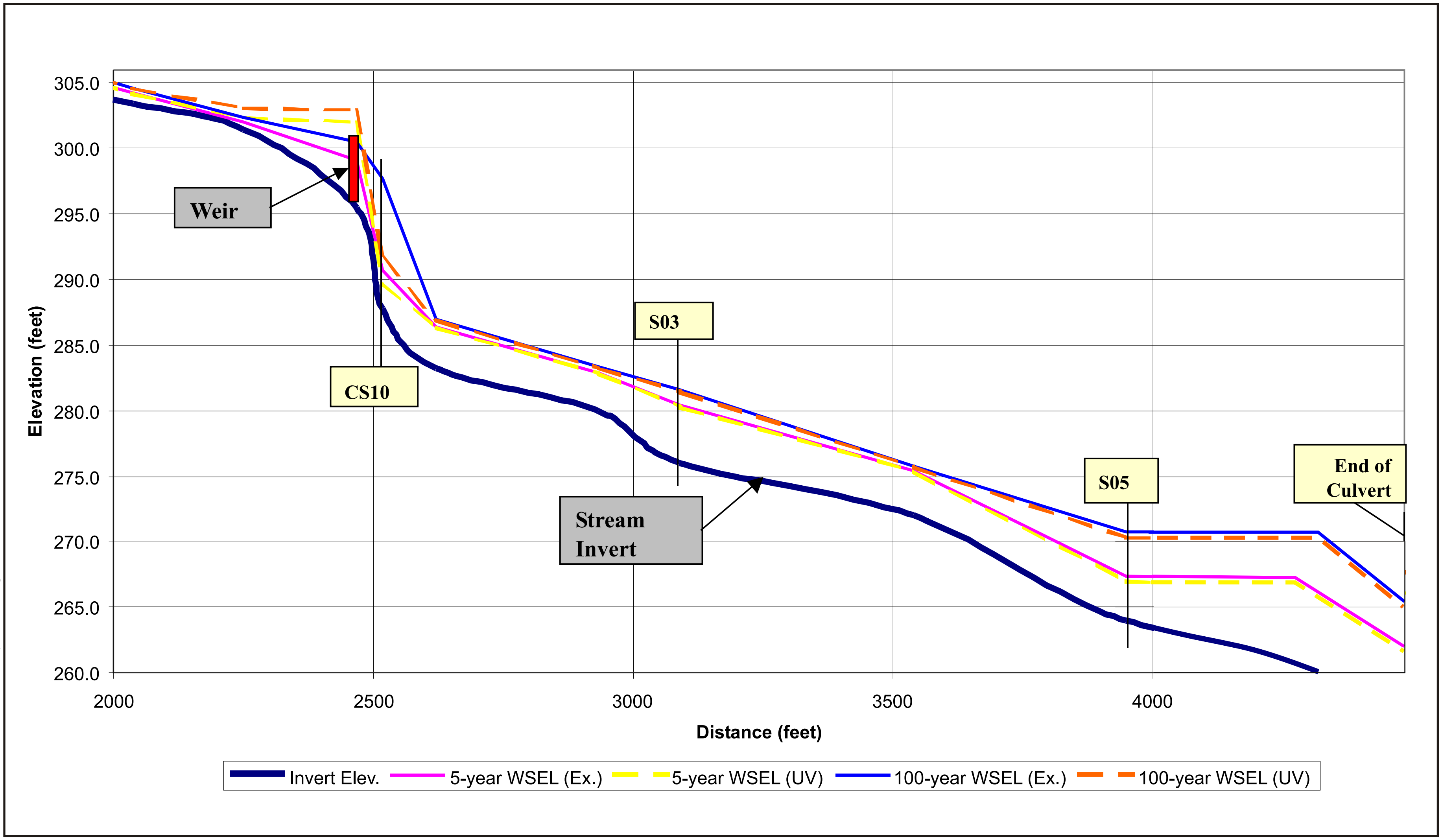
Comparison Between WSELs for Existing and UV Facility conditions Only for the 5-year and 100-year Storms

Catskill/Delaware UV Facility

Figure 4.15-20a



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Comparison Between WSELs for Existing and UV Facility Conditions Only for the 5-year and 100-year Storms

Catskill/Delaware UV Facility

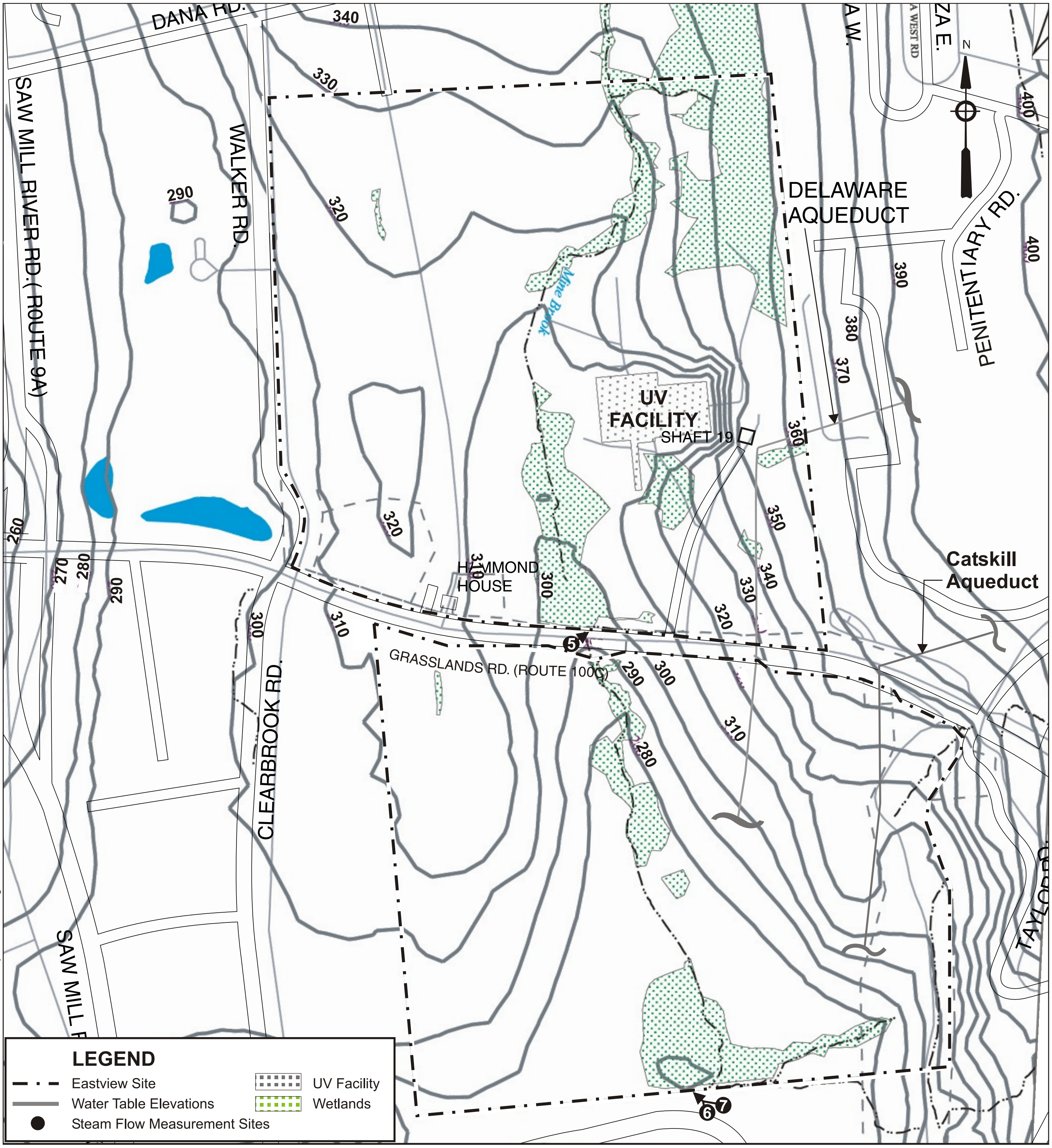
Figure 4.15-20b

Figure 4.15-21 shows the simulated steady state water table elevation for the proposed facility. The effects of the drainage system for the main disinfection building are evident in the tightly spaced contours. In particular, the steep gradients reflect the relatively low hydraulic conductivity of the till. Also, the simulated bedrock flow provides sufficient influx to the overburden to contribute to the relatively steep gradients. In general, the water table impacts are restricted to the immediate area surrounding and including the main disinfection building.

Based on the modeled results, the simulated dewatering rate of 15 gpm is required to maintain the groundwater elevation at 300 feet within the building's footprint. The simulated groundwater base flows at Sites 5 and 6/7 are 64 gpm and 130 gpm, respectively. The simulated base flow reduction at Site 5 was approximately 18 percent, and 10 percent at Site 6/7. Site 5 is located where Mine Brook flows through the culvert beneath Route 100C, and thus the flows measured there represent the complete groundwater and surface water drainage from the north parcel and its contributing off-site areas. Site 6/7 is located on the south parcel, in the area where a tributary joins Mine Brook. The Site 6/7 flow-measurement is derived from two separate flow stations (Sites 6 and 7) with the combined flow representing the total flow in Mine Brook at the southernmost on-site station. Flows from Site 6/7 therefore provide the best available data for describing the total groundwater and surface water drainage from the Eastview Site, before Mine Brook flows off-site towards its ultimate discharge into the Saw Mill River.

Simulated steady state water table drawdowns from baseline conditions are shown in Figure 4.15-22. The simulated one-foot drawdown line extends into some of the Mine Brook wetlands to the west of the proposed facility. No portion of the northeast wetland or the wetland area along Mine Brook south of Route 100C appears to be within the one-foot drawdown line. Additionally, it is not anticipated that the well utilized by the Hammond House, located in the southwestern portion of the north parcel and to the west of Mine Brook, would be affected by operation of the proposed UV Facility or its underdrain system.

Most wetland plants require a shallow depth to water to thrive because the root zones of many wetlands plants do not extend more than a few feet below land surface. In order to minimize impacts to wetlands, it is desirable to maintain a maximum two feet depth to water during the April to June growing period in locations where the water table is within two feet of the land surface during baseline conditions. Figure 4.15-23 shows the locations of the wetland assessment points and Figure 4.15-24 (A through F) presents transient simulation results for these locations within the delineated wetland areas during operation of the proposed facility. The graphs show monthly values of simulated depths to water for the baseline and post-construction scenarios. The transient simulation results were reviewed to identify locations where depths to water change from within two feet of land surface to greater than two feet below land surface during April to June. Simulation results of proposed facility operations suggest an insignificant change in water table elevations from the predicted future without the project conditions, during the critical growing season months April to June at the wetland assessment Points shown on Figure 4.15-23 and Figure 4.15-24, except at assessment Point 1. This Point is located at the most upstream extent of the wetland area that runs along Mine Brook, directly west of the disinfection building. At this location, the groundwater model predicts that the depth to



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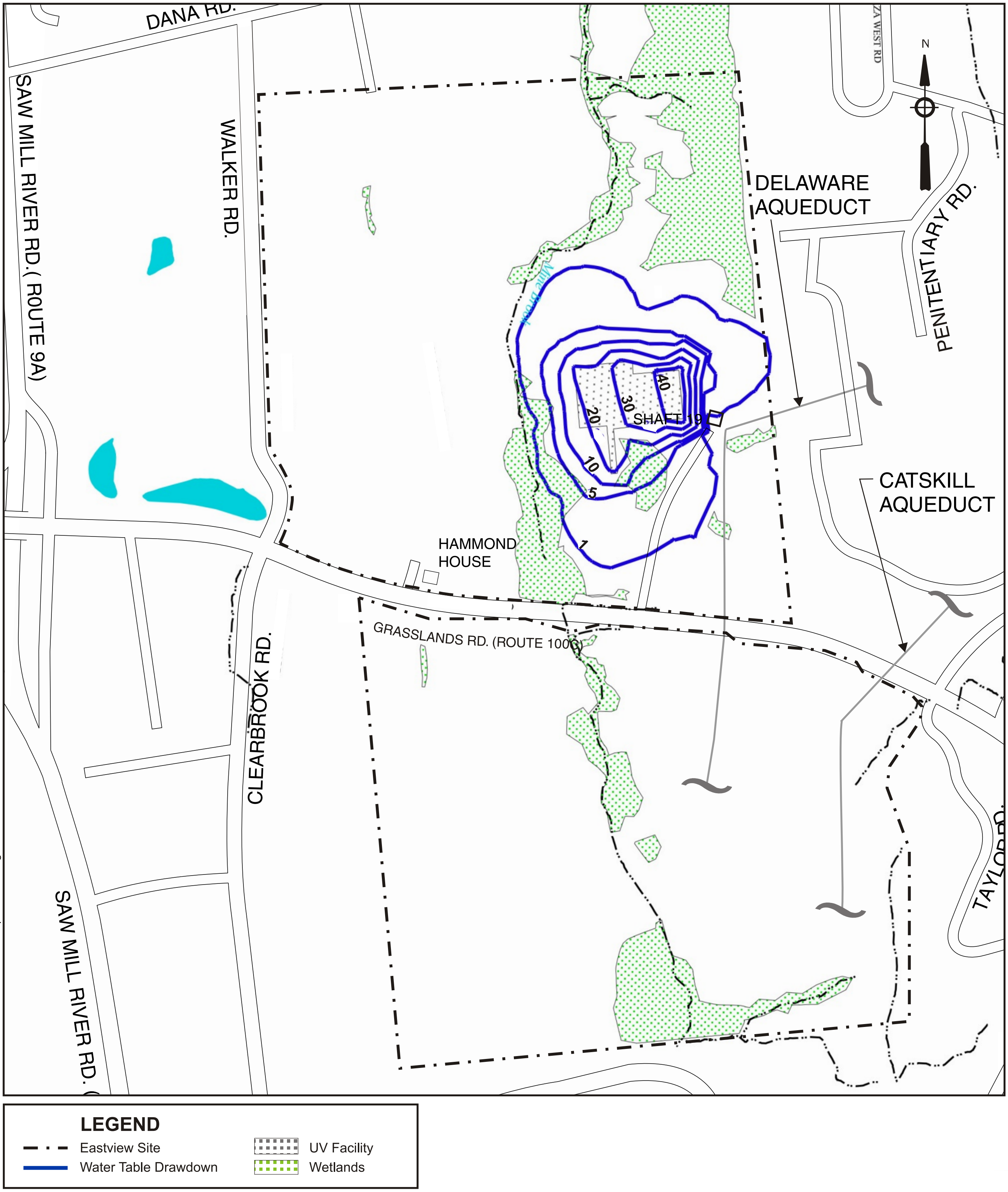
Simulated Water Table Elevations for UV Facility During Operations

Catskill/Delaware UV Facility

Figure 4.15-21



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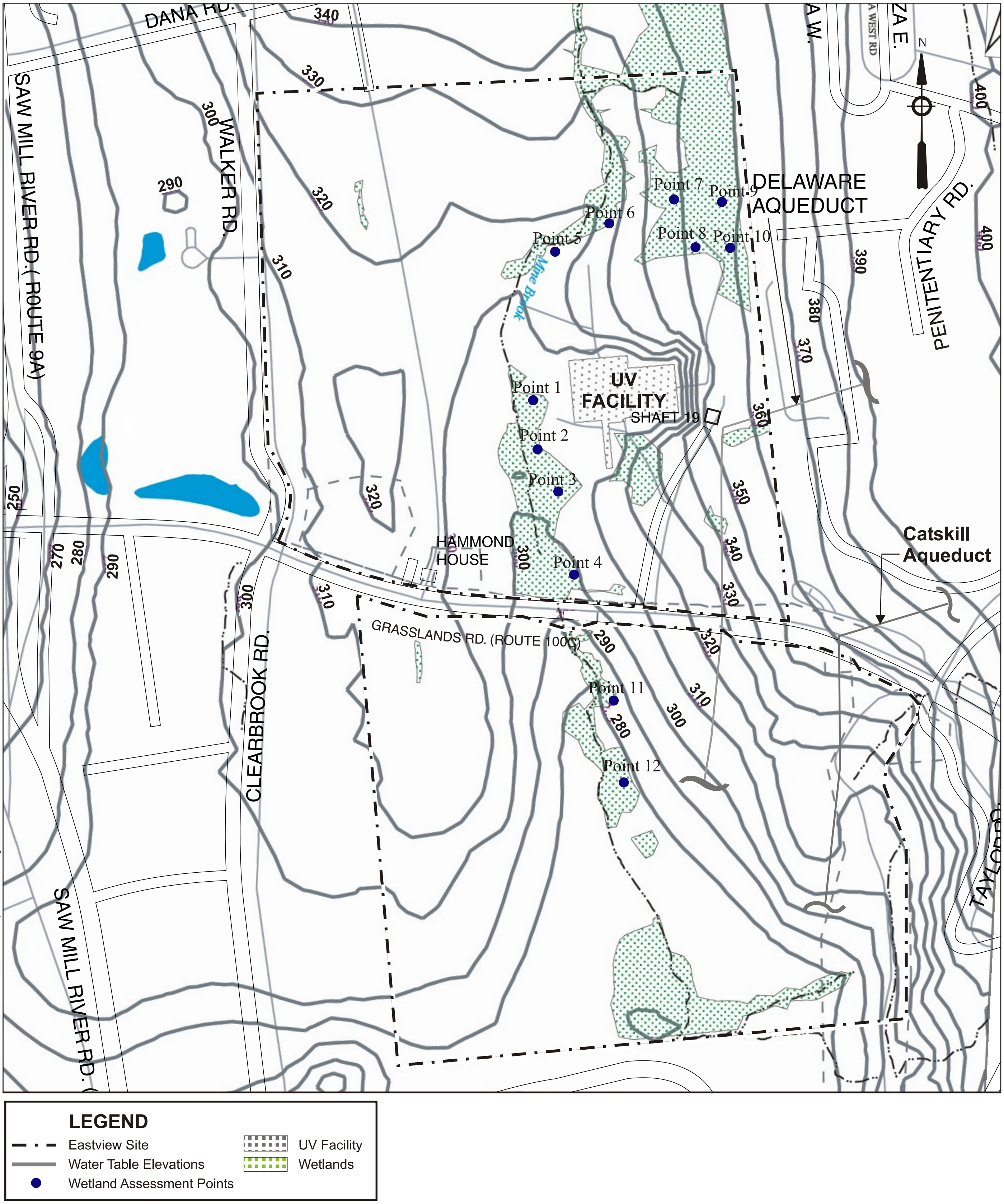
Simulated Water Table Drawdown for UV Facility During Operation

Catskill/Delaware UV Facility

Figure 4.15-22



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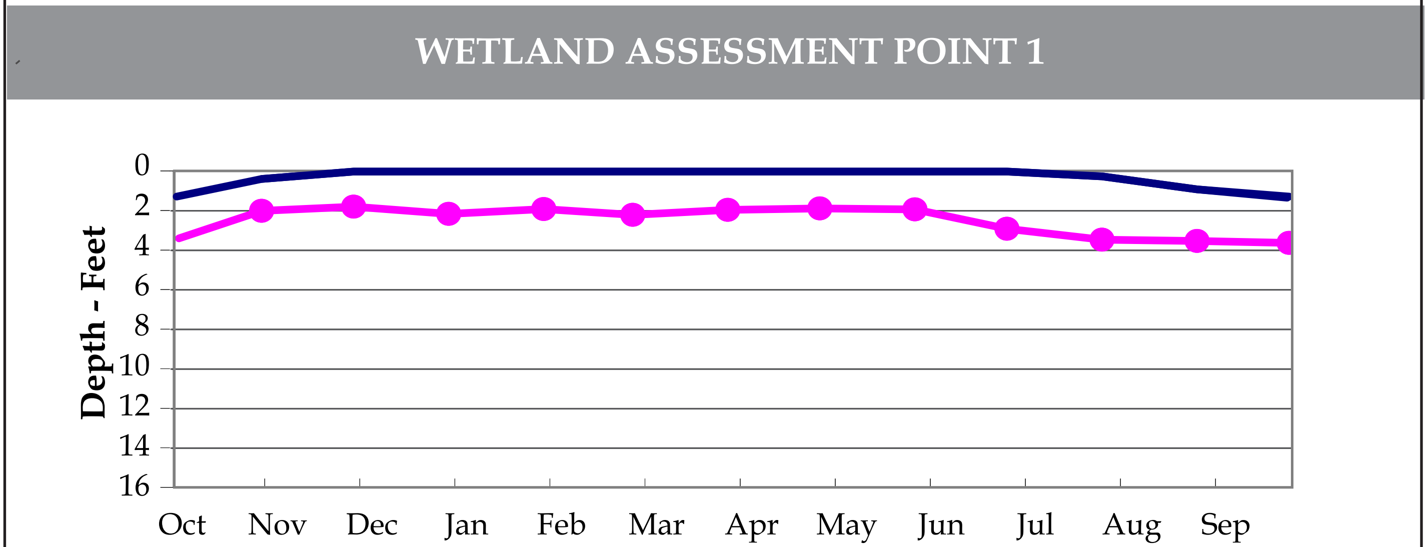
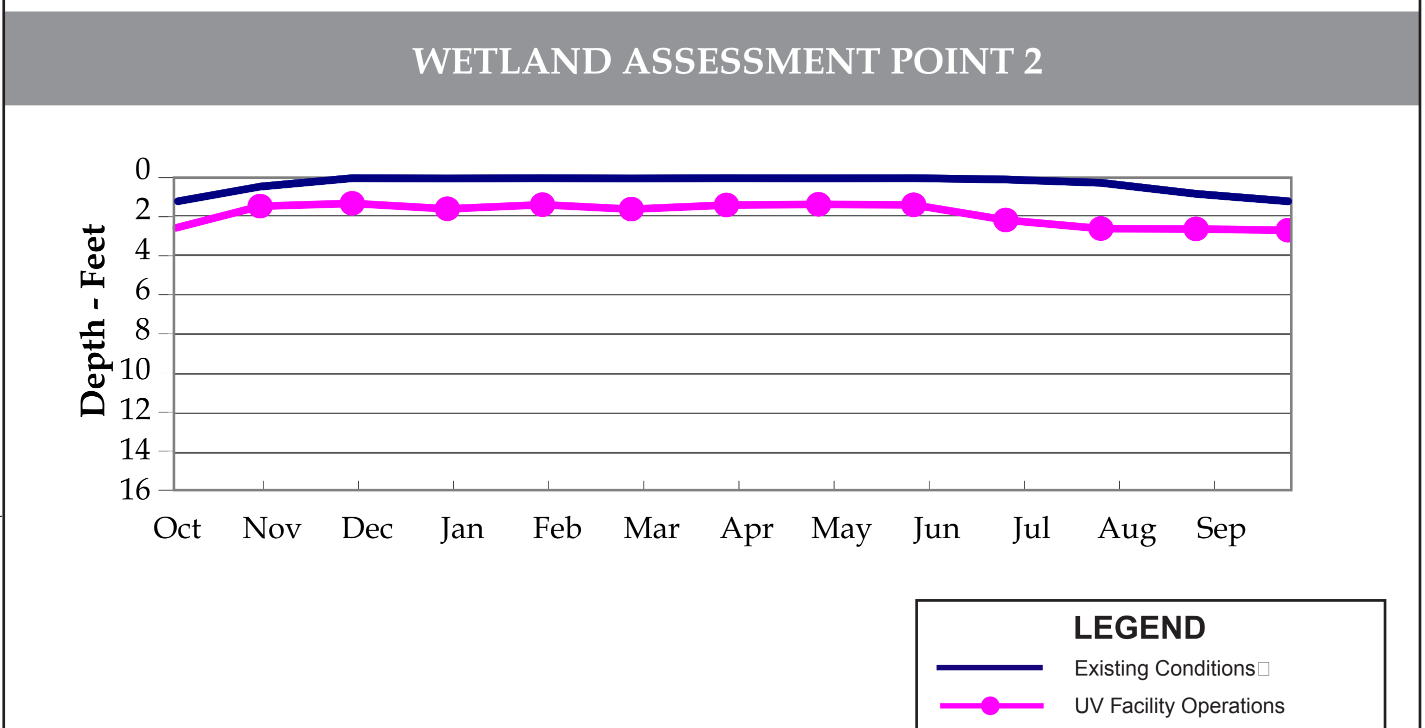
Simulated Water Table Elevations with Wetland Assessment Points for UV Facility During Operation

Catskill/Delaware UV Facility

Figure 4.15-23





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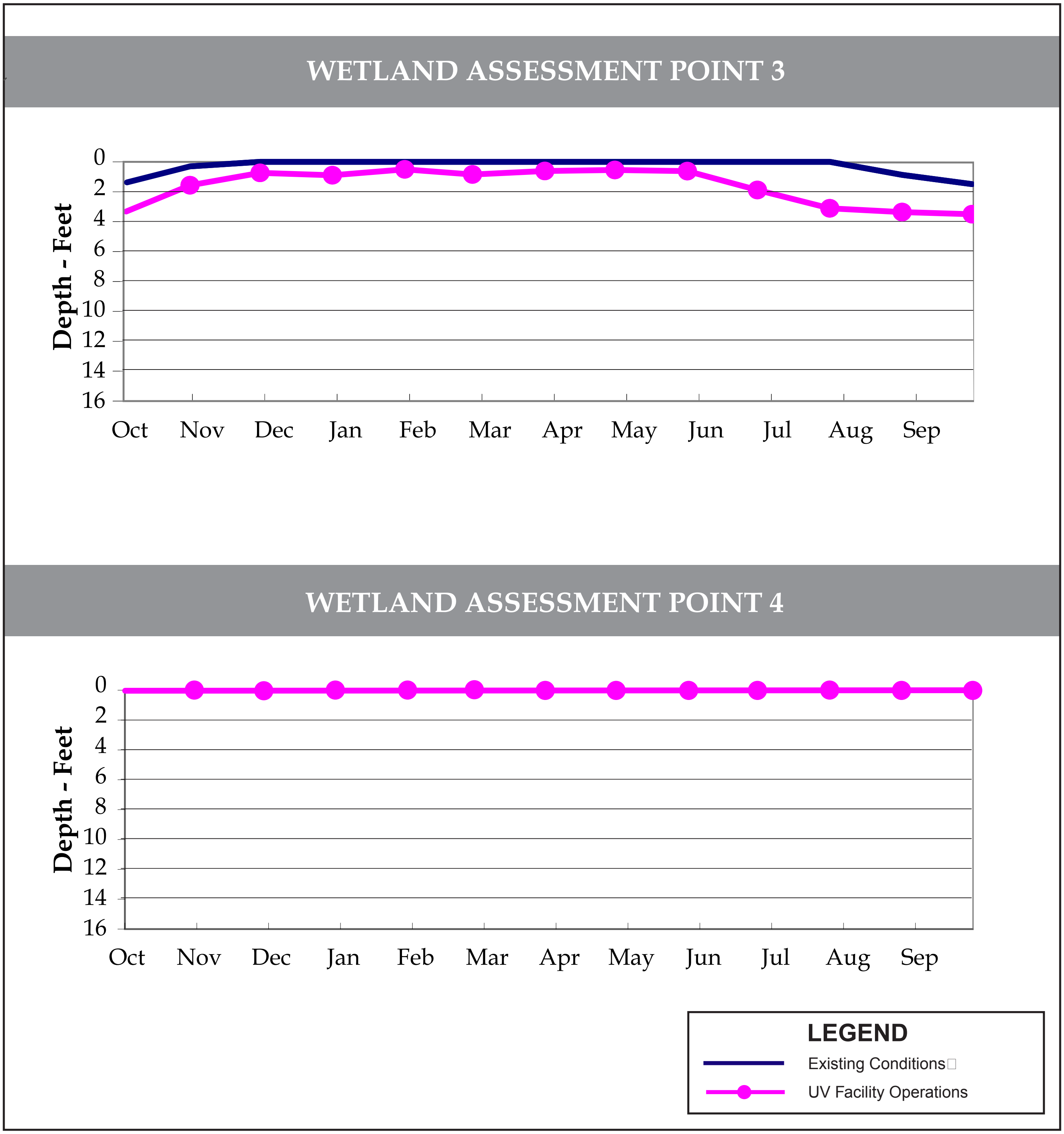
Simulated Monthly Depths to Water Within Delineated Wetland Areas for UV Facility During Operation at Wetland Assessment Points 1-2

Figure 4.15-24a



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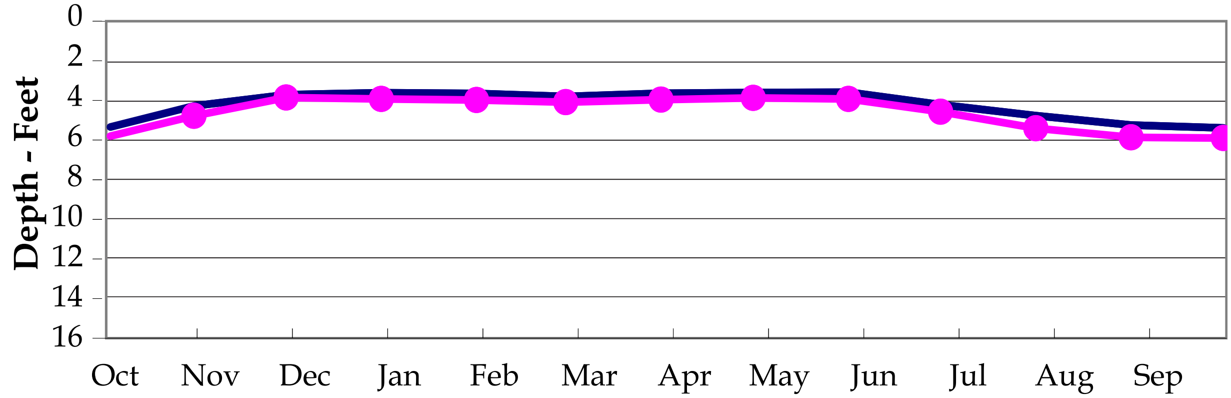
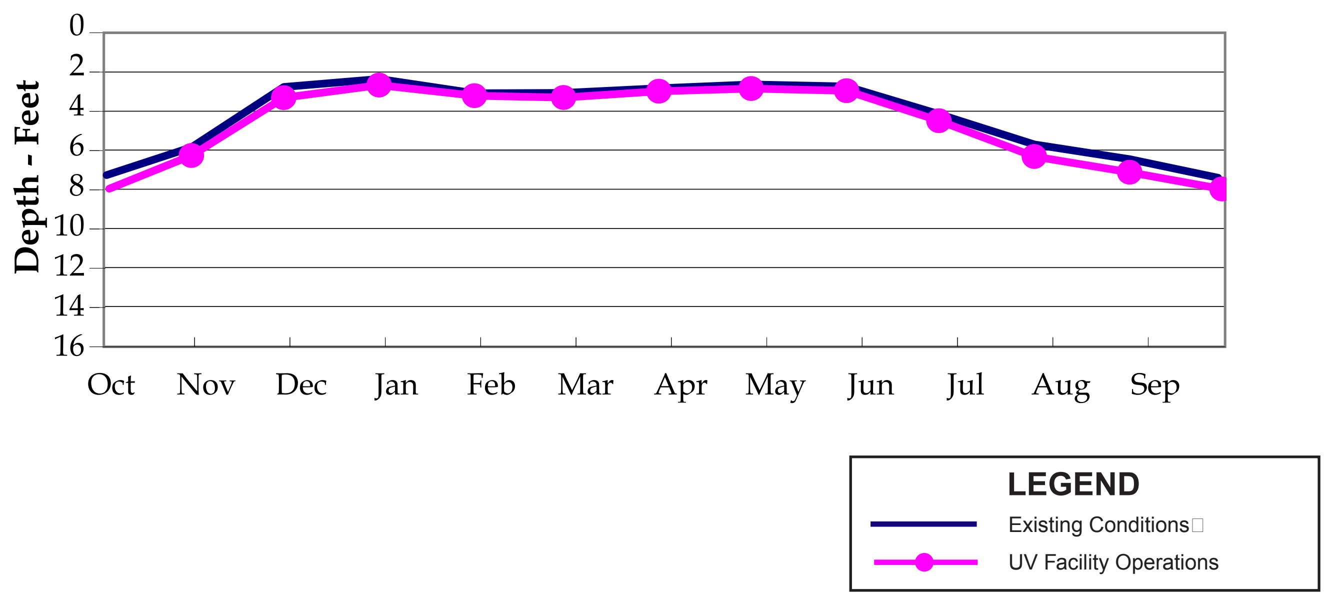
Simulated Monthly Depths to Water Within Delineated Wetland Areas for UV Facility During Operation at Wetland Assessment Points 3-4

Figure 4.15-24b

WETLAND ASSESSMENT POINT 5



WETLAND ASSESSMENT POINT 6



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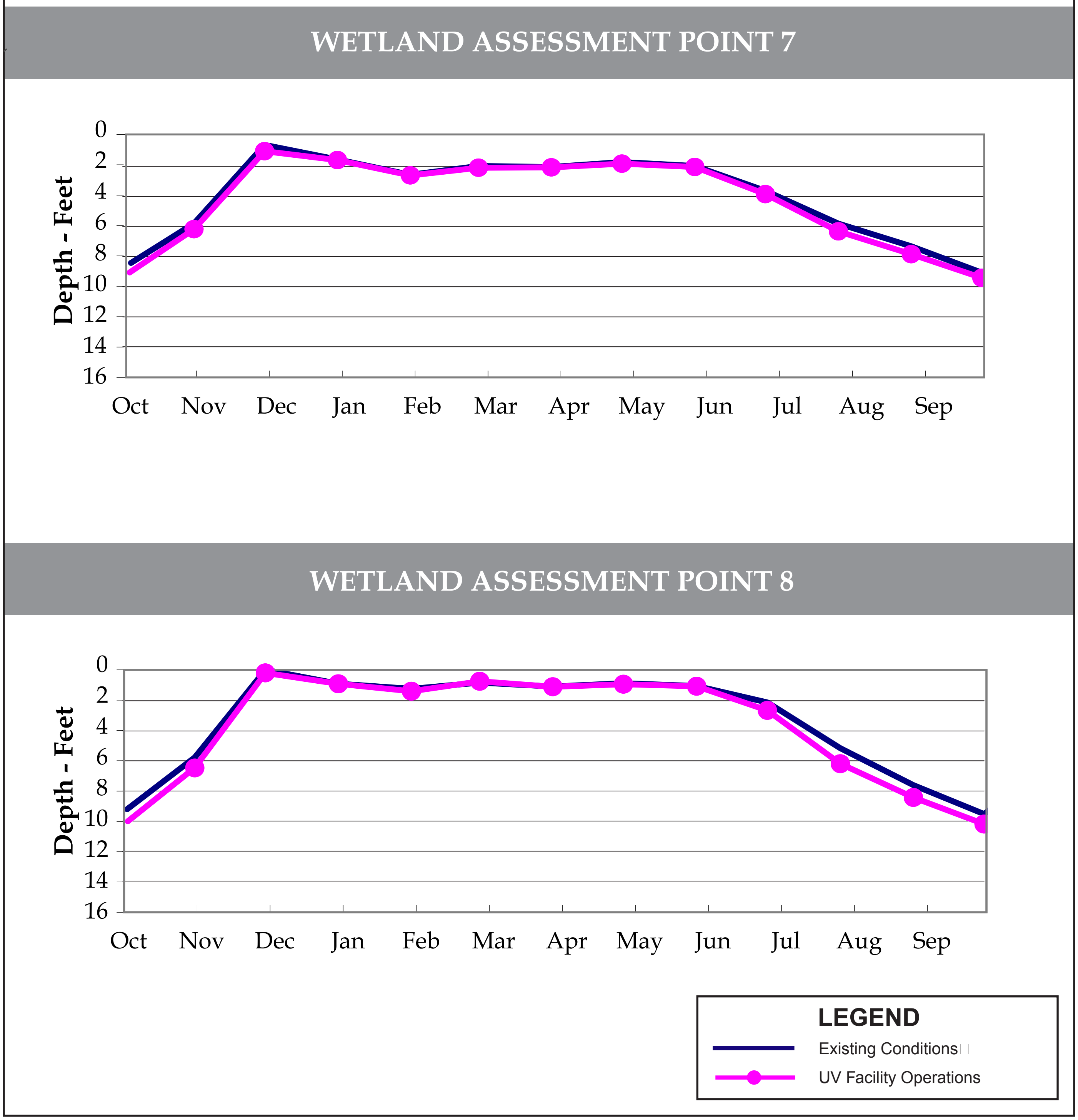
Simulated Monthly Depths to Water Within Delineated Wetland Areas for UV Facility During Operation at Wetland Assessment Points 5-6

Catskill/Delaware UV Facility

Figure 4.15-24c



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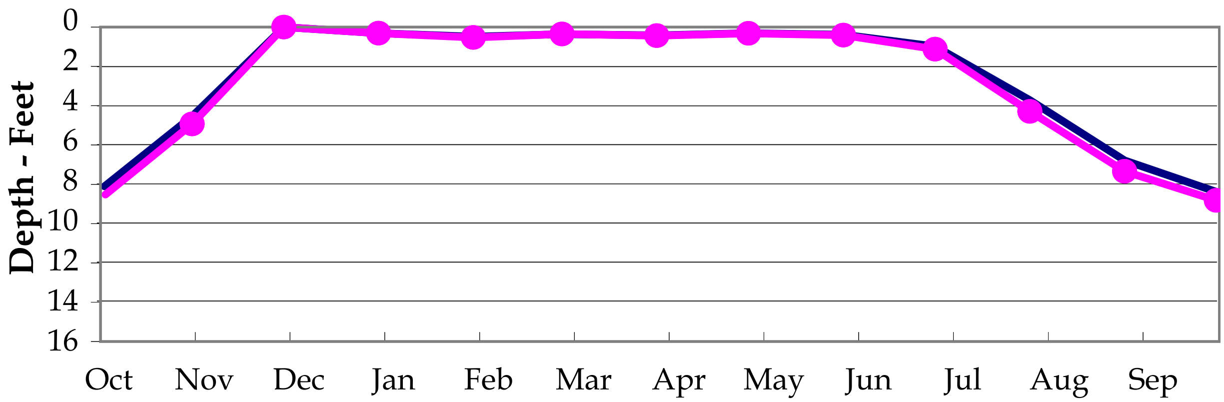
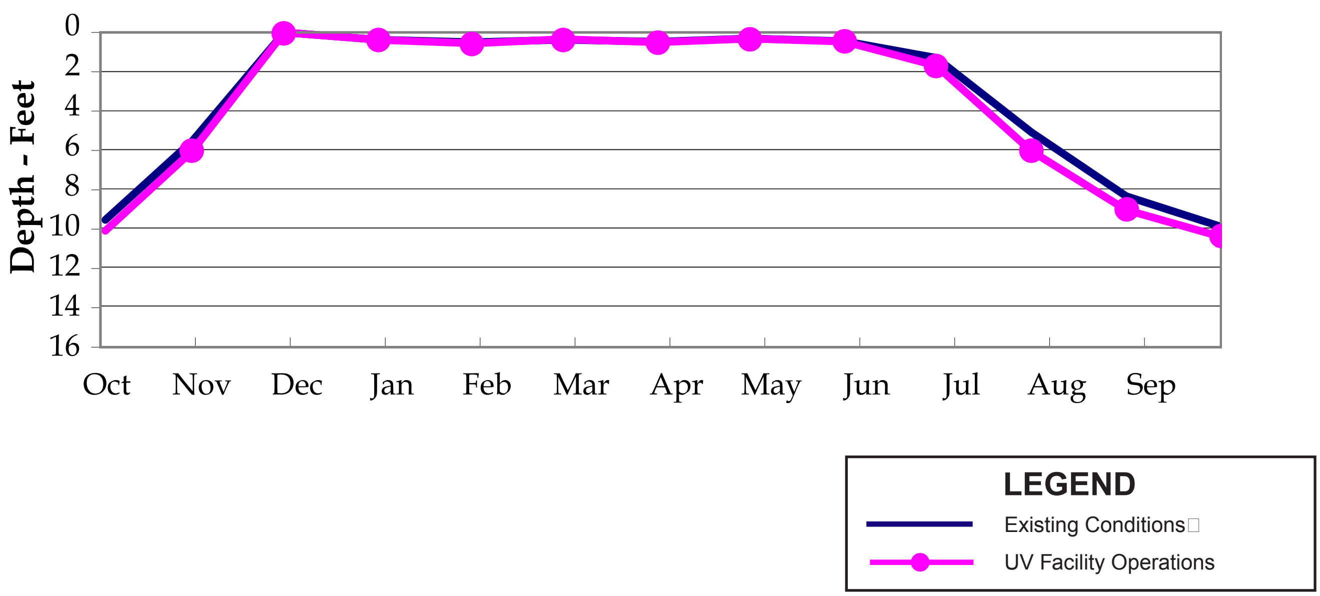
Simulated Monthly Depths to Water Within Delineated Wetland Areas for UV Facility During Operation at Wetland Assessment Points 7-8

Figure 4.15-24d

WETLAND ASSESSMENT POINT 9



WETLAND ASSESSMENT POINT 10



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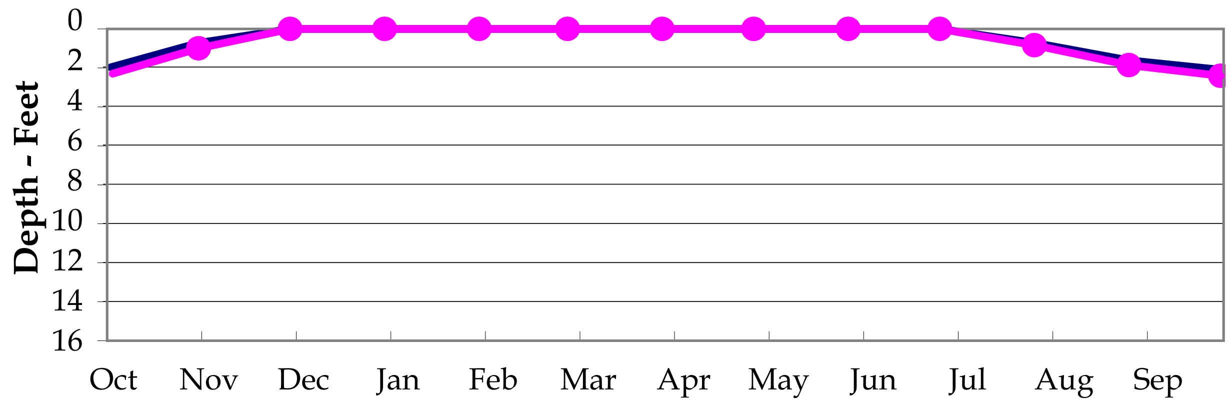
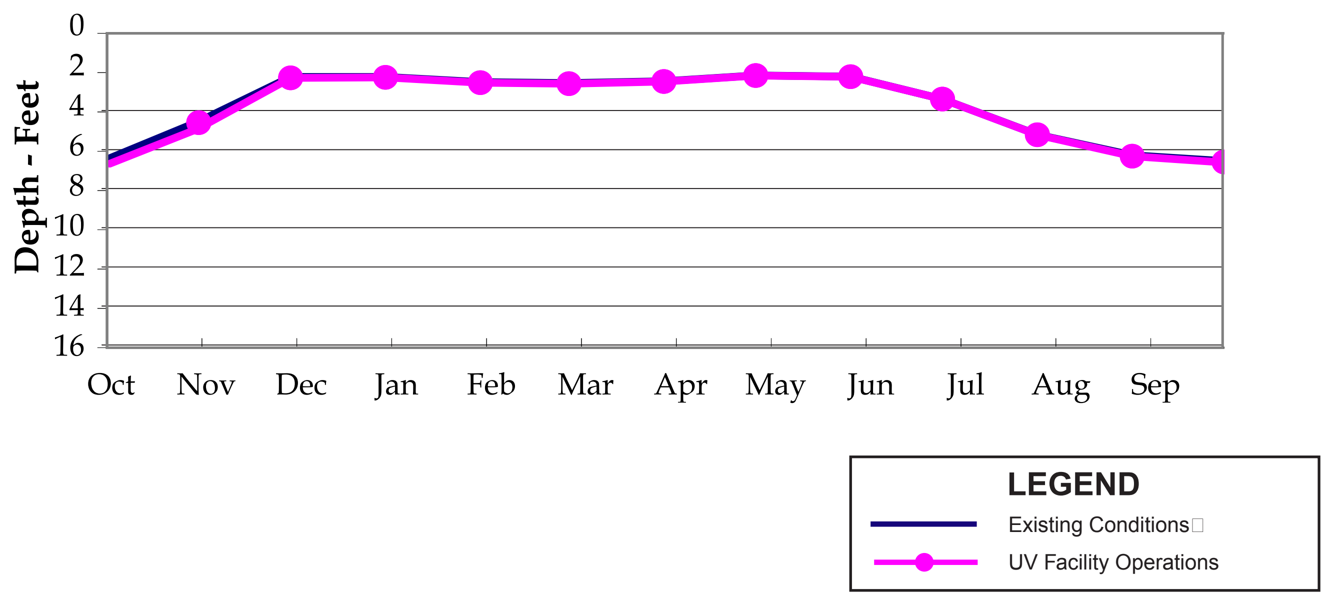
Simulated Monthly Depths to Water Within Delineated Wetland Areas for UV Facility During Operation at Wetland Assessment Points 9-10

Figure 4.15-24e

WETLAND ASSESSMENT POINT 11



WETLAND ASSESSMENT POINT 12



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Simulated Monthly Depths to Water Within Delineated Wetland Areas for UV Facility During Operation at Wetland Assessment Points 11-12

Figure 4.15-24f

TABLE 4.15-10. COMPARISION OF RUNOFF CHARACTERISTICS IN 3-MONTH, 2-YEAR, 5 YEAR, 10 YEAR AND 100YEAR STORM EVENTS (CROTON PROJECT WITH UV FACILITY)

STORM EVENT	CROSS-SECTION NO.	PEAK FLOW RATE (cfs)		ROUTED RUNOFF VOLUME (acre-ft)		WATER SURFACE ELEVATION (ft)	
		EXISTING with CROTON	PROPOSED PROJECT	EXISTING with CROTON	PROPOSED PROJECT	EXISTING with CROTON	PROPOSED PROJECT
3-MONTH STORM	CS-04	13.0	10.8	6.7	6.2	324.3	324.3
	CS-07	19.4	17.2	8.9	8.3	305.8	305.8
	CS-09	21.2	10.5	9.9	8.6	301.8	301.9
	WEIR (@ 100C)	26.1	10.2	12.0	12.7	297.8	300.8
	CS-10	26.1	10.3	12.0	12.6	288.7	288.4
	S03	28.1	10.7	12.6	13.1	278.5	277.8
	S05	27.5	11.3	13.5	13.6	265.5	265.5
	END CULVERT	27.5	11.3	13.5	13.6	263.5	257.7
2-YEAR STORM	CS-04	89.6	81.6	19.4	18.2	324.7	324.7
	CS-07	123.2	111.9	26.2	24.3	306.4	306.4
	CS-09	144.7	114.6	30.7	26.7	302.0	302.1
	WEIR (@ 100C)	180.0	149.8	38.6	38.6	298.6	301.6
	CS-10	180.0	149.7	38.6	38.6	289.9	289.1
	S03	192.4	159.4	40.8	40.8	279.8	279.7
	S05	172.7	150.3	45.0	44.6	266.1	266.6
	END CULVERT	172.7	150.3	45.0	44.6	265.5	260.2
5-YEAR STORM	CS-04	152.2	140.8	27.5	25.9	324.9	324.9
	CS-07	204.3	186.8	37.0	34.4	306.7	306.7
	CS-09	245.5	203.5	44.1	38.2	302.1	302.3
	WEIR (@ 100C)	306.7	268.7	55.7	55.7	299.1	302.0
	CS-10	306.6	268.7	55.6	55.8	290.7	289.7
	S03	325.4	285.5	58.8	59.0	280.5	280.3
	S05	275.4	254.5	65.6	65.2	267.3	265.7
	END CULVERT	275.4	254.5	65.6	65.2	266.4	261.5
10-YEAR STORM	CS-04	200.4	186.2	33.3	31.5	325.1	325.0
	CS-07	263.5	242.0	44.8	41.7	306.8	306.8
	CS-09	321.5	268.0	53.8	46.6	302.1	302.5
	WEIR (@ 100C)	402.8	356.8	67.9	68.2	299.4	302.2
	CS-10	402.8	356.8	67.9	68.2	291.6	290.1
	S03	428.9	380.2	71.9	72.1	280.9	280.7
	S05	331.0	318.6	80.3	80.2	268.2	265.8
	END CULVERT	331.0	318.6	80.3	80.2	266.8	262.2
100-YEAR STORM	CS-04	367.1	344.2	52.3	49.5	325.5	325.5
	CS-07	480.3	443.3	70.1	65.3	307.2	307.2
	CS-09	589.1	499.2	85.5	73.7	302.4	303.1
	WEIR (@ 100C)	733.1	662.5	108.2	109.5	300.5	302.9
	CS-10	733.1	662.5	108.2	109.5	297.7	291.6
	S03	781.1	706.9	114.8	116.0	281.6	281.5
	S05	513.6	502.8	129.2	130.1	270.7	266.4
	END CULVERT	513.6	502.8	129.2	130.1	267.8	265.4

water would approach or slightly exceed the criterion of two feet. The simulation results therefore suggest that, in general, the groundwater component for the nearby wetlands would not be significantly affected by the changes in depth to water during operation conditions.

4.15.3.1.2. With the Croton Project at Eastview Site

Surface Water. The impacts to the surface water features within the Eastview Site are based on three factors, direct impacts due to encroachment/grading and excavation, impacts induced by changes to stormwater runoff, and impacts induces by changes to groundwater. The locations of the Croton project and the proposed UV Facility would introduce two separate developments that would result in effects upon the existing surface waters on the site.

Mine Brook was modeled and simulations were conducted for a variety of storm conditions to evaluate the potential stormwater impacts on the stream. Table 4.15-10 presents the comparison of the existing and proposed conditions with the Croton project in addition to the proposed UV Facility. As illustrated, the routed runoff volume and the water surface elevations in the proposed conditions are very similar to the existing conditions for all locations upstream and downstream of the proposed on-line storage. This indicates that no significant change to the surface water characteristics for those reaches of Mine Brook is anticipated. At the proposed on-line storage, just upstream of the weir, north of Route 100C, the water surface elevations for all the storms are higher in the proposed conditions since the weir elevations were modified to optimize upstream storage.

Figure 5.15.25 (A and B) presents the stream invert profile along with the maximum water surface elevations for the various storms modeled (location points are presented in Figure 4.15-10). The profile compares the water surface elevations for the 5-year and 100-year storms.

No significant change to the water surface (floodplain) elevations was observed across the stream profile, except the area just upstream of the weir. This difference was localized and contained within the on-line storage extent and occurs due to the modification and raising of the weir to optimize the upstream storage and sustain the enhanced wetland.

These findings determine that there would not be a significant incremental impact due to the Croton project with the proposed UV Facility and that the results are similar to the Future With the Project and without the Croton project.

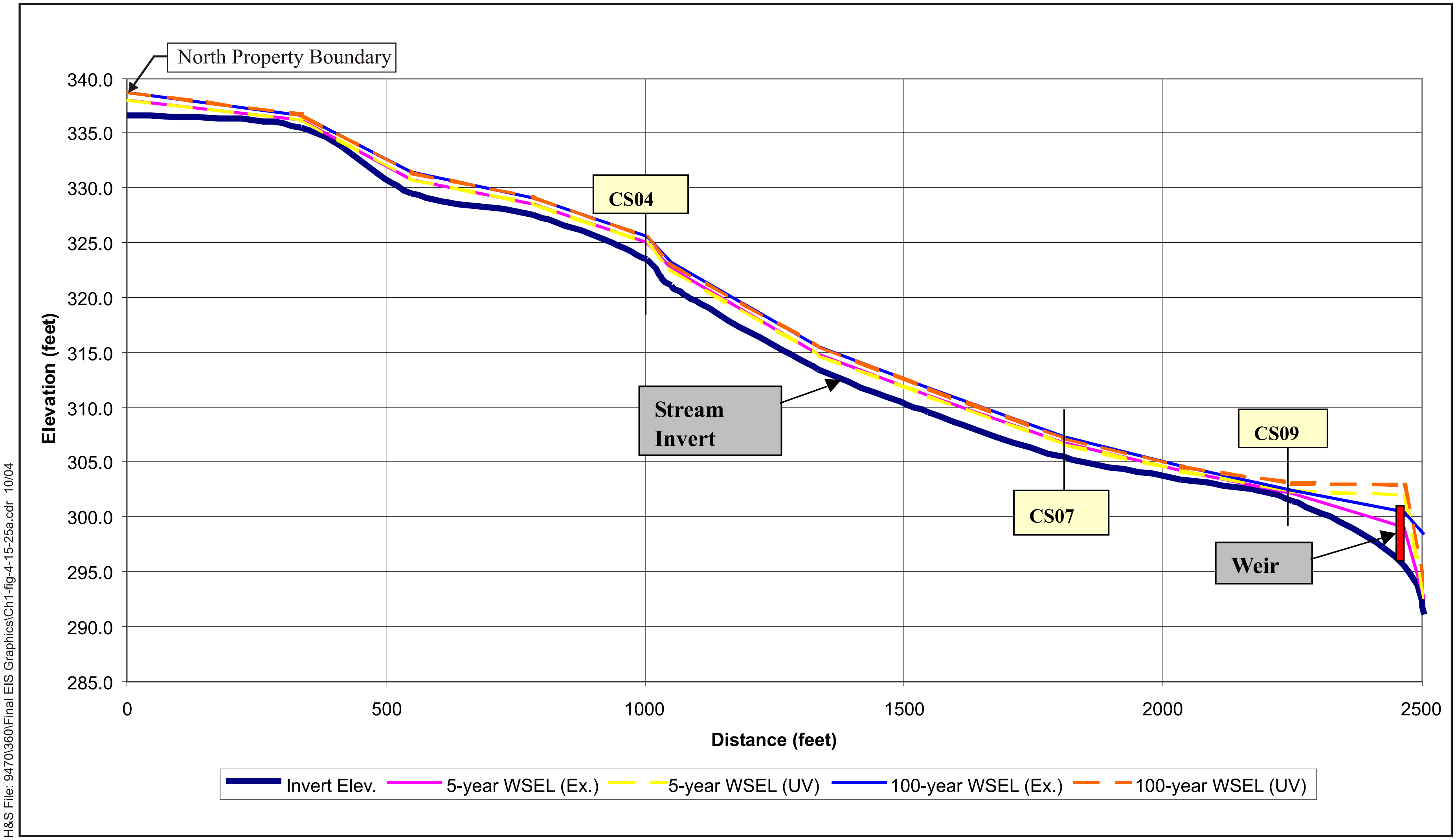
Stormwater Runoff. The stormwater management plans for the Eastview Site would introduce long-term control and treatment of stormwater runoff to the maximum extent practicable. Measures would include landscaping to provide proper stabilization of the site and treatment of stormwater runoff from all impervious services, while maintaining flows to adjacent natural resource areas at or near the existing conditions rates and volumes. Both projects would install stormwater detention basins. The runoff from each of the projects, as well as the perimeter and access roads, and parking area, would be collected via independent storm drainage systems and be directed to their stormwater detention basins. The Croton project's stormwater detention basin would be located directly south of the southeastern corner of the plant while the proposed UV Facility pretreatment forebay and online storage would be located south of the southwestern corner of the proposed facility. These basins would be designed to contain the runoff generated from the 100-year 24-hour storm (7.2 inches of rainfall).

Table 4.15-10 summarizes the peak runoff flow, total routed runoff volume and the water surface elevations at a number of cross sections along the Mine Brook drainage corridor for the 3-month, 2-year, 5-year, 10-year and 100-year storm events under the Croton project with the proposed UV Facility scenario. The model indicates that within the Eastview Site and during the 2-year storm, the peak flow in upper Mine Brook is approximately 81.6 cfs with a total runoff volume of 18.2 acre-feet. The majority of this runoff comes from off-site and on-site basins. Of the on-site basins, Basin 7, which contains several wetland tributaries to Mine Brook, and Basin 8, which is the largest on-site basin, are the major contributors. The model simulations confirm that stormwater runoff from within the Eastview Site is not the primary source of water supporting the hydrology of Mine Brook but includes a significant contribution of stormwater runoff from off-site (upstream) basins.

Therefore, in the future with the Croton project and the proposed UV Facility, a decrease in peak flow rate from 90.5 cfs to 81.6 cfs is indicated during operation. This decrease would result from the flood attenuation provided by the independent detention basins and with no incremental change in the routed runoff volumes or water surface elevations no significant detriment is anticipated to the stream flows. As described previously, the water detained within the detention basin would be discharged over time to the Mine Brook to maintain pre-construction flows in the brook, so that adjacent wetlands are not affected. Figure 4.15-26 shows the 100 year pre-

developed and post-developed peak flows over time and illustrates the attenuation provided by the proposed BMP to meet the Town of Mount Pleasant stormwater detention requirements.

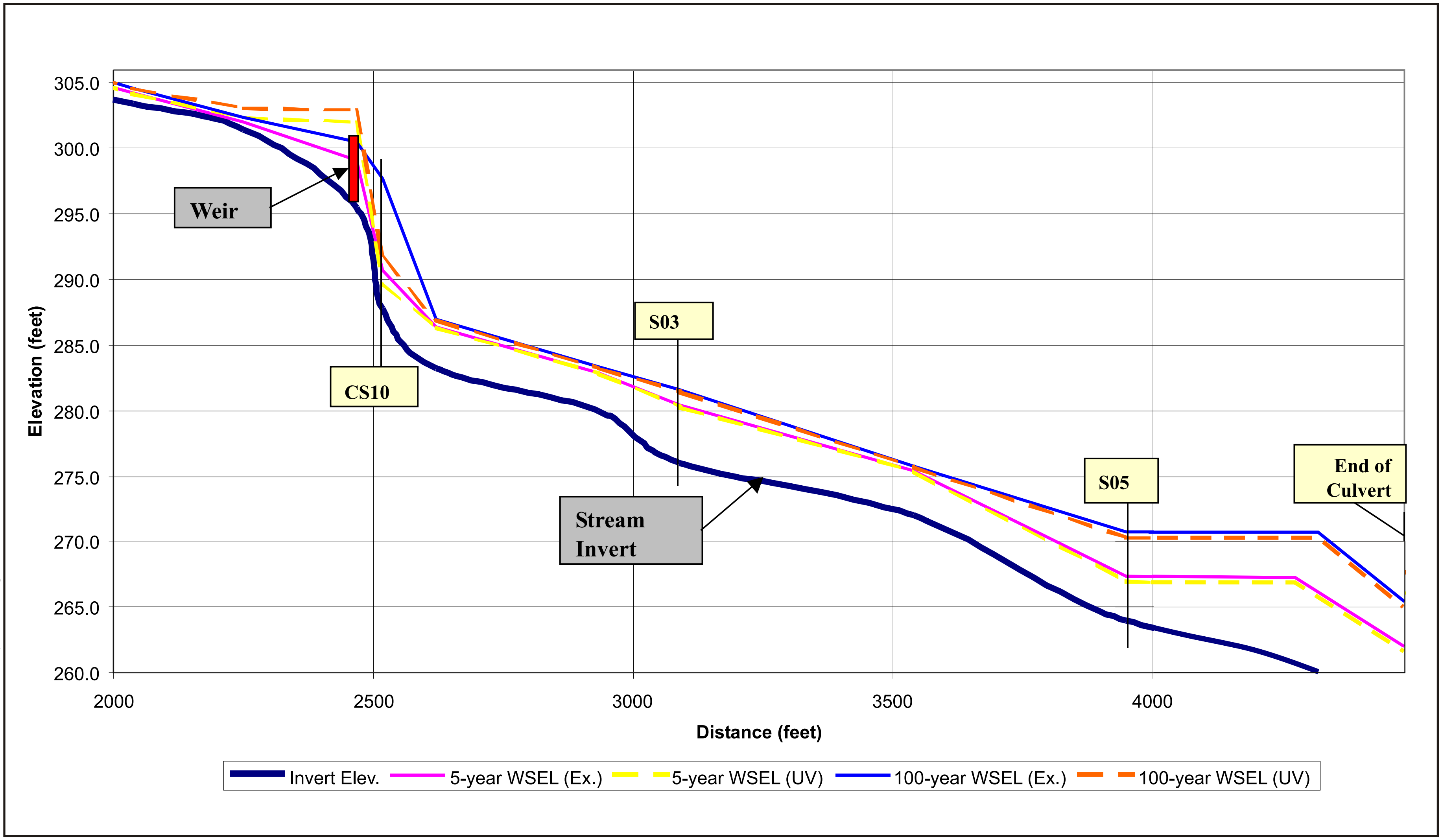
Groundwater. Steady state and transient simulations were performed to evaluate the potential impacts of the combined projects (Croton project with the proposed UV Facility). Both groundwater simulations were run for a target water table elevation of 300 feet at the proposed UV Facility and 313 feet at the Croton project.



Comparison Between WSELs for Future with Croton and Croton + UV Facility for the 5-year and 100-year Storms

Catskill/Delaware UV Facility

Figure 4.15-25a



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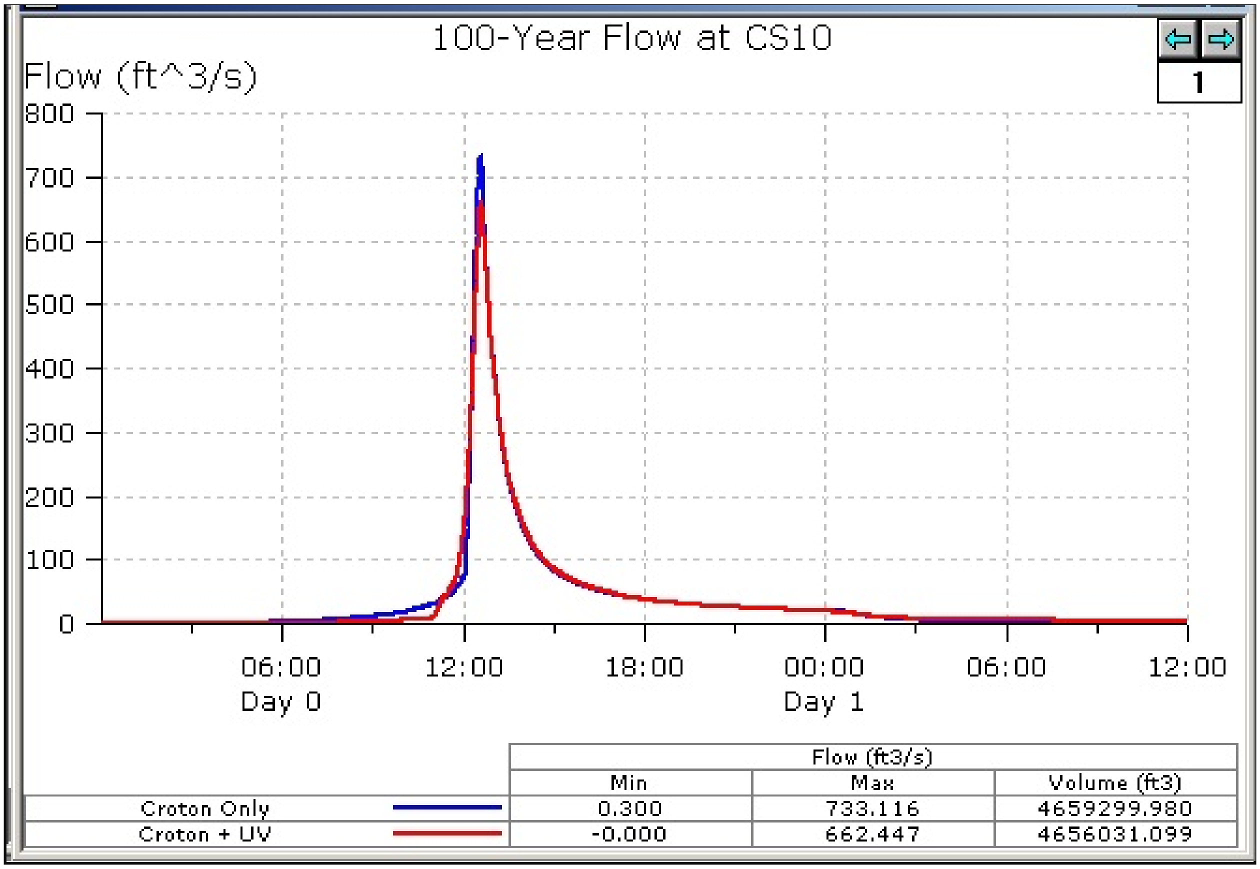
Comparison Between WSELs for Future with Croton and Croton + UV Facility for the 5-year and 100-year Storms

Catskill/Delaware UV Facility

Figure 4.15-25b



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100 year Pre-Developed and Post-Developed Peak Flows for the UV Facility with Croton Project

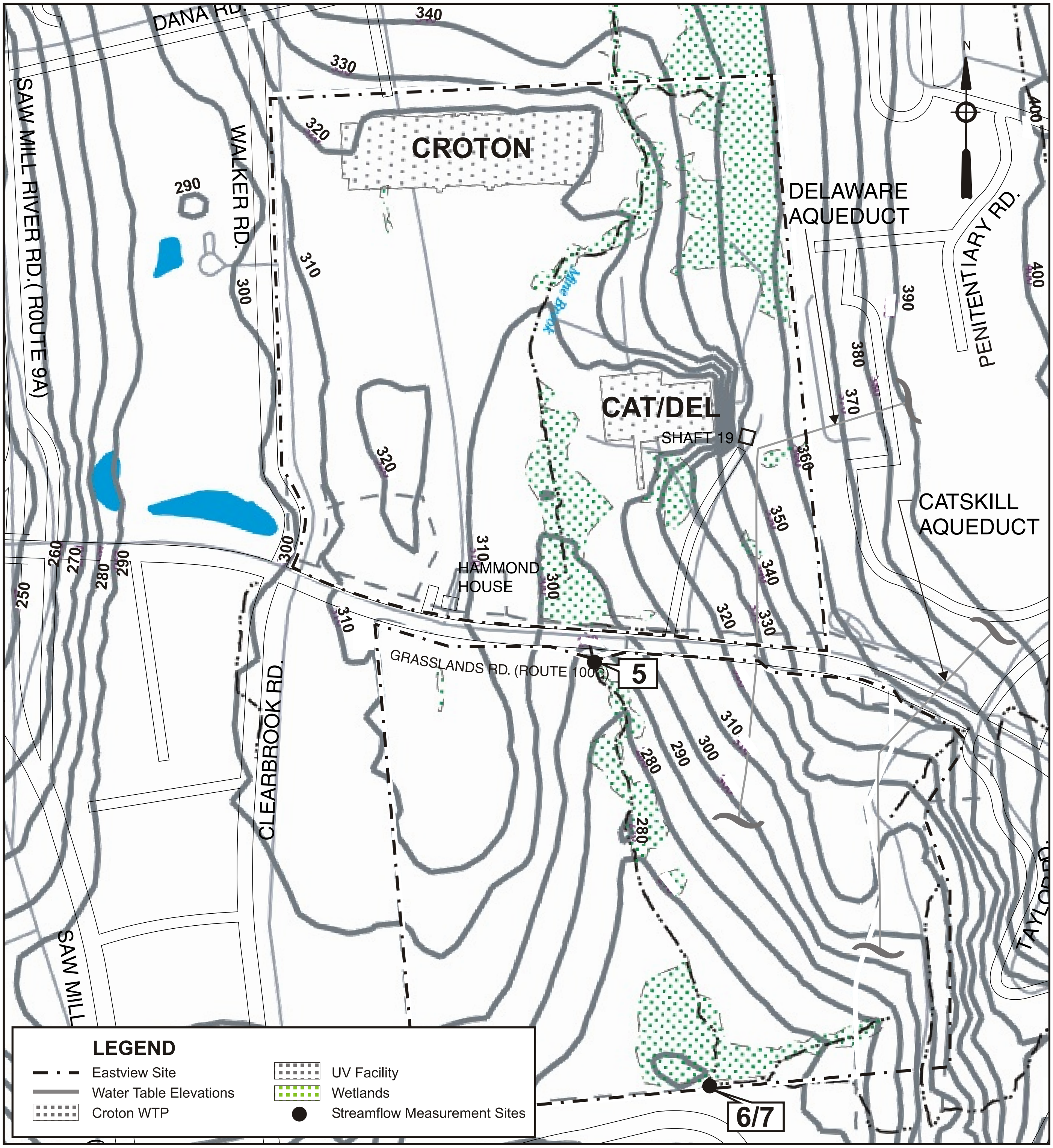
Catskill/Delaware UV Facility

Figure 4.15-26

Figure 4.15-27 shows the simulated steady state water table elevation for the two projects. The effects of the drainage systems for the main disinfection building and for the Croton project are evident in the tightly spaced contours surrounding those features. In particular, the steep gradients to the east of the disinfection building reflect the relatively low hydraulic conductivity of the till. Also, the simulated bedrock flow provides sufficient influx to the overburden to contribute to the relatively steep gradients. In general, for both the proposed UV Facility and Croton project the water table impacts are restricted to the immediate areas surrounding and including the main structures with drains.

The simulated dewatering rate required to maintain the groundwater elevation at 300 feet (for the UV footprint) is 15 gpm. The simulated groundwater base flows at Sites 5 and 6/7 are 53 gpm and 119 gpm, respectively. The simulated base flow reduction at Site 5 and 6/7 was approximately 32 percent, and about 19 percent, respectively. Site 5 is located where Mine Brook flows through the culvert beneath Route 100C, and thus the flows measured there represent the complete groundwater and surface water drainage from the north parcel and its contributing off-site areas. Site 6/7 is located on the south parcel, in the area where a tributary joins Mine Brook. The Site 6/7 flow-measurement is derived from two separate flow stations (Sites 6 and 7) with the combined flow representing the total flow in Mine Brook at the southernmost on-site station. Flows from Site 6/7 therefore provide the best available data for describing the total groundwater and surface water drainage from the Eastview Site, before Mine Brook discharges into the Saw Mill River. These reductions in the base groundwater flow are replenished with the routing of the surface stormwater runoff and the online storage.

Simulated steady state water table drawdown from the baseline conditions is shown in Figure 4.15-28. East of Mine Brook, near the proposed UV Facility footprint area the extent of the simulated one-foot drawdown line is similar to that projected for the operation conditions without the Croton project also in operation. The simulated one-foot drawdown line extends into some of the Mine Brook wetlands to the west. No portion of the northeast or northwest wetlands appears to be within the one-foot drawdown line. The water table drawdown associated with the Croton project, as delineated by the one-foot drawdown line, extends relatively close to Mine Brook to the east.



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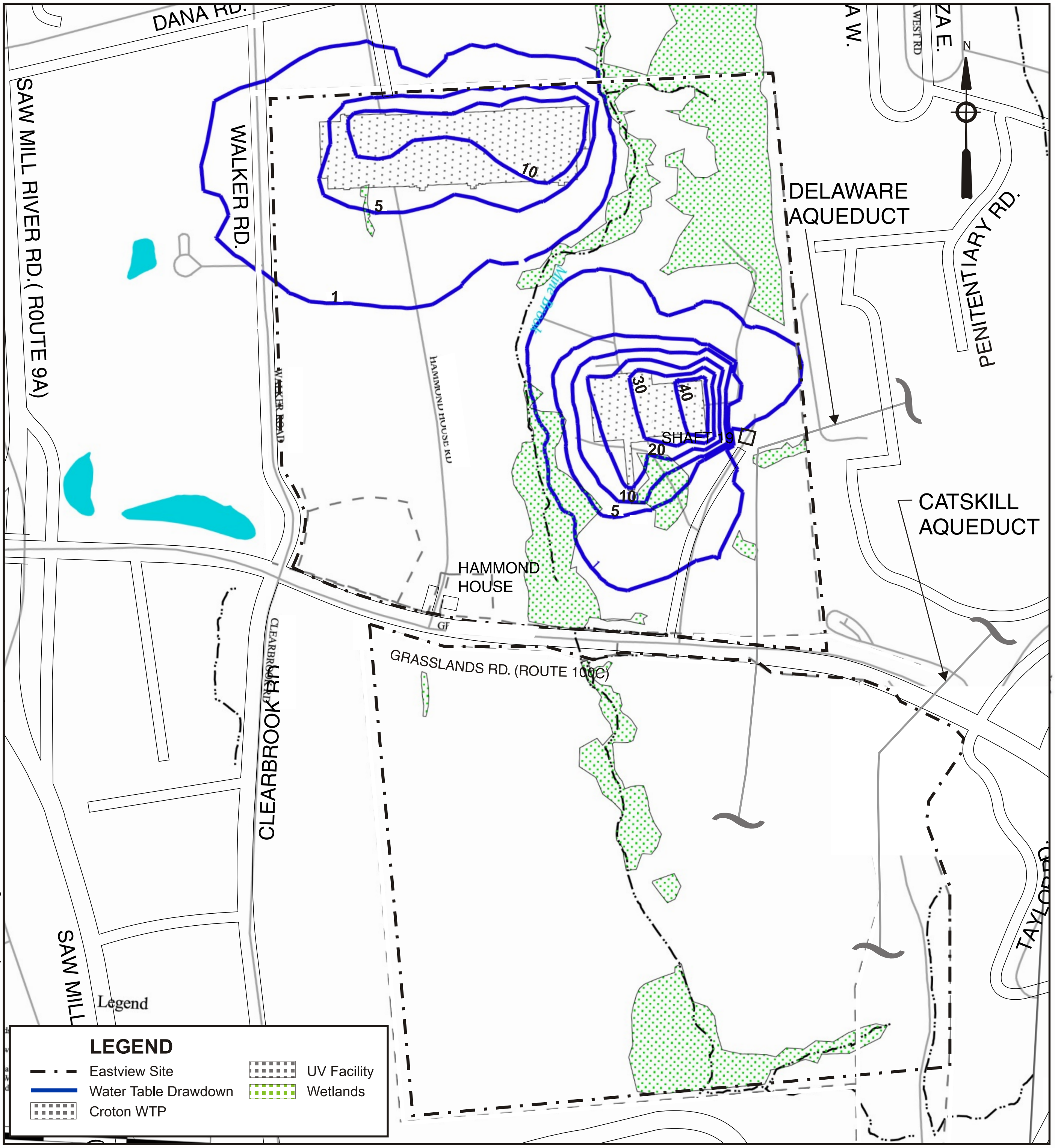
Simulated Water Table Elevations for Croton with UV Facility During Operation

Catskill/Delaware UV Facility

Figure 4.15-27



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Simulated Water Table Drawdown
Croton with UV Facility During Operation

Catskill/Delaware UV Facility

Figure 4.15-28

Most wetland plants require a shallow depth to water to thrive because the root zones of many wetlands plants do not extend more than a few feet below land surface. In order to minimize impacts to wetlands, it is desirable to maintain a maximum two feet depth to water during the April to June growing period in locations where the water table is within two feet of the land surface during baseline conditions. Figure 4.15-29 shows the locations of the wetland assessment points and Figure 4.15-30 (A through F) presents transient simulation results for these locations within the delineated wetland areas during operation conditions of the Croton project with the proposed facility. The graphs show monthly values of simulated depths to water for the baseline and post-construction scenarios. The transient simulation results were reviewed to identify locations where depths to water change from within two feet of land surface to greater than two feet below land surface during April to June. Simulation results of proposed facility operations suggest an insignificant change in water table elevations from the predicted future without the project conditions, during the critical growing season months April to June at the wetland assessment Points shown on Figure 4.15-29 and Figure 4.15-30, except at assessment Point 1. This Point is located at the most upstream extent of the wetland area that runs along Mine Brook, directly west of the main disinfection building. At this location, the groundwater model predicts that the depth to water would approach or slightly exceed the criterion of two feet. The simulation results therefore suggest that, in general, the nearby wetlands would not be affected by significant changes in depth to water during operation conditions.

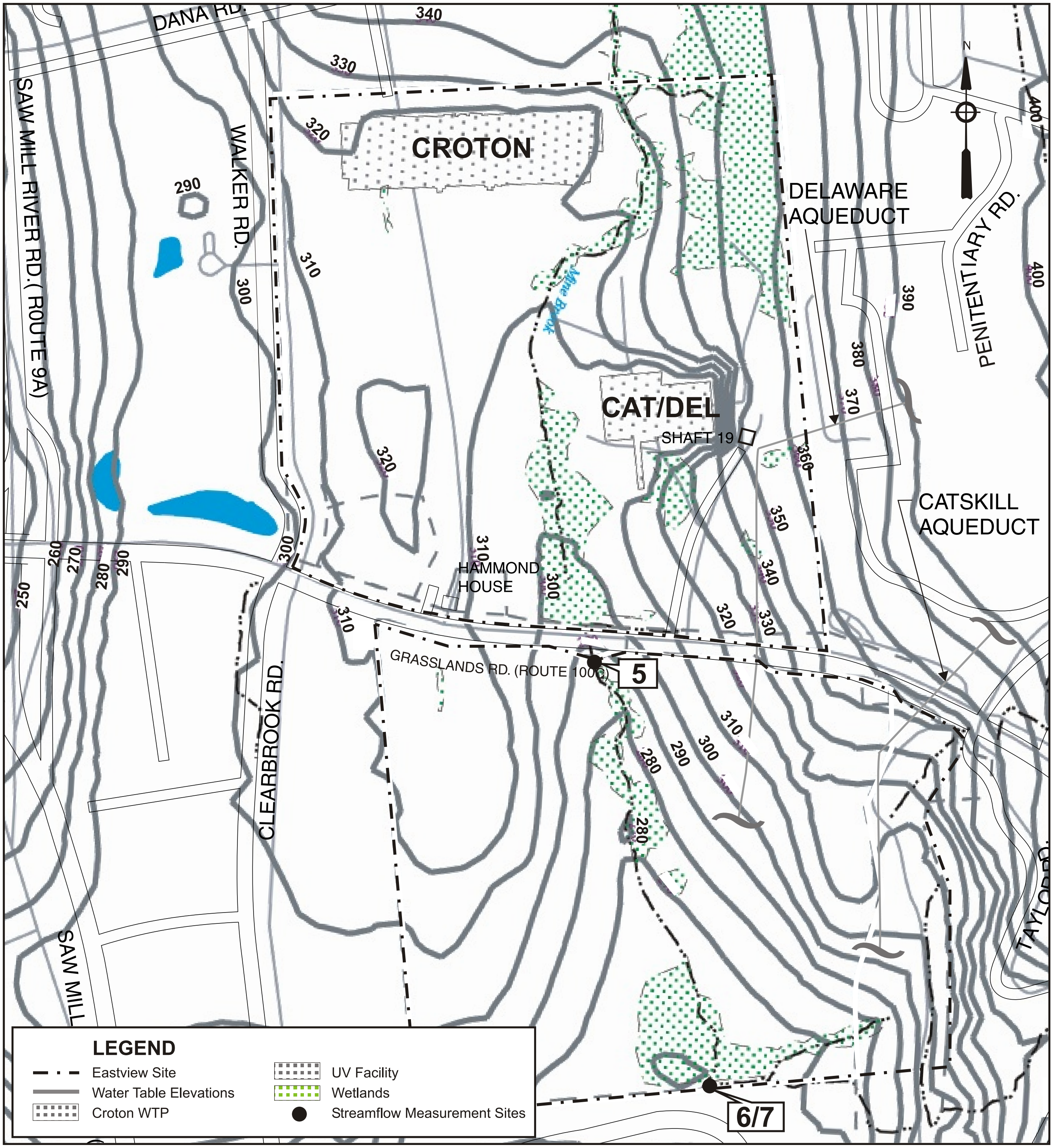
4.15.3.2. Potential Construction Impacts

The anticipated peak year of construction for the proposed facility is 2008. Therefore, potential construction impacts have been assessed by comparing the Future With the Project conditions against the Future Without the Project conditions for the year 2008 for both scenarios.

4.15.3.2.1. Without the Croton Project at Eastview Site

The potential construction impact area including the potential staging area for the proposed facility would be approximately 67 acres. During construction, the construction impact area would be cleared and graded to accommodate the storage and daily activities of construction vehicles and equipment. The three areas of excavation and potential dewatering and possible temporary stream diversion include: (1) the excavation of the building footprints; (2) the excavation of conduits and shafts that would include the cut and cover activity and (3) the reconstruction of the weir north of Route 100C and replacement of the culvert across Route 100C. In addition, a roadway is proposed across the Mine Brook corridor to provide access from the Walker Road entrance to the proposed facility.

Surface Water. The principal concern for construction impacts on surface water quality is turbidity, which could come from several sources, including large unprotected excavations, stockpiled soils, stream diversions and sediment from groundwater and stormwater dewatering effluents. All these sources are addressed below with respect to the potential for impacts and the types of mitigation measures that could be implemented as part of the proposed facility.



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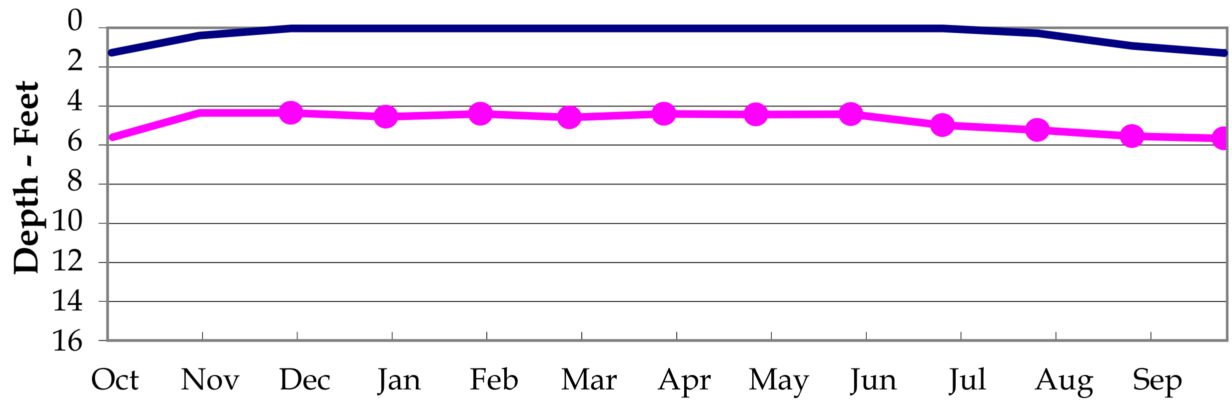
Simulated Water Table Elevations with Wetland Assessment Points for Croton with UV Facility During Operation

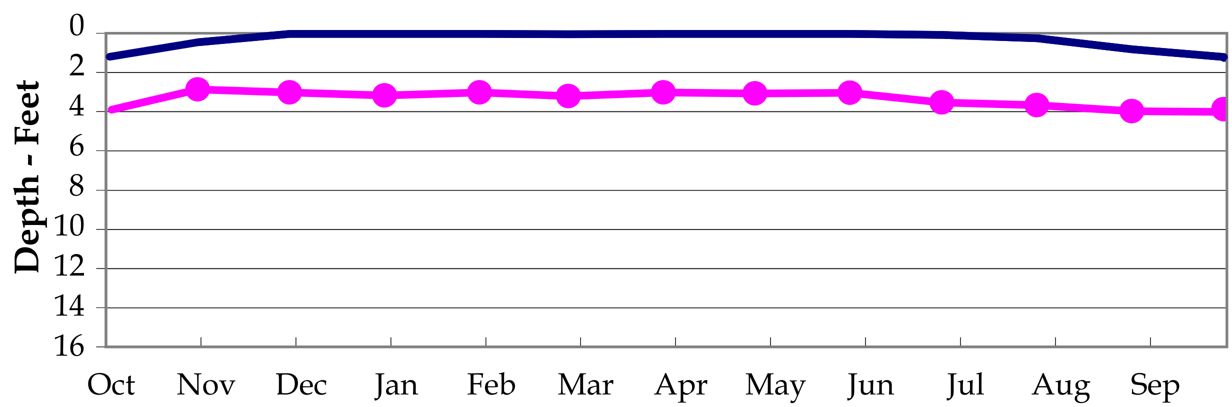
Catskill/Delaware UV Facility

Figure 4.15-29

WETLAND ASSESSMENT POINT 1



WETLAND ASSESSMENT POINT 2



LEGEND

Existing Conditions

UV Facility Operations with Croton Project at Eastview

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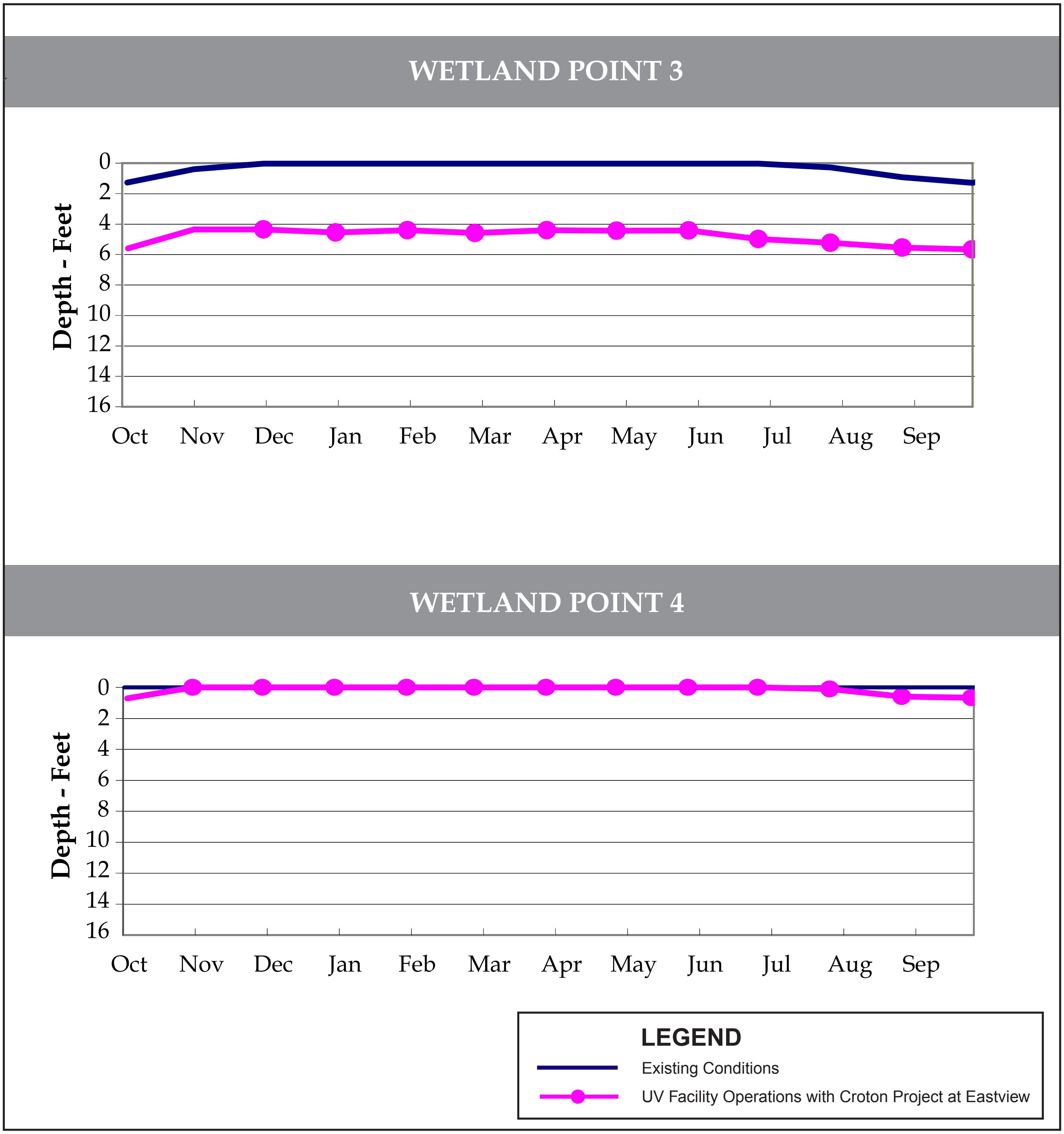
Simulated Monthly Depths to Water Within Delineated Wetland Areas for the Croton Project with UV Facility During Operation at Wetland Assessment Points 1-2

Catskill/Delaware UV Facility

Figure 4.15-30a



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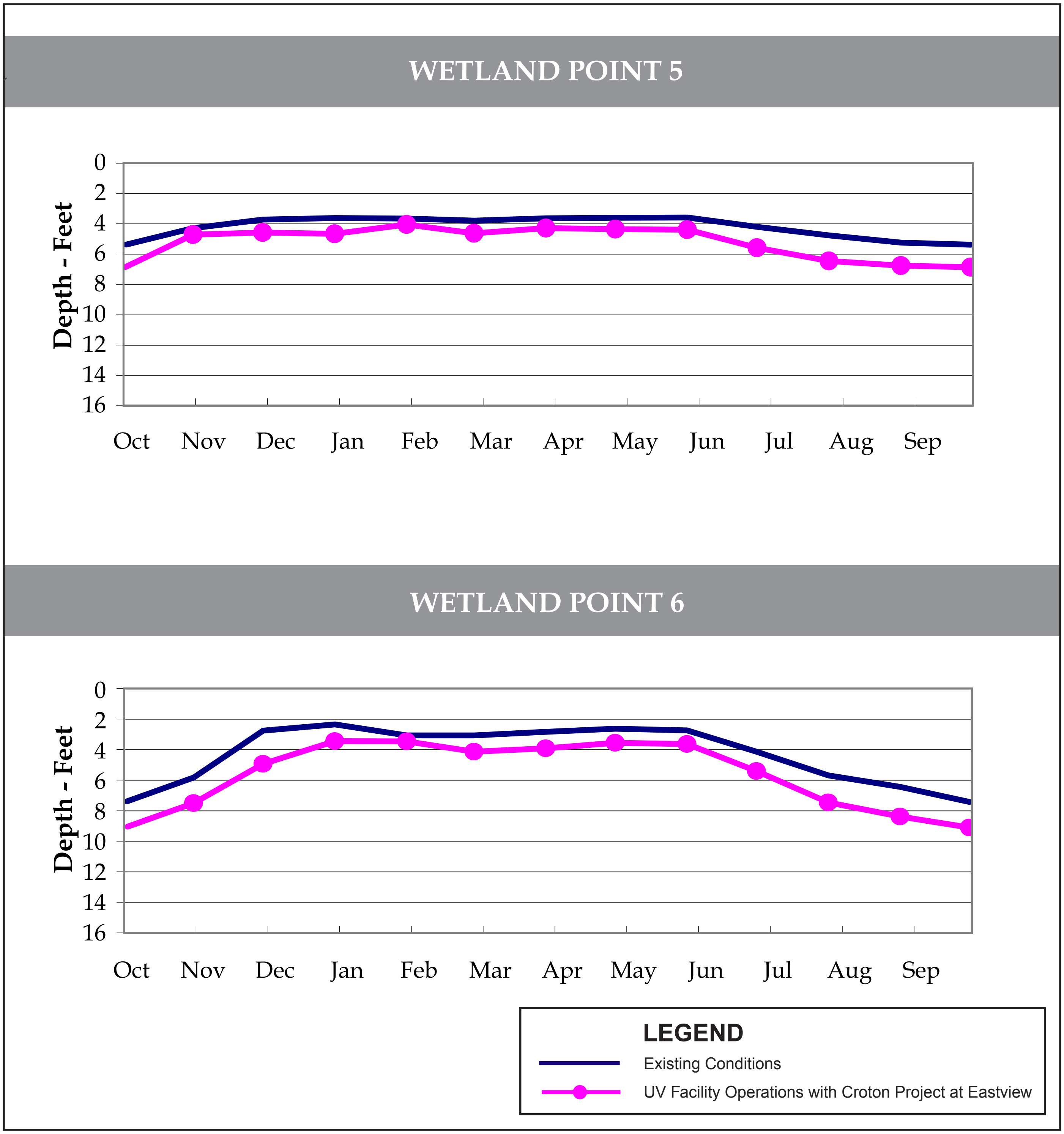
Simulated Monthly Depths to Water Within Delineated Wetland Areas for the Croton Project with UV Facility During Operation at Wetland Assessment Points 3-4

Catskill/Delaware UV Facility

Figure 4.15-30b



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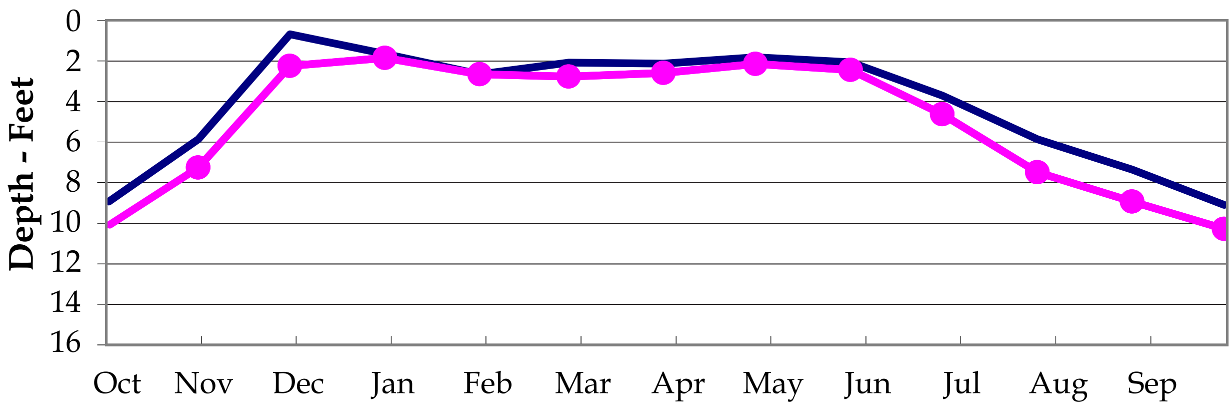
Simulated Monthly Depths to Water Within Delineated Wetland Areas for the Croton Project with UV Facility During Operation at Wetland Assessment Points 5-6

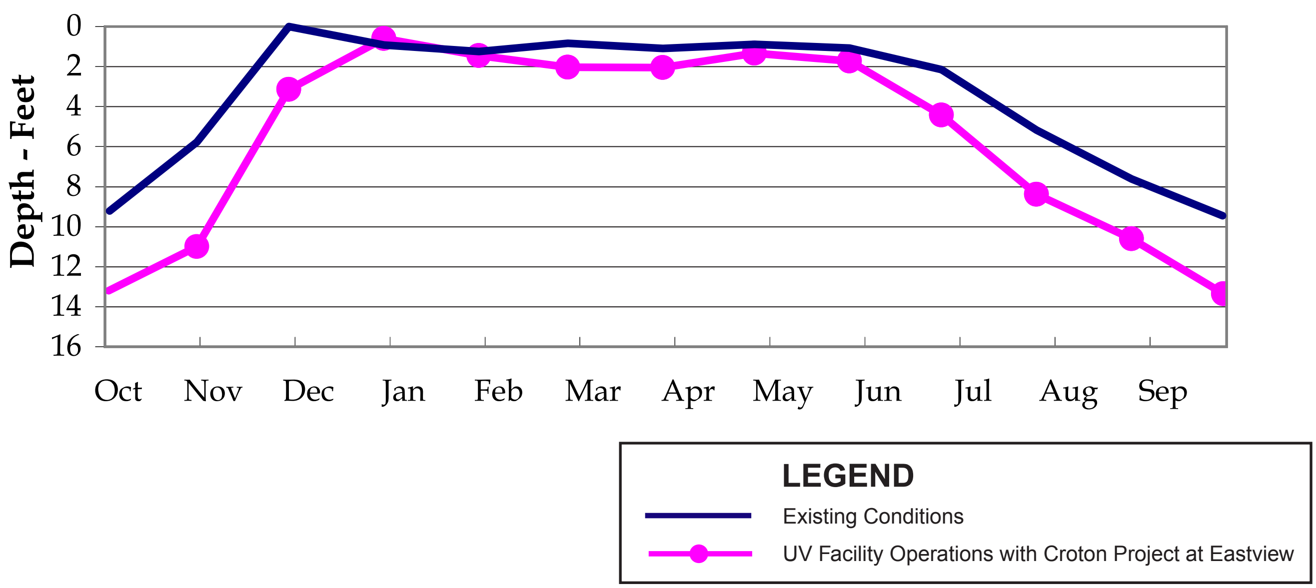
Catskill/Delaware UV Facility

Figure 4.15-30c

WETLAND POINT 7



WETLAND POINT 8



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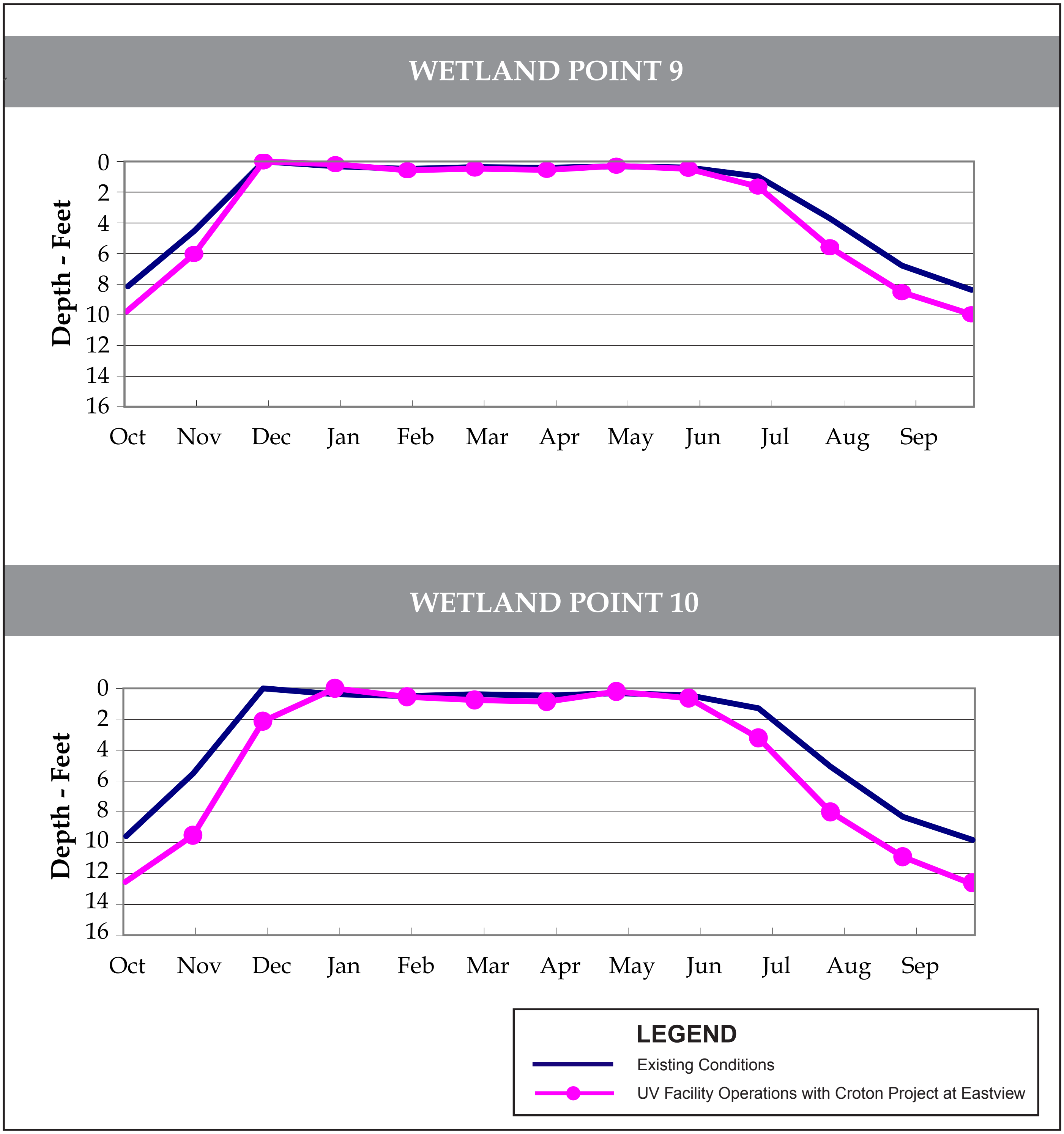
Simulated Monthly Depths to Water Within Delineated Wetland Areas for the Croton Project with UV Facility During Operation at Wetland Assessment Points 7-8



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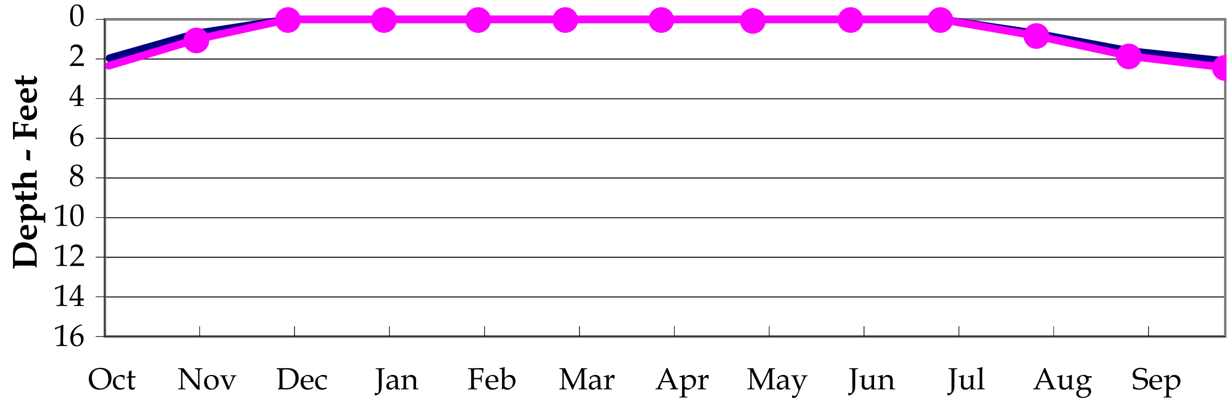
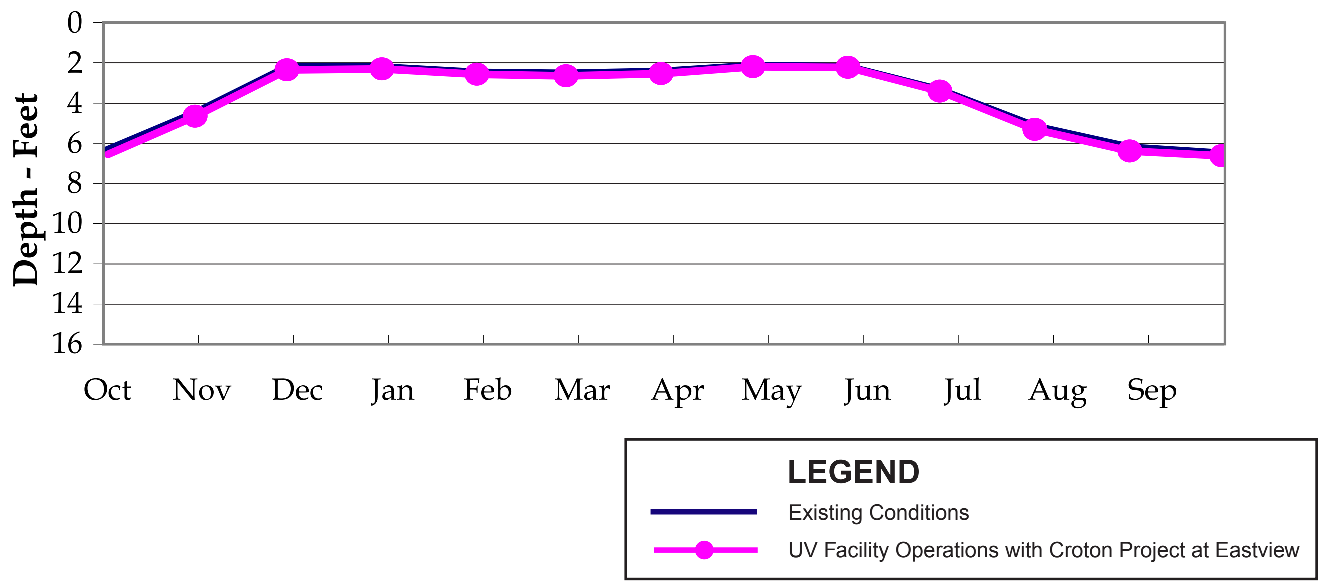
Simulated Monthly Depths to Water Within Delineated Wetland Areas for the Croton Project with UV Facility During Operation at Wetland Assessment Points 9-10

Figure 4.15-30e

WETLAND ASSESSMENT POINT 11



WETLAND ASSESSMENT POINT 12



Simulated Monthly Depths to Water Within Delineated Wetland Areas for the Croton Project with UV Facility During Operation at Wetland Assessment Points 11-12

Dewatering Operations. During the construction of the proposed UV Facility continuous dewatering would be implemented for the entire construction duration. Contractors would be required to send pumped-out residual water through settling devices, such as sediment basins, sediment traps or portable sediment tanks, prior to discharge to avoid surface water impacts during dewatering. These devices allow the suspended solids to settle out prior to discharge. The captured sediments would be regularly removed by the contractor from the bottom of the tanks. In some instances, depending on the nature of the sediments augmenting the settling characteristics may be required. Construction documents would require that contractors adhere to a specific protocol for the discharge of the dewatering effluent. The protocol establishes a testing procedure whereby the turbidity of the effluent is monitored and standards are set for the maximum turbidity value permissible. The standard is based in part on the existing turbidity of the receiving pond or stream. As stated, the type of dewatering system to be used would depend on the amount of groundwater to be pumped. However, in all cases the pumped water would be returned to the surface water system only after it is collected and treated in sediment traps, filters, or portable sediment tanks. As a result, dewatering during construction is not anticipated to cause an impact on surface waters.

Stream Diversion. The reconstruction of the weir north of Route 100C and the replacement of the culvert under Route 100C would require a temporary stream diversion and fluming of Mine Brook so that the construction could occur in dry conditions. Sediment impacts to surface water from stream diversion is anticipated to be limited for the following reasons:

- Since the work is done in dry conditions, and the new stream corridor is stabilized, the potential for downstream sedimentation is reduced.
- The work would be limited to a section of the stream, and therefore impacts on upstream and downstream surface flows and hydrology are anticipated to be limited.
- Adequate diversion strategies are planned and would be implemented. In all cases, flow-through capacity would be maintained and no flooding would occur as a result of the proposed in-stream work.

There is a limited potential for impacts during a major storm event. Diversions would be designed to handle up to a two-year storm, which accounts for up to 99 percent of all storm events; however, heavier storms could result in overflowing into the work area following which appropriate remedial work would be conducted to restore the affected corridor.

A temporary disturbance to an approximately 40-foot section of Mine Brook would occur to allow for the installation of culverts for a temporary bridge and installation of two underground utility conduits. Prior to installing the permanent bridge crossing, a temporary bridge would be installed. Temporary piping of the stream would be required for the temporary bridge. This would result in a temporary significant adverse impact to the flora and fauna that might utilize this section of Mine Brook. Following construction of the permanent roadway over Mine Brook, the affected stream channel would be re-engineered to create natural stream morphology complete with pool and riffle dynamics that would attenuate stream velocities and improve water quality.

Erosion and Sedimentation Control. The potential for soil erosion during construction is increased when the soil is cleared of its vegetation, excavated, and stockpiled, thereby exposing loose soil to the direct impacts of rainwater and wind. The magnitude of the excavation and construction activities associated with the proposed UV Facility would result in substantial areas of the site being temporarily cleared, excavated and portions of it being used for soil stockpiling. Further, based on the construction durations the potential exposure of the cleared and stockpiled site to rainwater and wind is also potentially significant.

A detailed erosion control plan would be specified for each of the construction contracts and cover all activities conducted at the construction site to minimize and reduce the potential short- and long-term erosion impacts on the watershed streams and wetlands.

For example, work activities and clearing limits would be determined as part of the construction documents; no vegetation outside these limits would be disturbed. Also, no stockpiling of excavated material would be allowed in a manner that would cause erosion. “Stop work” orders would be issued to the contractor if erosion control measures were not properly installed and maintained after such contractor has been given a reasonable amount of time to correct the problem. An allotment item would be set up in each contract to provide a budget for maintenance as needed by the contractor at the direction of the resident engineer, which would enable the proper maintenance of the erosion control measures.

Another proposed technique to control erosion during construction is by using temporary sediment traps and/or temporary sediment basins. A temporary sediment trap is a settling area created by constructing an earthen embankment with a stone outlet. The purpose is to detain sediment-laden runoff from small disturbed areas (generally less than three acres), allowing the majority of the sediment to settle out. A temporary sediment basin is a barrier or dam with a controlled stormwater release structure formed by constructing an embankment of compacted soil across a drainage way. The purpose is to detain sediment-laden runoff from disturbed areas larger than those upstream of traps, generally three acres or greater. These measures can be supplemented with sediment filters in a downstream location.

Any low-lying areas along the edge of the construction limit are excellent locations for these erosion control facilities, since they are at low elevations in the watershed and would subsequently be restored. As part of the project’s final design documents, NYCDEP would identify locations, as appropriate, for the construction of sediment basins that may be outside the proposed BMP location. In each case, the sediment traps, basins, and/or filters would stay in place until the construction activity is complete and the ground surface stabilized. During their use, sediment traps require frequent maintenance; typically, when they are 50 percent or more full of silt, they must be cleaned. Silt intercepted by basins and filters must also be removed, especially after storms.

Another important erosion-control measure is temporary seeding or the establishment of a temporary vegetative cover on disturbed areas or soil stockpile areas by seeding with appropriate, rapidly growing annual plants. This measure provides protection to exposed soils during construction until permanent vegetation or other erosion-control measures can be established.

In sum, measures that are proposed to be part of the construction documents for erosion and sedimentation control would include:

- Installing a construction-limiting fence;
- Using portable sediment tanks during dewatering;
- Constructing temporary sediment traps and/or basins at appropriate locations to capture sediment from runoff and from water produced by dewatering operations, with sediment filters at the exit channel to further treat sediment-laden water;
- Using block and gravel curb inlet sediment filters and gravel and wire mesh drop inlet sediment filters to protect existing stormwater inlets;
- Constructing a temporary sump pit;
- Controlling sediment from areas traversed by trucks and other heavy equipment by constructing temporary construction accessways covered which would be with properly sized stone over filtering material; and
- Prior to the start of construction activities, all erosion control measures would be inspected and continually monitored, especially after each storm event.

These measures are recommended to help prevent soil erosion from construction activities. The construction contract should require the prospective contractor to hire a certified sediment and erosion control specialist and prepare a detailed sediment and erosion control plan in addition to the Stormwater Pollution Prevention Plan.

Stormwater Runoff. The stormwater controls for construction of the proposed facility would incorporate measures specified by Westchester County,[8] New York State[9], NYCDEP and USEPA[10]. Stabilization and structural best management practices (BMPs) would be included in the project design to dissipate peak flows to avoid on-site erosion, and that total storm volumes would be maintained on surface water, and wetland hydrology.

The sedimentation and erosion controls and stormwater management practices as described earlier would be employed to minimize erosion, and prevent sedimentation of Mine Brook and adjacent wetlands. Control measures would include stabilization of disturbed areas, and structural controls to divert runoff and remove sediment. In addition to managing stormwater runoff and erosion, BMPs measures would be implemented to prevent accidental releases of fuels, lubricating fluids, or other hazardous materials from construction supplies and equipment.

Groundwater. For the proposed facility groundwater flow, simulations were run with the assumption that construction dewatering would affect the proposed footprint and the surrounding area. Groundwater flow model simulations were performed by assuming a dewatering elevation of 300 feet over an area of approximately 11 acres in size. This area is much greater than that of

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[8] Westchester County Department of Planning. 1984.

[9] New York State Department of Environmental Conservation. State Pollution Discharge Elimination System (SPDES); General Permit; NYS Stormwater Management Design Manual (August 2003); and NYS Guidelines for Urban Erosion & Sediment Control.

[10] Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices (EPA B32-R-92-005)

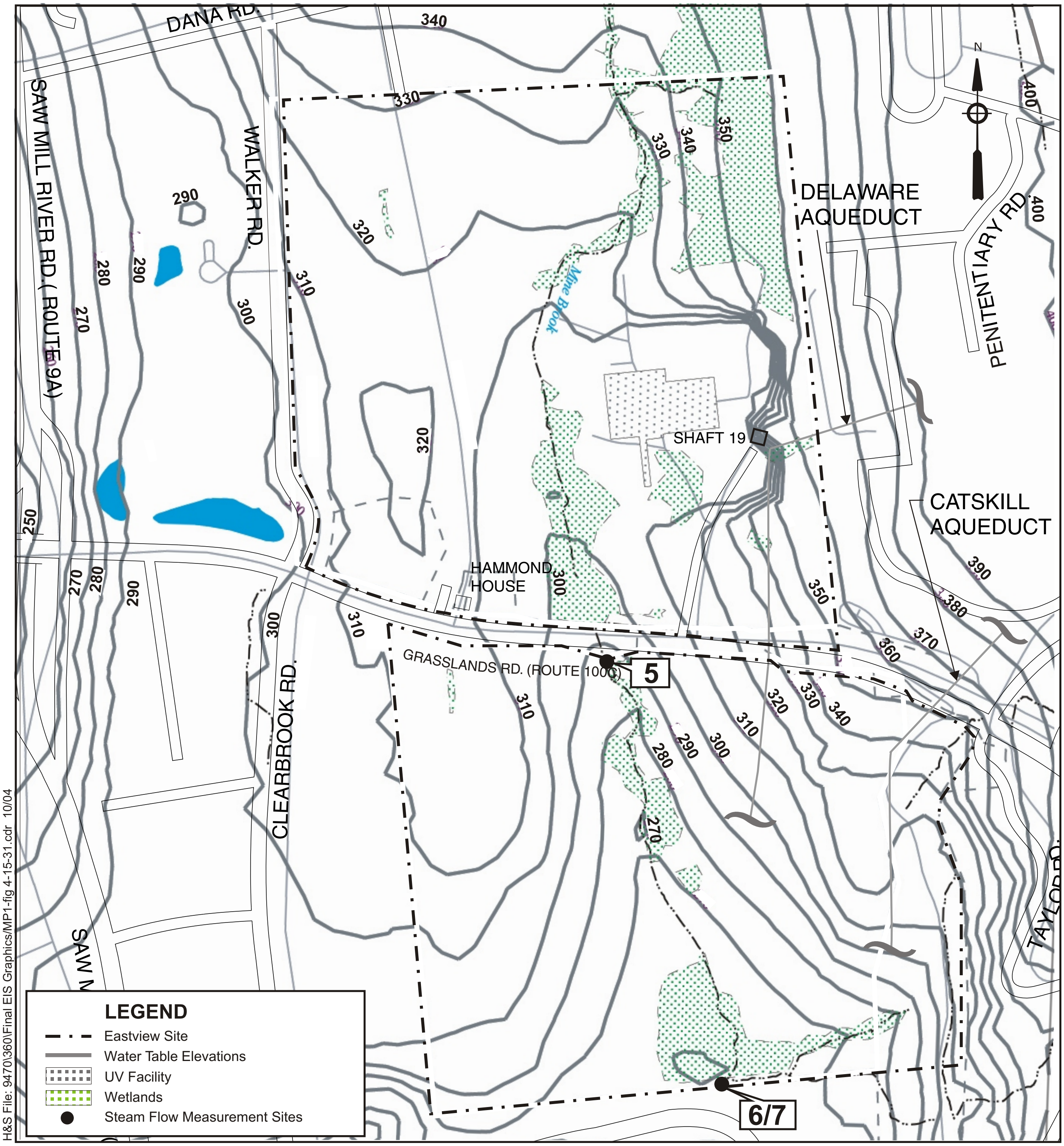
the buildings footprint, and as such this simulation provides a worst-case estimate of the potential construction dewatering impacts.

Steady state and transient simulations of the proposed facility were performed by not allowing the groundwater elevation in the construction area to exceed 300 foot elevation. Average water table elevations, water table drawdowns, dewatering flow rates and groundwater base flow to Mine Brook were estimated based on the steady state simulation results. Transient simulation results were used to evaluate potential changes in depth to the water table that may occur over the course of a typical year.

Figure 4.15-31 shows the simulated steady state water table elevations under the construction conditions. The effects of the dewatering system for the construction of the proposed facility structures are evident in the tightly spaced contours surrounding the construction area. In particular, the steep gradients to the east of the construction area reflect the relatively low hydraulic conductivity of the till. Also, the simulated bedrock flow provides sufficient influx to the overburden to contribute to the relatively steep gradients. In general, the water table impacts are restricted to the immediate area surrounding and including the excavation dewatering area. However, the impacted area is significantly larger than for the main disinfection building, and the construction dewatering elevations are lower than the post-construction drains. Therefore, the water table impacts are spread over a larger area during construction than following excavation and construction.

The simulated dewatering rate required to maintain the groundwater elevation at 300 feet over the construction area is 27 gpm. The simulated groundwater base flows at Sites 5 and 6/7 are 55 gpm and 119 gpm, respectively. The simulated base flow reduction at Site 5 was approximately 30 percent, and about 17 percent at Site 6/7. Site 5 is located where Mine Brook flows through the culvert beneath Route 100C, and thus the flows measured there represent the complete groundwater and surface water drainage from the north parcel and its contributing off-site areas. Site 6/7 is located on the south parcel, in the area where a tributary joins Mine Brook. The Site 6/7 flow-measurement is derived from two separate flow stations (Sites 6 and 7) with the combined flow representing the total flow in Mine Brook at the southernmost on-site station. Flows from Site 6/7 therefore provide the best available data for describing the total groundwater and surface water drainage from the Eastview Site, before Mine Brook flows off-site towards is ultimate discharge into the Saw Mill River.

Simulated steady state water table drawdown is shown in Figure 4.15-32. The simulated one-foot drawdown line extends west towards Mine Brook, south approximately to Route 100C and north into the southernmost portion of the northeast wetland. This indicates that it is likely that the construction dewatering activities would lower the water table enough to impact the wetlands along Mine Brook on the north parcel and in limited portions of the northeast wetland. The wetlands south of Route 100C are not likely to be impacted by dewatering effects on groundwater.



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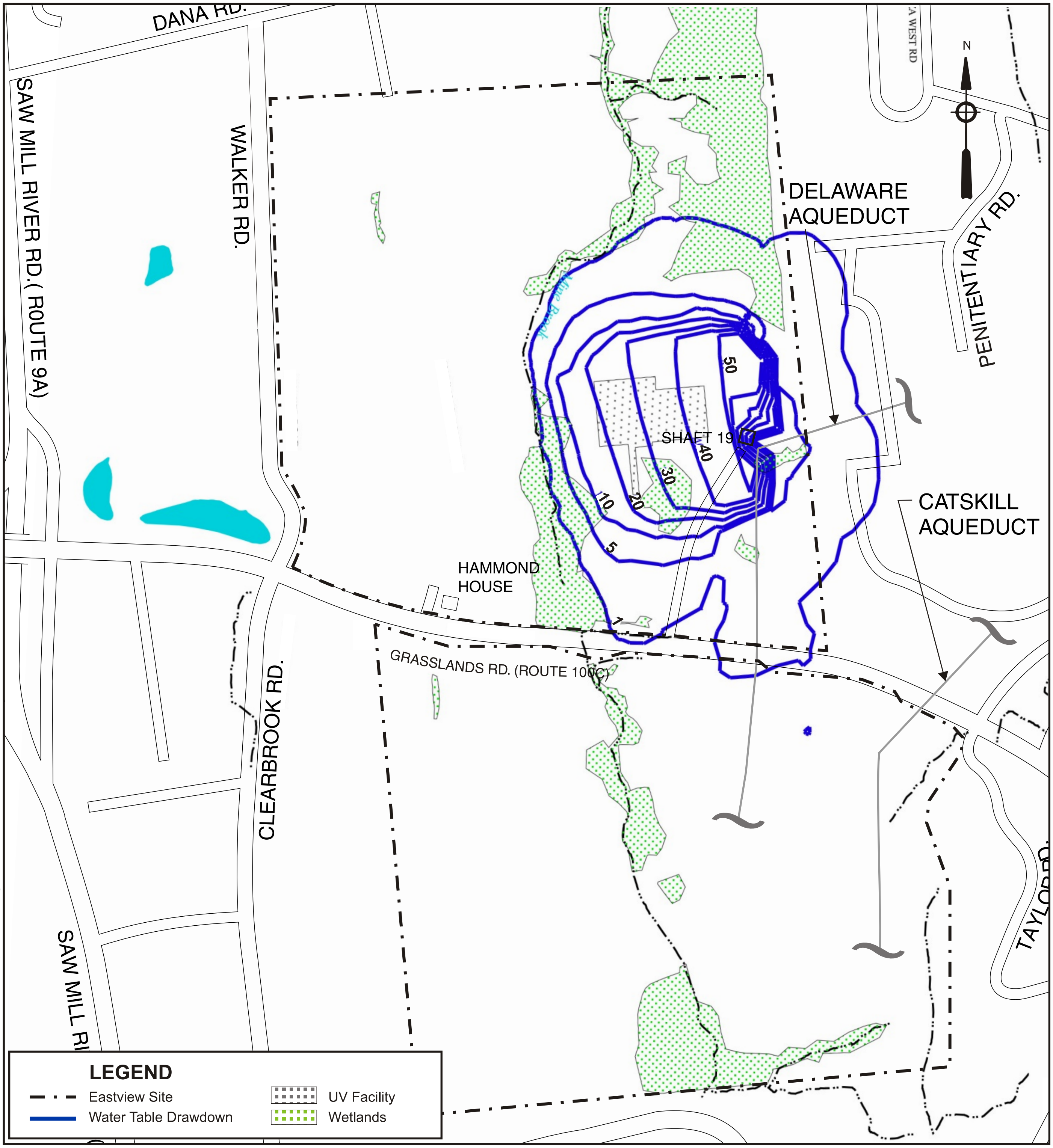
Simulated Water Table Elevations for UV Facility During Construction

Catskill/Delaware UV Facility

Figure 4.15-31



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Simulated Water Table Drawdown for UV Facility During Construction

Catskill/Delaware UV Facility

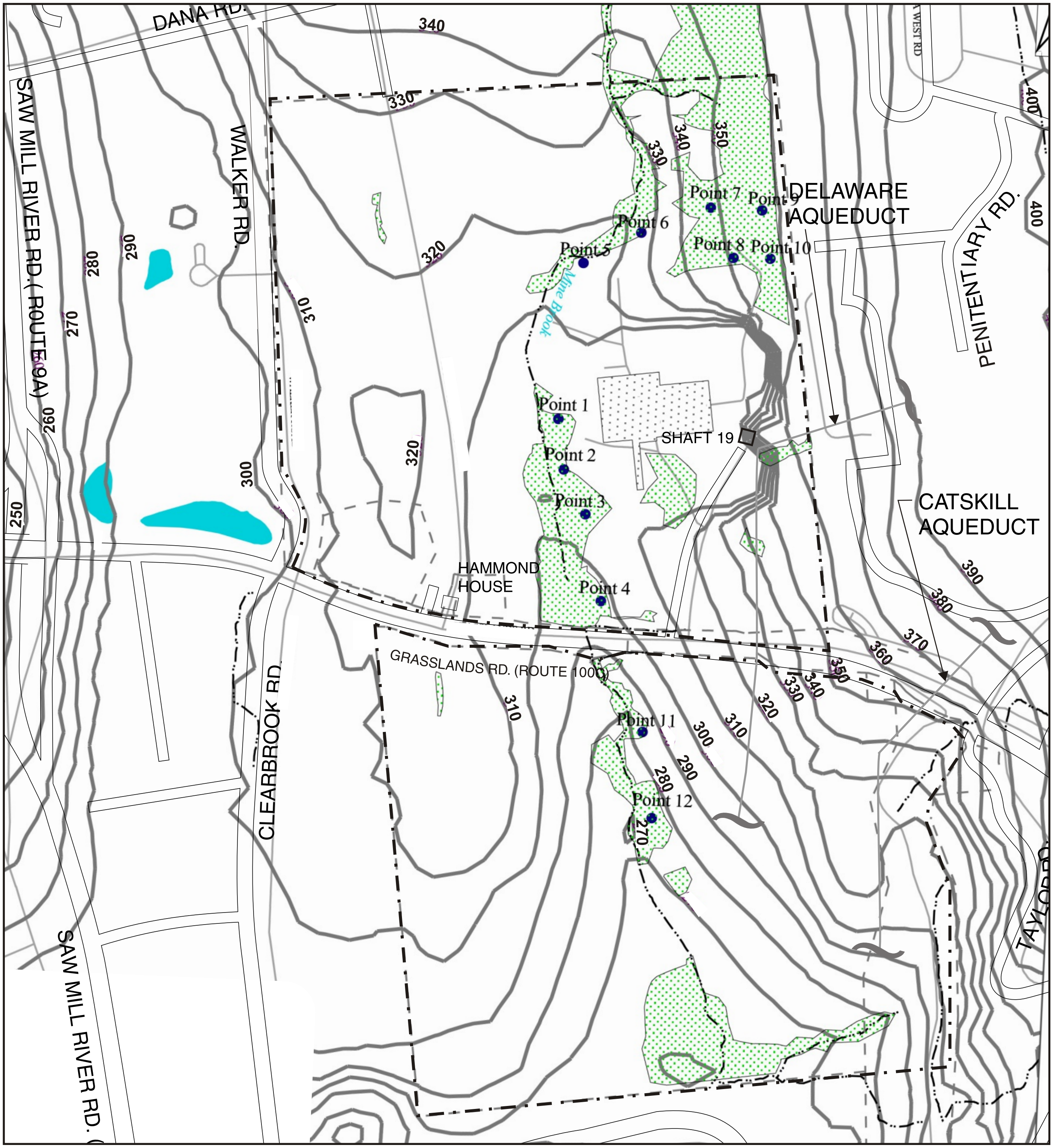
Figure 4.15-32

Most wetland plants require a shallow depth to water to thrive because the root zones of many wetlands plants do not extend more than a few feet below land surface. In order to minimize impacts to wetlands, it is desirable to maintain a maximum two feet depth to water during the April to June growing period in locations where the water table is within two feet of the land surface during baseline conditions.

Figure 4.15-33 shows the locations of the wetland assessment points and Figure 4.15-34 (A through F) presents transient simulation results for these locations within the delineated wetland areas during construction activities of the proposed facility. The graphs show monthly values of simulated depths to the water table for the baseline and construction scenarios. The transient simulation results were reviewed to identify locations where the depths to the water table change from within two feet of land surface during baseline conditions to greater than two feet below land surface during April to June during construction conditions.

Simulation results of construction activities suggest that the water table may drop to more than two feet below land surface during the critical growing season months from April to June at the wetland assessment Points 1, 2 and 3 located west of the proposed UV Facility and shown on Figure 4.15-33 and Figure 4.15-34. In the northwest wetland area along Mine Brook, represented by assessment Points 5 and 6, the water table is also predicted to drop up to two feet. However, baseline simulation results suggest that these locations under existing conditions the depth to water is greater than two feet and as such, the vegetation in these wetlands may not be entirely dependant on groundwater. Similarly in the southwestern portion of the northeast wetland area, shown by wetland assessment Points 7 and 8, the simulated depth to the water table during construction drops approximately one foot during the April to June period, and is greater than two feet from the land surface. At wetland assessment Points 9 and 10, only a limited amount of drawdown is predicted during construction indicating that by and large the simulated changes to the water table due to dewatering activities during construction do not impact the wetland northeast of the facility. This confirms the predominance of the surface water hydrology this wetland. No change from baseline conditions in water table elevations and depths to water was predicted for Points 11 and 12, south of Route 100C, and as a result no impacts to the wetlands south of Route 100C are predicted due to the dewatering activities. Please note that the typically the impact due to construction activities is temporary, however from a water Natural resources perspective the extent and permanence of wetland impacts would be governed in part by the length of the construction period. Section 4.14, Natural Resources provides further discussion of wetlands impacts and potential mitigation measures to minimize the extent of impacts.

Hammond House. The Hammond House has a potable water well located in the southwestern portion of the north parcel and to the west of Mine Brook. The hydrologic modeling used in the groundwater analysis indicates that the Hammond House water well would not be affected by construction dewatering activities on the eastern side of the north parcel.



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LEGEND

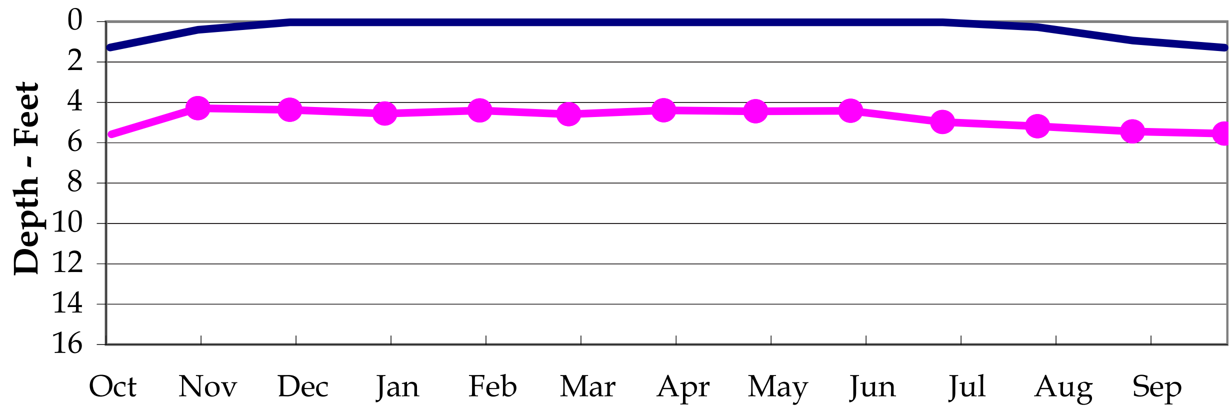
- Eastview Site
- Water Table Elevations
- Wetland Assessment Points
- UV Facility
- Wetlands

Simulated Water Table Elevations with Wetland Assessment Points for UV Facility During Construction

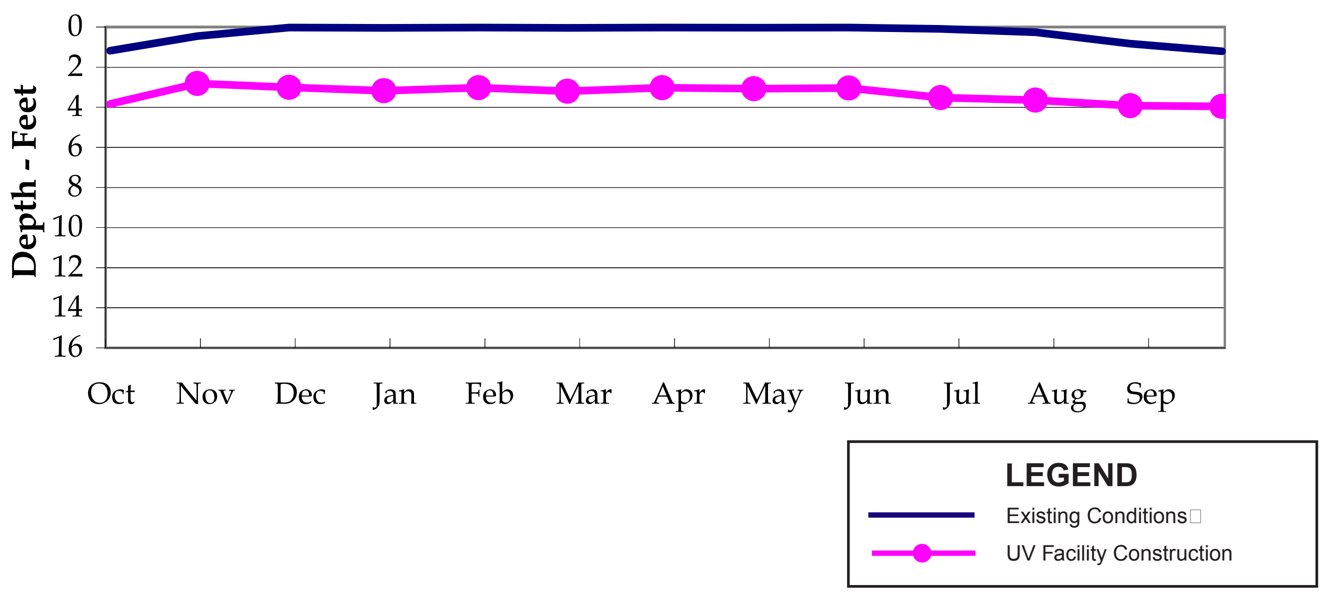
Catskill/Delaware UV Facility

Figure 4.15-33

WETLAND ASSESSMENT POINT 1



WETLAND ASSESSMENT POINT 2



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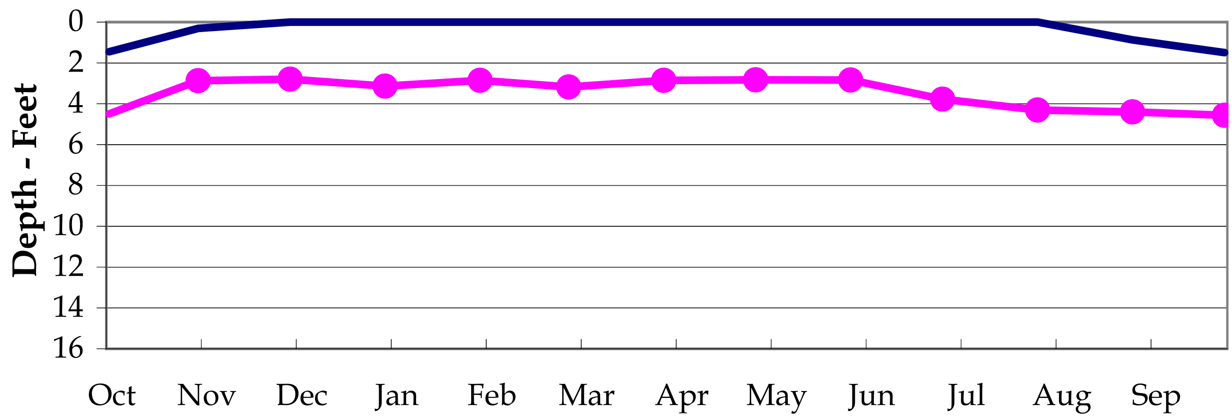
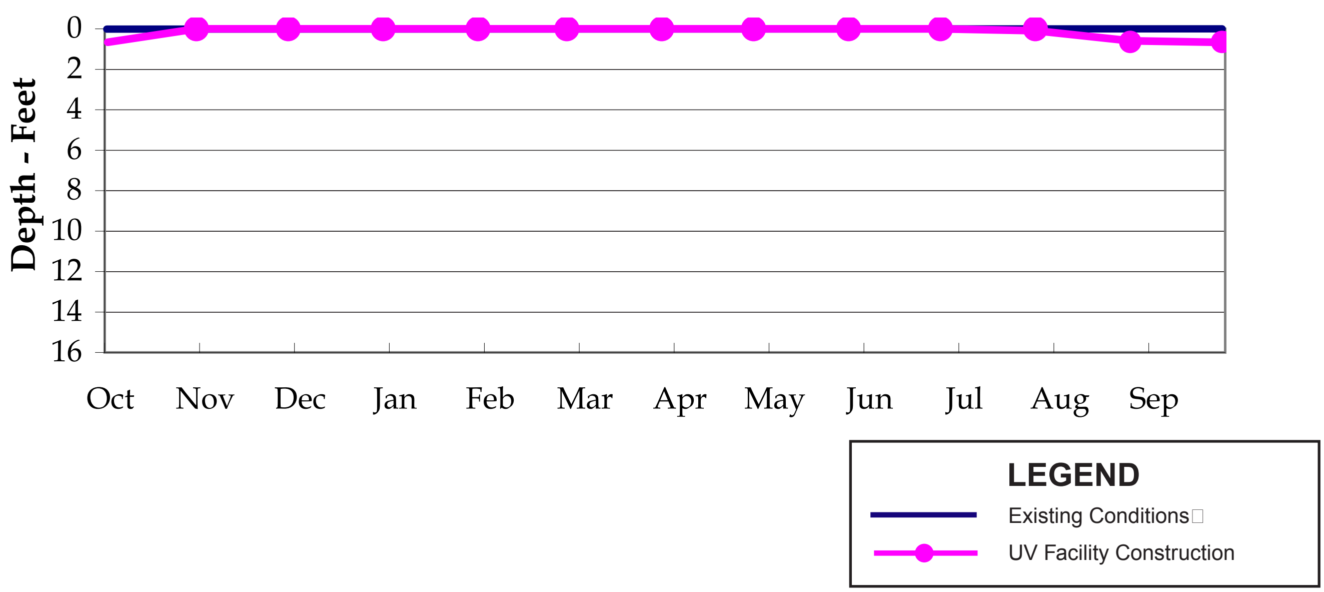
Simulated Monthly Depths to Water Within Delineated Wetland Areas for UV Facility During Construction at Wetland Assessment Points 1-2

Figure 4.15-34a

WETLAND ASSESSMENT POINT 3



WETLAND ASSESSMENT POINT 4



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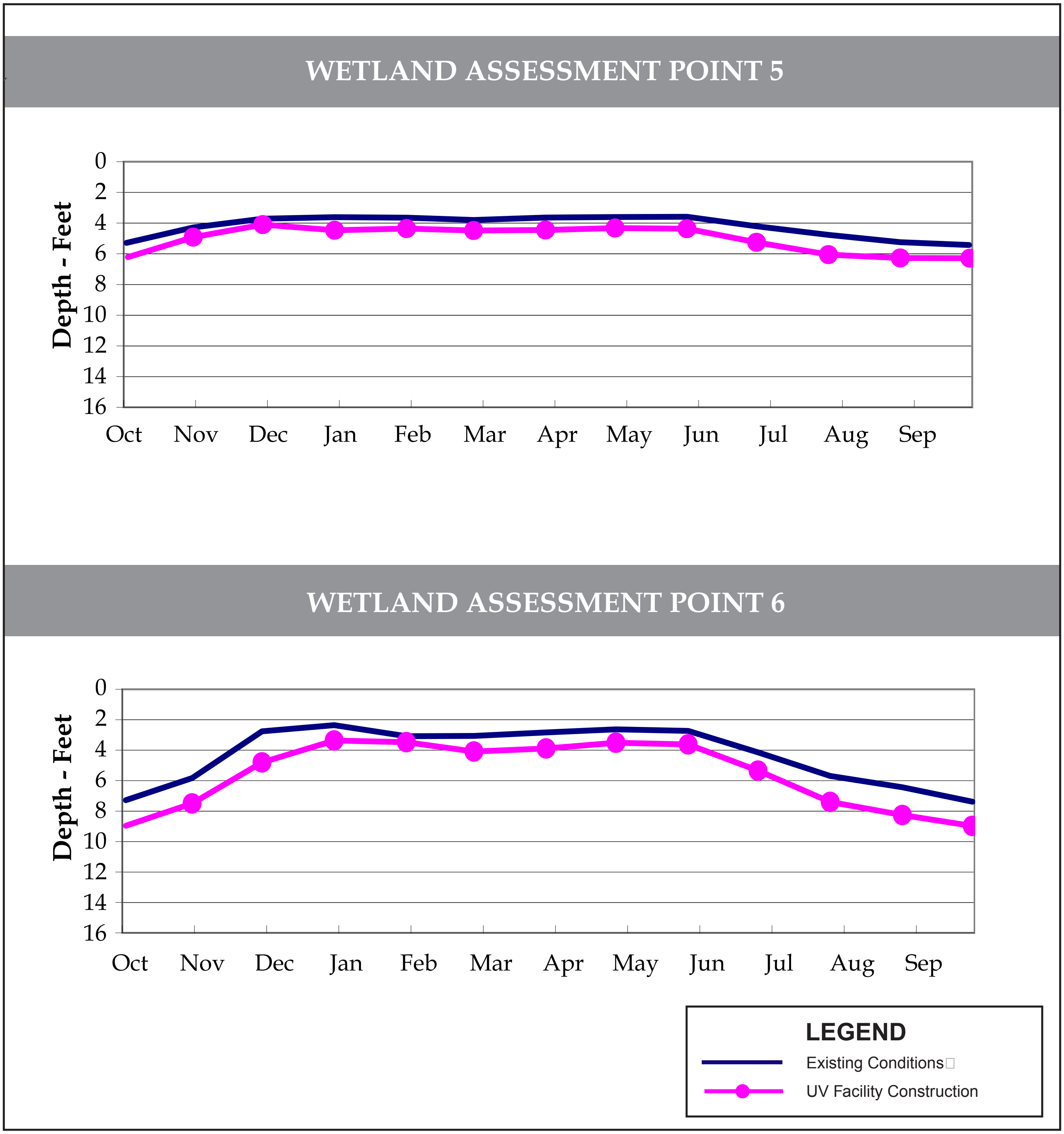
Simulated Monthly Depths to Water Within Delineated Wetland Areas for UV Facility During Construction at Wetland Assessment Points 3-4

Figure 4.15-34b



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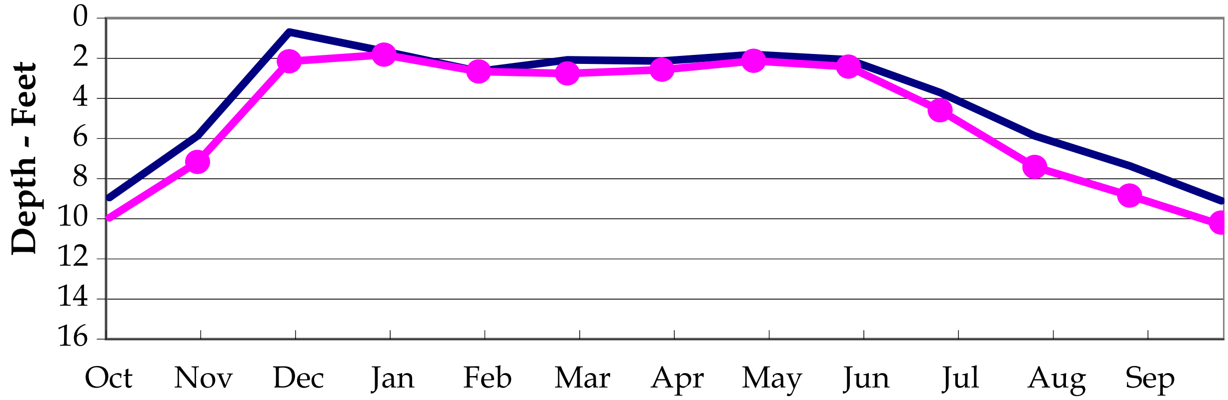
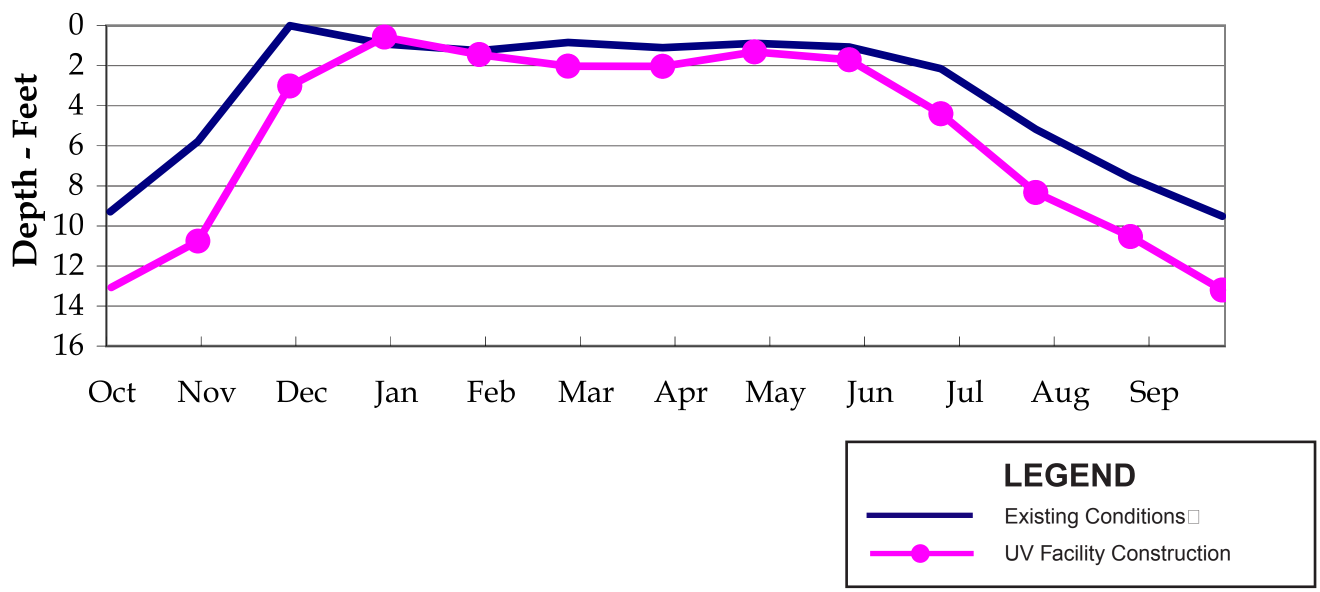
Simulated Monthly Depths to Water Within Delineated Wetland Areas for UV Facility During Construction at Wetland Assessment Points 5-6

Figure 4.15-34c

WETLAND ASSESSMENT POINT 7



WETLAND ASSESSMENT POINT 8



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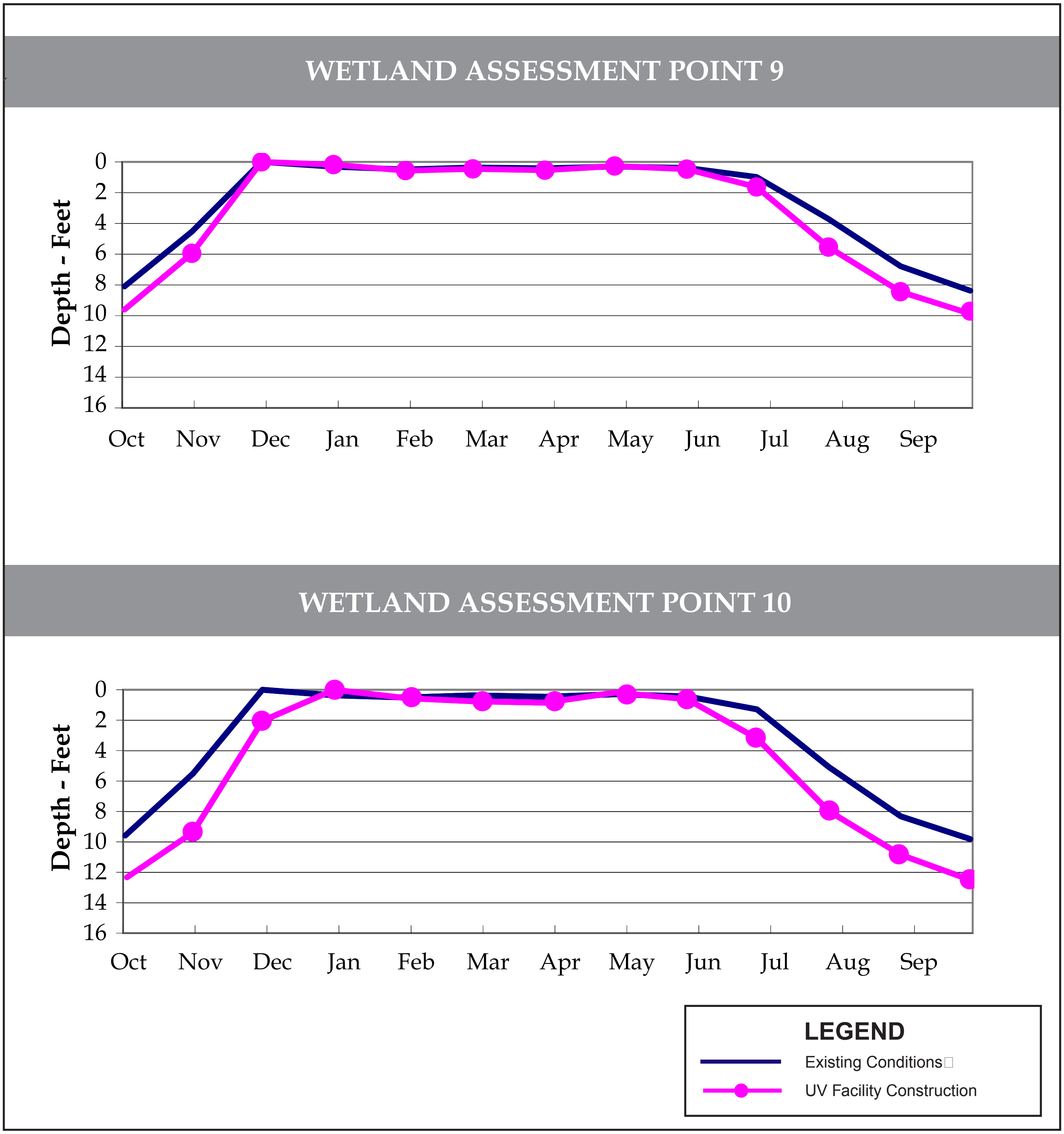
Simulated Monthly Depths to Water Within Delineated Wetland Areas for UV Facility During Construction at Wetland Assessment Points 7-8



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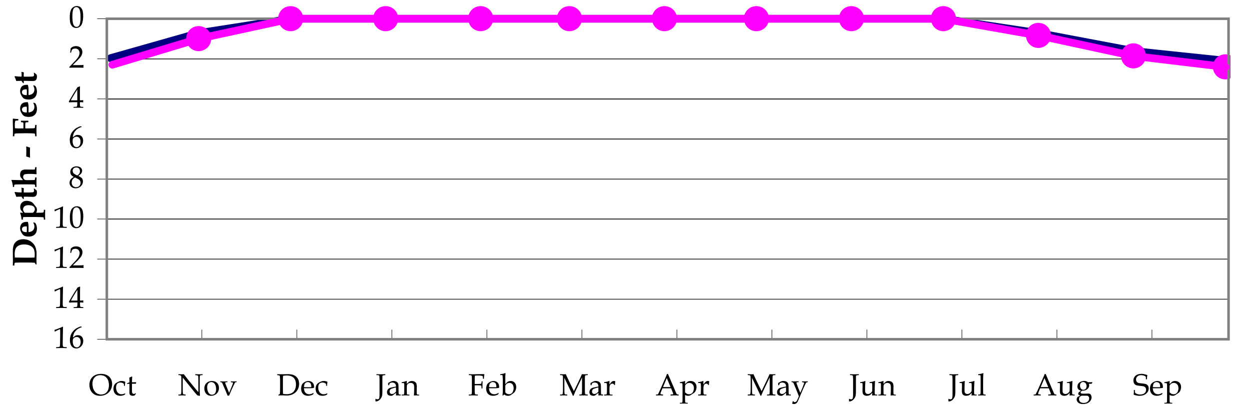
Simulated Monthly Depths to Water Within Delineated Wetland Areas for UV Facility During Construction at Wetland Assessment Points 9-10

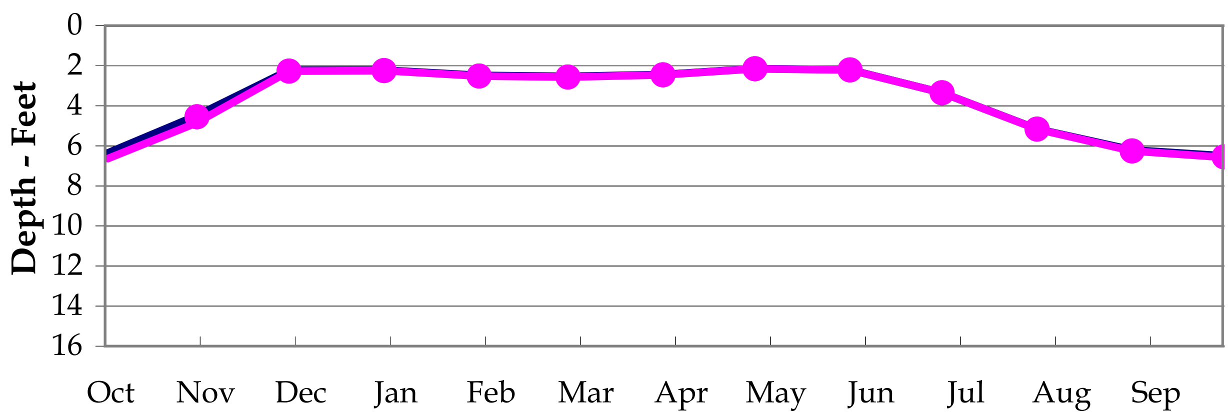
Catskill/Delaware UV Facility

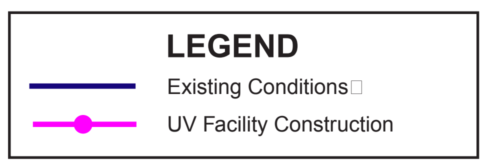
Figure 4.15-34e

WETLAND MONITORING POINT 11



WETLAND MONITORING POINT 12





Simulated Monthly Depths to Water Within Delineated Wetland Areas for UV Facility During Construction at Wetland Assessment Points 11-12

Figure 4.15-34f

4.15.3.2.2. With the Croton Project at Eastview Site

Surface Water. The principal concern during construction activities at the Eastview Site on surface water quality is turbidity, which could come from several sources, including large unprotected excavations, stockpiled soils, stream diversions and sediment from groundwater and stormwater dewatering effluents. As previously mentioned, contractors for the Croton project and the additional proposed UV Facility would institute several practices to avoid potential impacts to the Mine Brook. These practices would include sediment basins to settle out residuals from the dewatering activities prior to discharge and erosion and sedimentation control measures, such as: installing a construction-limiting fence; portable sediment tanks during dewatering; using block and gravel curb inlet sediment filters and gravel and wire mesh drop inlet sediment filters to protect existing stormwater inlets; constructing a temporary sump pit; and constructing temporary construction accessways covered with properly sized stone over filtering material.

Stormwater Runoff. The stormwater controls for construction of the Croton project and the proposed facility would incorporate measures specified by Westchester County,[11] New York State[12], NYCDEP and USEPA[13]. Stabilization and structural best management practices (BMPs) would be included in the project design to dissipate peak flows to avoid on-site erosion, and that total storm volumes would be maintained on surface water, and wetland hydrology.

The sedimentation and erosion controls and stormwater management practices would be employed to minimize erosion, and prevent sedimentation of Mine Brook and adjacent wetlands. Control measures would include stabilization of disturbed areas, and structural controls to divert runoff and remove sediment. In addition to managing stormwater runoff and erosion, BMPs measures would be implemented to prevent accidental releases of fuels, lubricating fluids, or other hazardous materials.

Groundwater. Steady state and transient simulations were performed to evaluate the potential impacts of concurrent projects (Croton project with the proposed UV Facility) during peak construction (2010). Both groundwater simulations were run for a target water table elevation of 300 feet at the proposed UV Facility and 313 feet at the Croton project.

Figure 4.15-35 shows the simulated steady state water table elevations for the concurrent projects. The effects of the dewatering systems for the construction of the proposed facility structures and for the Croton project are evident in the tightly spaced contours surrounding the construction area. In particular, the steep gradients to the east of the proposed UV Facility construction area reflect the relatively low hydraulic conductivity of the till. Also, the simulated bedrock flow provides sufficient influx to the overburden to contribute to the relatively steep gradients. In general, for both the proposed facility and the Croton project, the water table

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[11] Westchester County Department of Planning. 1984.

[12] New York State Department of Environmental Conservation. State Pollution Discharge Elimination System (SPDES). 2003.

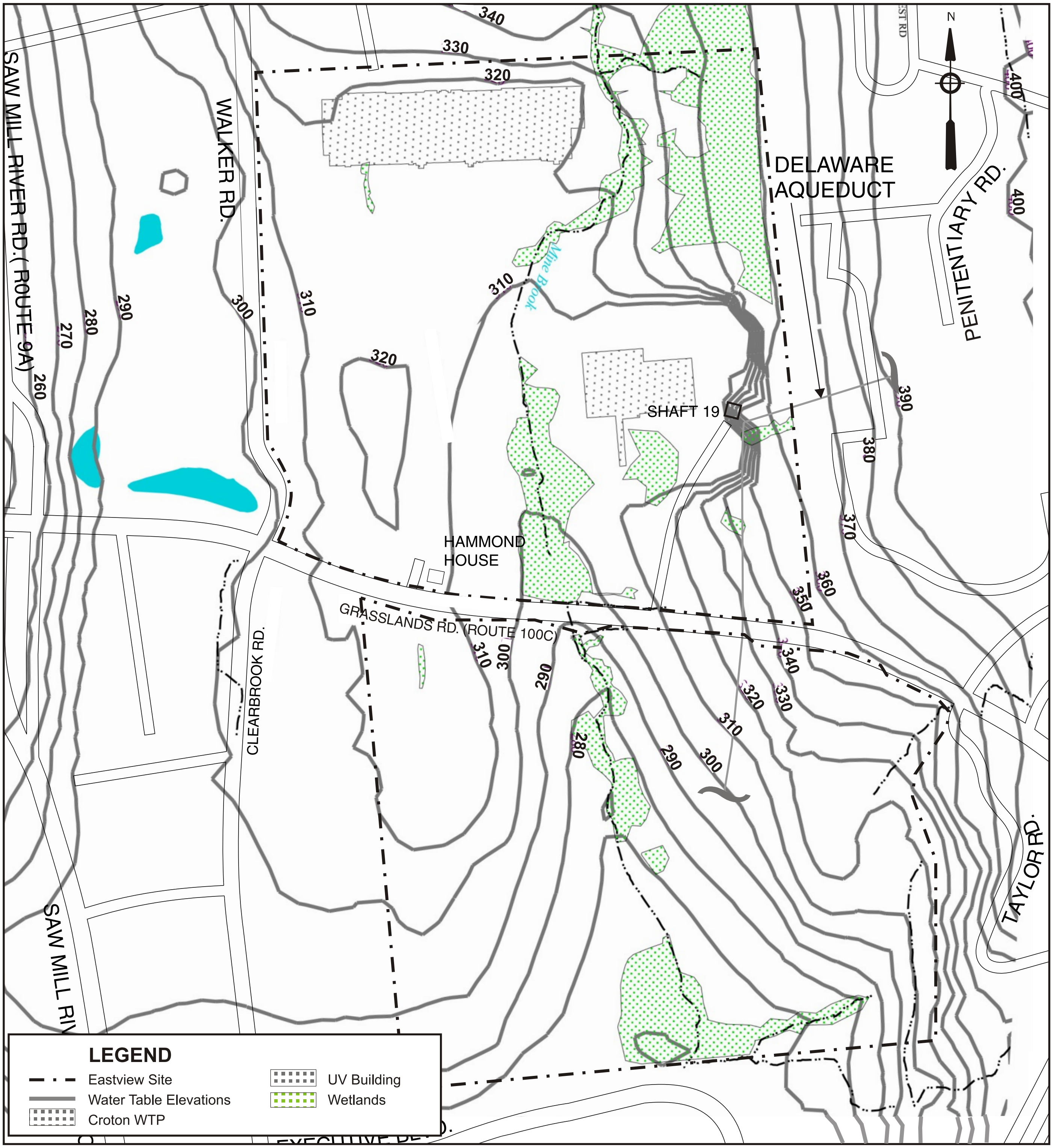
[13] Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices (EPA B32-R-92-005)

impacts are restricted to the immediate areas surrounding and including the excavation dewatering areas. However, these areas are significantly larger than for the main disinfection building or the Croton project, and the construction dewatering elevations are lower than the post-construction drains. Therefore, the water table impacts are spread over a larger area during construction than following excavation and construction.

The simulated dewatering rate for the proposed facility would be 26 gpm and the Croton project would be 14 gpm. The simulated groundwater base flow at Sites 5 and 6/7 are 43 gpm and 108 gpm, respectively. The simulated base flow reduction at Site 5 was approximately 45 percent, and about 25 percent at Site 6/7. Site 5 is located where Mine Brook flows through the culvert beneath Route 100C, and thus the flows measured there represent the complete groundwater and surface water drainage from the north parcel and its contributing off-site areas. Site 6/7 is located on the south parcel, in the area where a tributary joins Mine Brook. The Site 6/7 flow-measurement is derived from two separate flow stations (Sites 6 and 7) with the combined flow representing the total flow in Mine Brook at the southernmost on-site station. Flows from Site 6/7 therefore provide the best available data for describing the total groundwater and surface water drainage from the Eastview Site, before Mine Brook flows off-site towards its ultimate discharge into the Saw Mill River.

Simulated steady state water table drawdown from baseline conditions is shown in Figure 4.15-36. The one-foot drawdown line extends west to Mine Brook, south approximately to Route 100C and north into the southernmost portion of the northeastern wetland. The water table drawdown associated with the Croton project, as delineated by the one-foot drawdown line, extends close to Mine Brook to the east. This indicates that it is likely that the construction dewatering would create wetlands impacts, in terms of depth to water increases, in the wetlands along Mine Brook on the north parcel, and in limited portions of the northeast wetland. The wetlands south of Route 100C are not likely to be impacted by dewatering effects on groundwater.

Most wetland plants require a shallow depth to water to thrive because the root zones of many wetlands plants do not extend more than a few feet below land surface. In order to minimize impacts to wetlands, it is desirable to maintain a maximum two feet depth to water during the April to June growing period in locations where the water table is within two feet of the land surface during baseline conditions.



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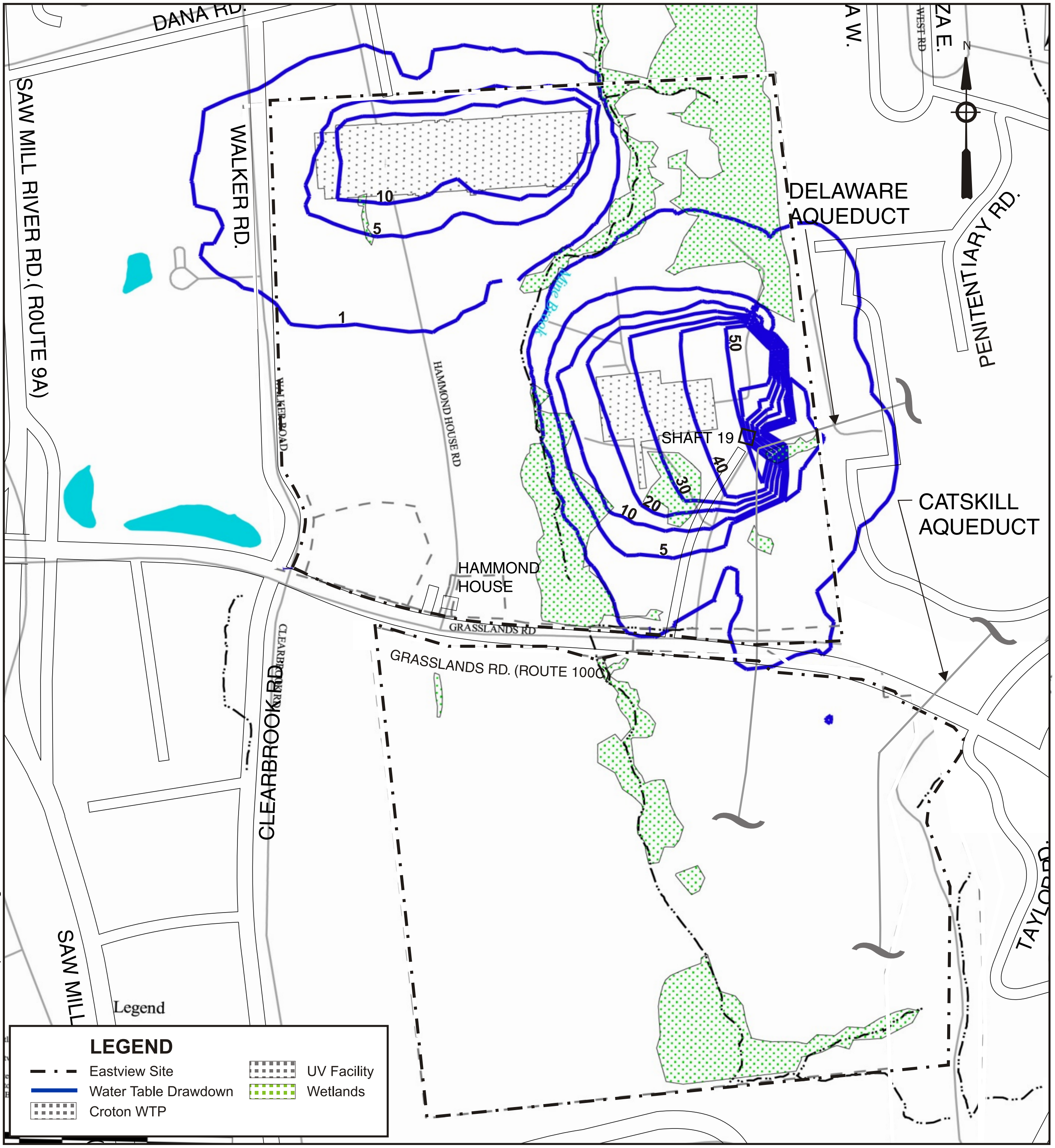
Simulated Water Table Elevations for Croton with UV Facility During Construction

Catskill/Delaware UV Facility

Figure 4.15-35



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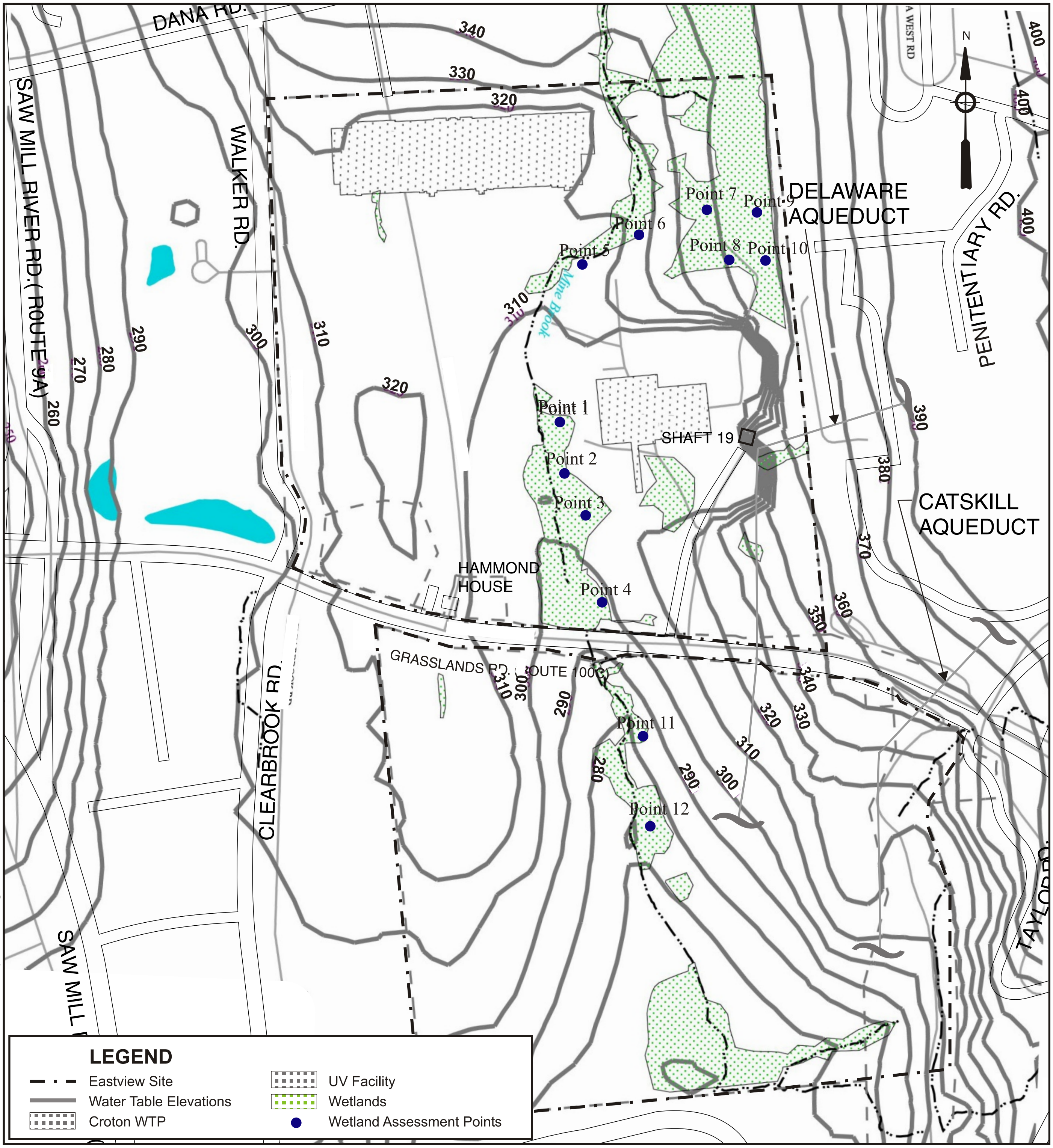
Simulated Water Table Drawdown for Croton with UV Facility During Construction

Catskill/Delaware UV Facility

Figure 4.15-36

Figure 4.15-37 shows the locations of the wetland assessment points and Figure 4.15-38 (A through F) presents transient simulation results for these locations within the delineated wetland areas during construction activities for the Croton project with the proposed facility. The graphs show monthly values of simulated depths to water for the baseline and construction scenarios. The transient simulation results were reviewed to identify locations where depths to water change from within two feet of land surface during baseline conditions to greater than two feet below land surface during construction conditions for the April to June period.

Simulation results of combined construction projects suggest that the water table may drop to more than two feet below land surface during the critical growing season months April to June at the wetland assessment Points 1, 2 and 3 located west of the main disinfection building and shown on Figure 4.15-37 and Figure 4.15-38. In the northwest wetland area along Mine Brook, represented by assessment Points 5 and 6, the water table is predicted to drop up to two feet from its position during baseline conditions. At Points 5 and 6 the existing condition depth to water is two feet or greater; as such vegetation near these points may already be accustomed to a greater depth to water. In the southwestern portion of the northeast wetland area, shown by Points 7 and 8, the simulated water table falls just below the two-foot depth-to-water criterion during April to June. At Points 9 and 10, representing the southeastern portion of this wetland area, a limited amount of drawdown is predicted, but this is more than occurred in the simulations for the facility operation scenario. Points 11 and 12, south of Route 100C, are in wetlands that are not predicted to be impacted by water table declines. The extent and permanence of wetland impacts, predicted at all of the assessment Points except south of Route 100C, would be governed in part by the length of the construction period. Section 4.14, Natural Resources provides further discussion of wetlands impacts and potential mitigation measures to minimize the extent of impacts.



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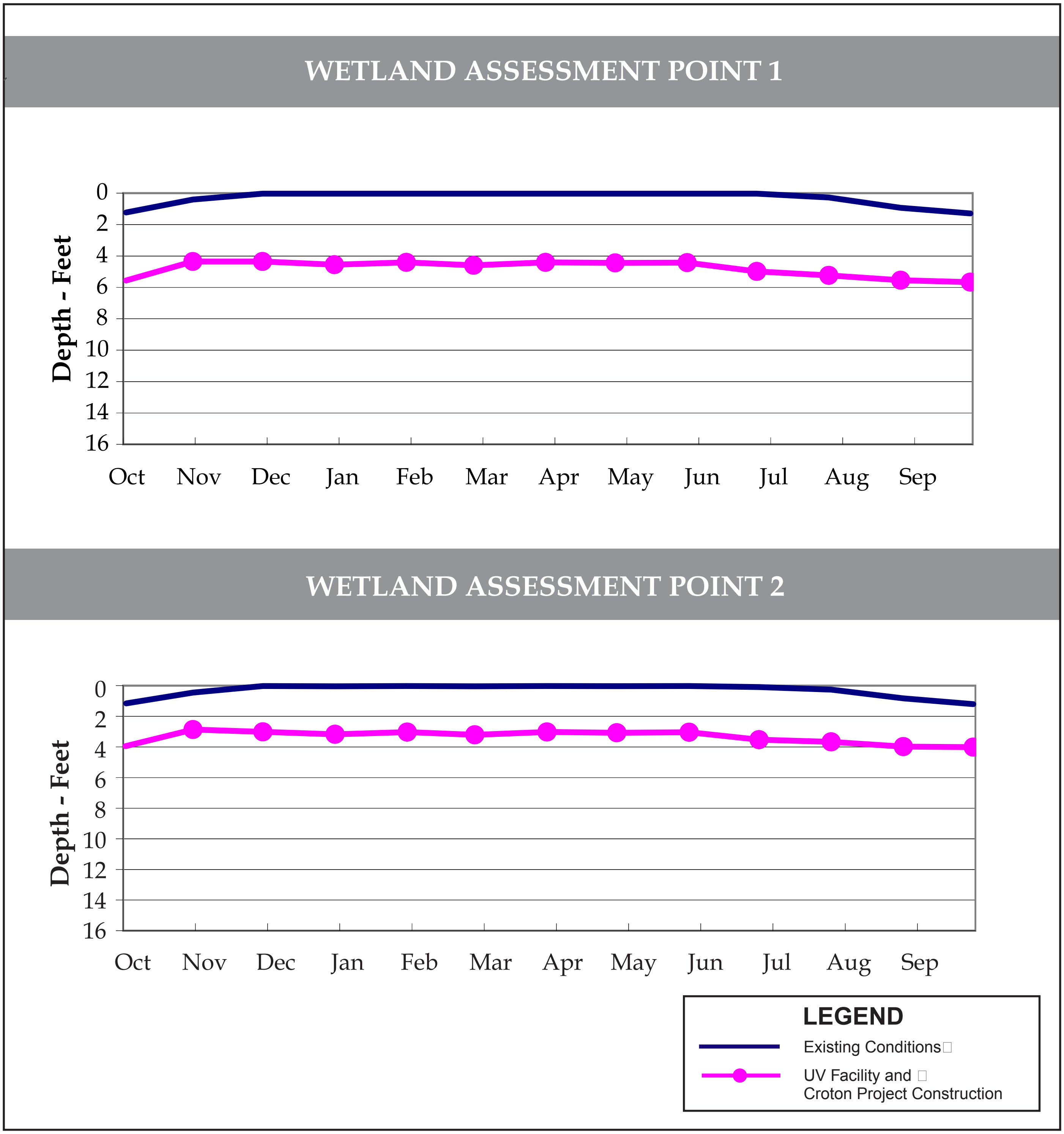
Simulated Water Table Elevation with Wetland Assessment Points for Croton Project with UV Facility During Construction

Catskill/Delaware UV Facility

Figure 4.15-37



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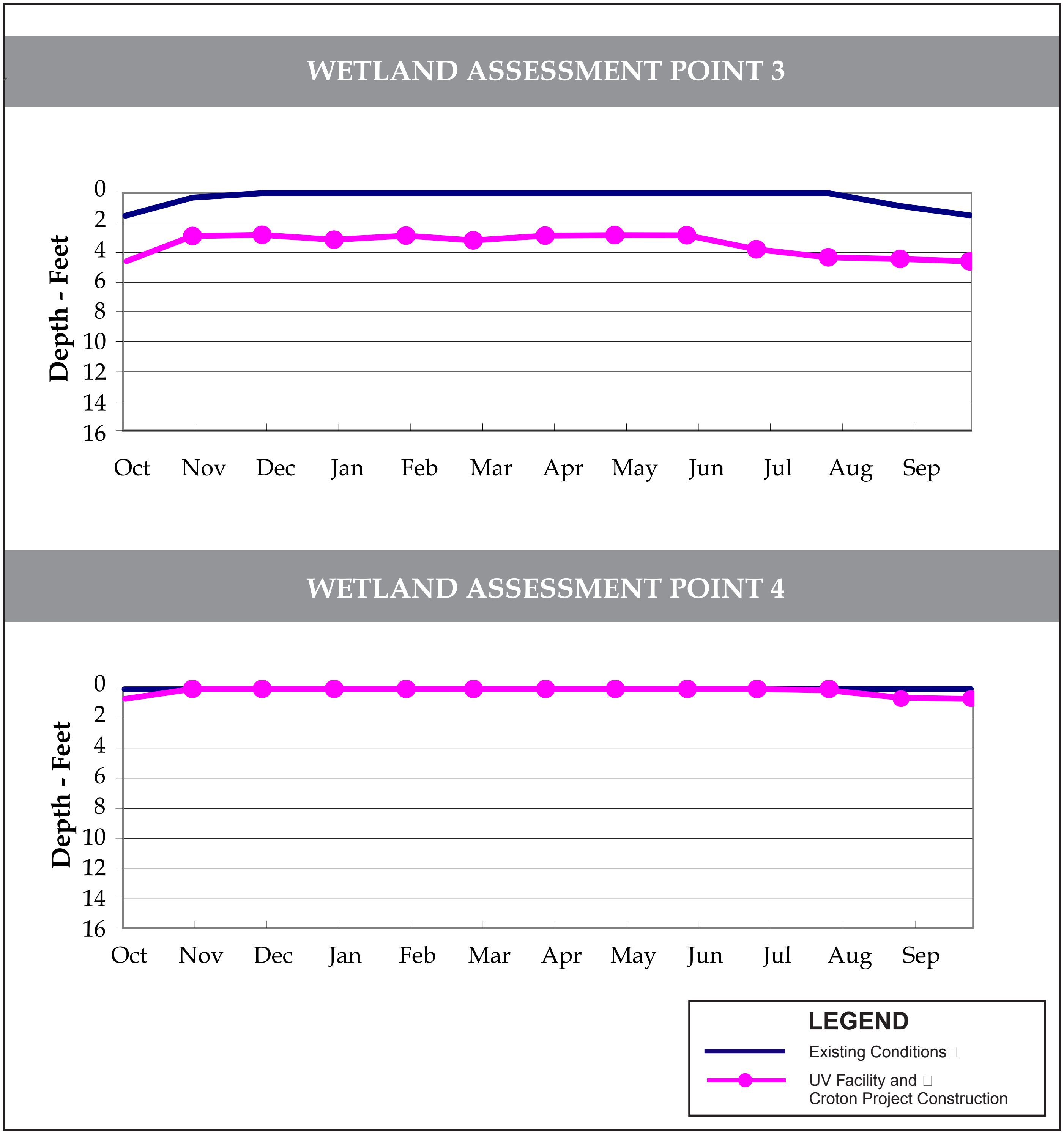
Simulated Monthly Depths to Water Within Delineated Wetland Areas for Croton Project With UV Facility During Construction at Wetland Assessment Points 1-2

Catskill/Delaware UV Facility

Figure 4.15-38a



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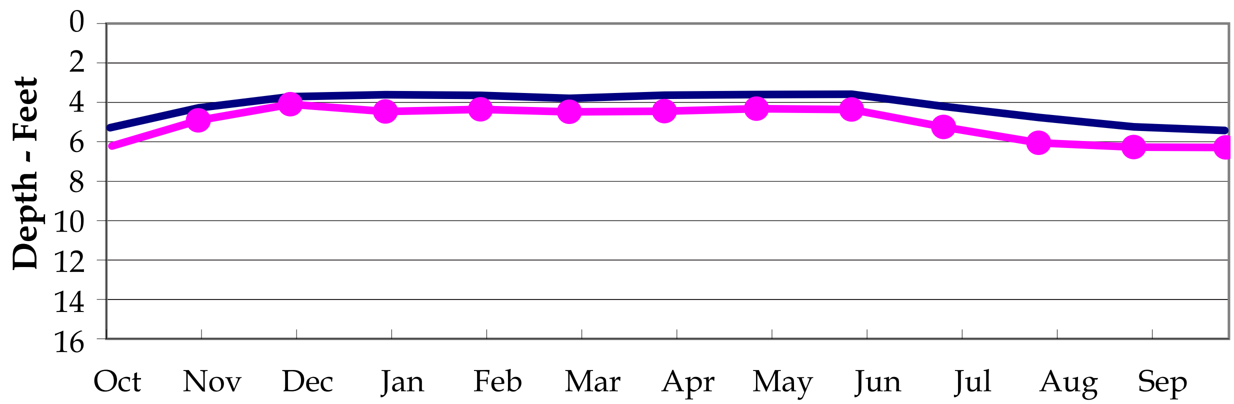
Simulated Monthly Depths to Water Within Delineated Wetland Areas for Croton Project With UV Facility During Construction at Wetland Assessment Points 3-4

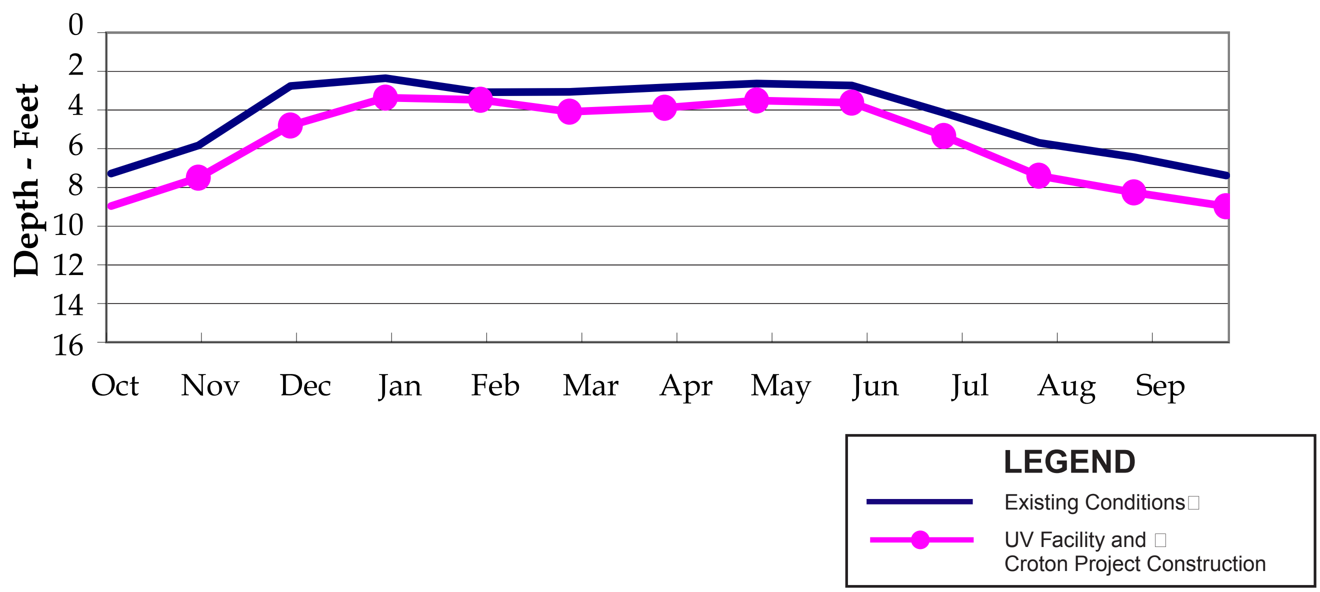
Catskill/Delaware UV Facility

Figure 4.15-38b

WETLAND ASSESSMENT POINT 5



WETLAND ASSESSMENT POINT 6



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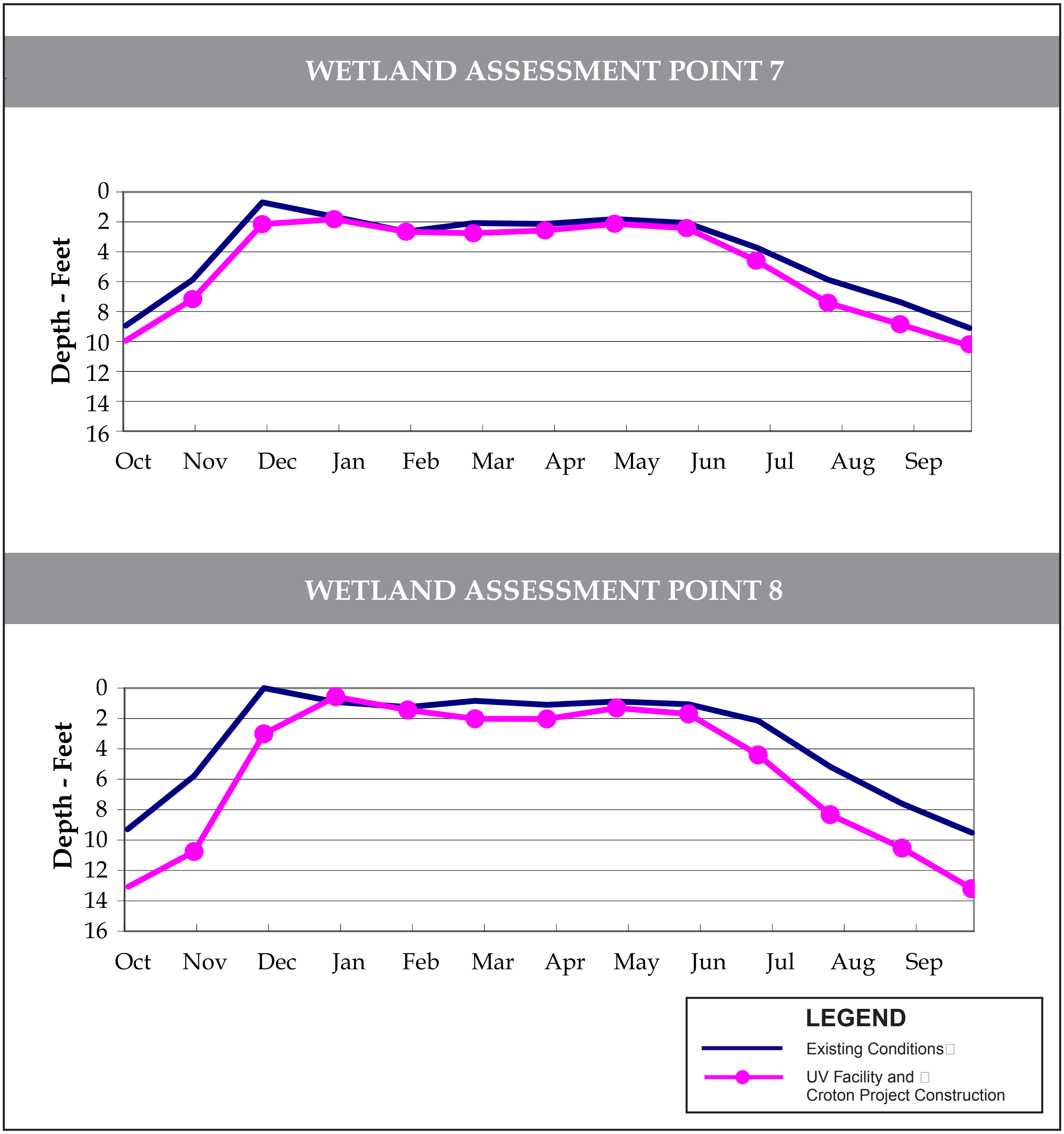
Simulated Monthly Depths to Water Within Delineated Wetland Areas for Croton Project With UV Facility During Construction at Wetland Assessment Points 5-6

Figure 4.15-38c



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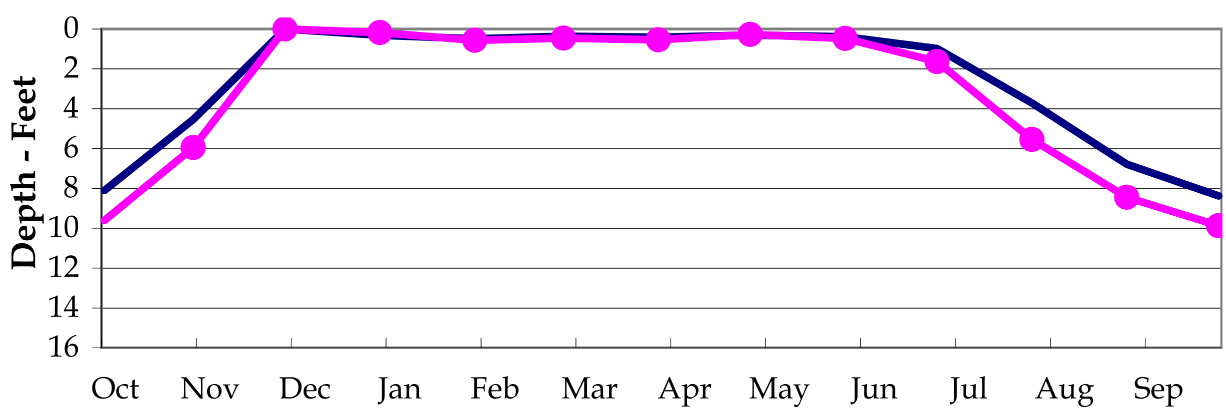
Simulated Monthly Depths to Water Within Delineated Wetland Areas for Croton Project With UV Facility During Construction at Wetland Assessment Points 7-8

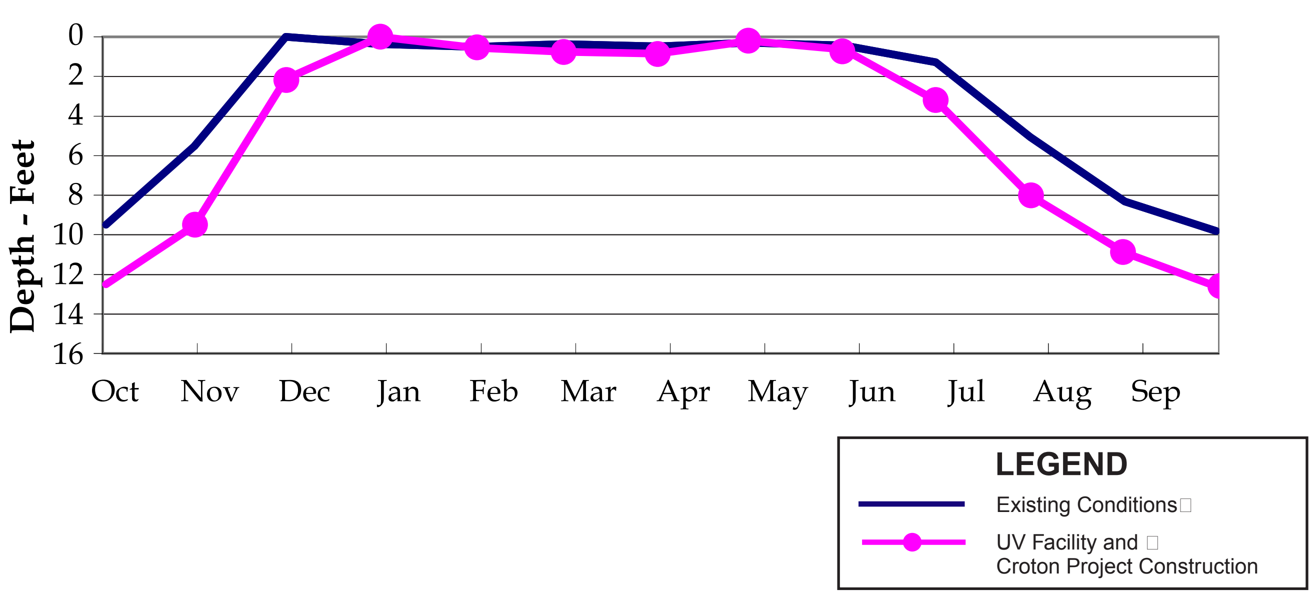
Catskill/Delaware UV Facility

Figure 4.15-38d

WETLAND ASSESSMENT POINT 9



WETLAND ASSESSMENT POINT 10



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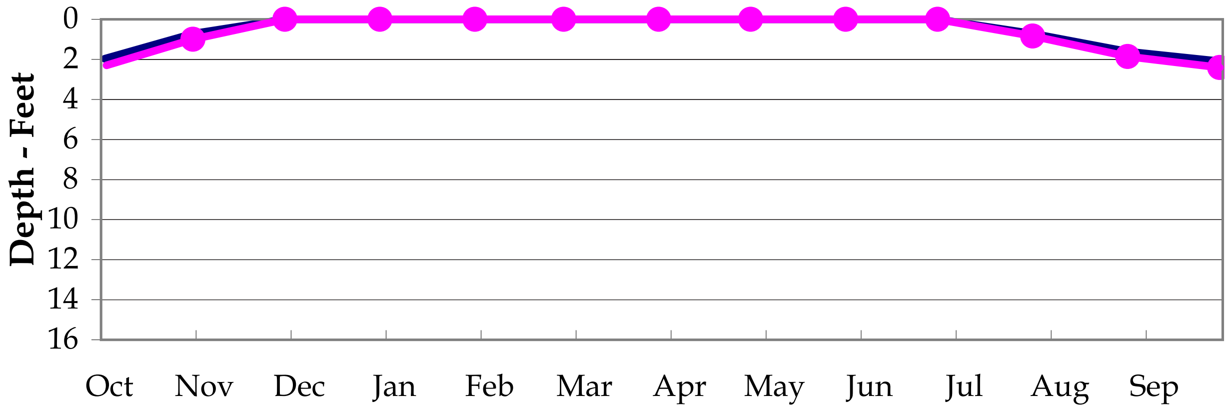
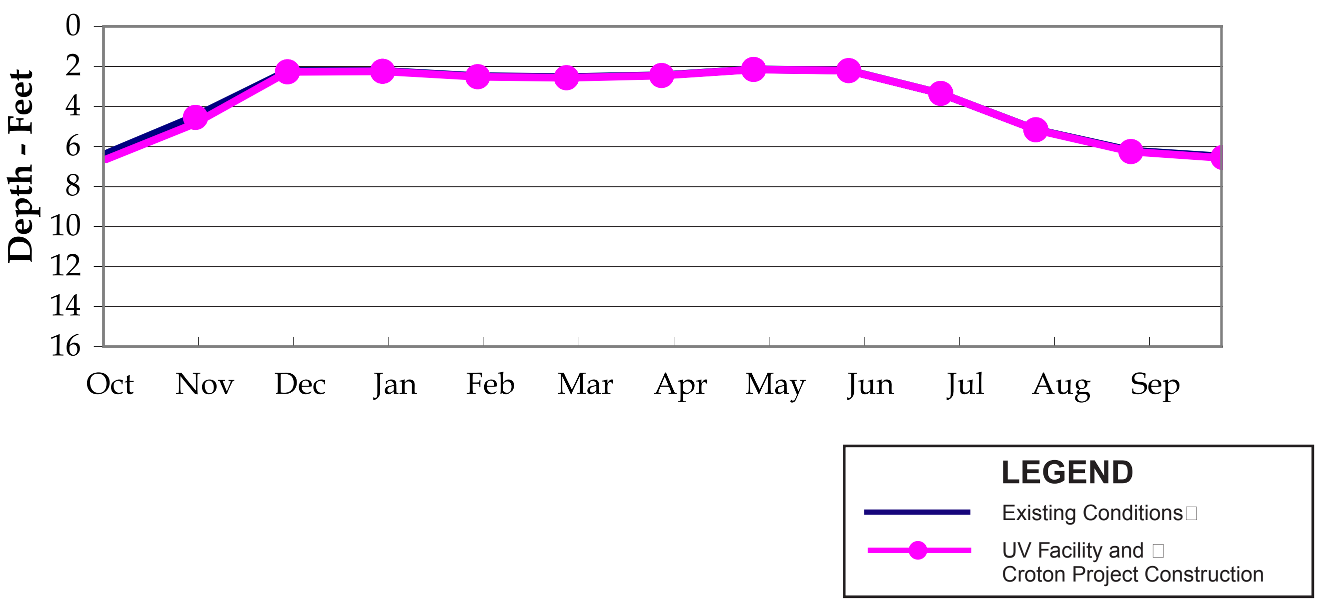
Simulated Monthly Depths to Water Within Delineated Wetland Areas for Croton Project With UV Facility During Construction at Wetland Assessment Points 9-10

WETLAND ASSESSMENT POINT 11



WETLAND ASSESSMENT POINT 12



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Simulated Monthly Depths to Water Within Delineated Wetland Areas for Croton Project With UV Facility During Construction at Wetland Assessment Points 11-12