A. INTRODUCTION

This chapter describes the existing geology, soils, and topography within the Project Site and Phase 1 Site, and addresses potential impacts to these resources. (Refer to Chapter 1, "Project Description," for a detailed description of the Proposed Project and Phase 1.) Bedrock geology, surface soils, and steep slopes are described based on topographic surveys and data published by the Natural Resources Conservation Service (NRCS), the New York State Museum, and results of a geotechnical boring survey of the Phase 1 Site conducted by Melick-Tully and Associates in April 2012. Potential impacts to these resources are based on the potential for a project to cause soil erosion and to impact geologic resources. Topography addresses issues related to slopes. Geology considers both bedrock and unconsolidated surficial deposits. Soils typically consider the uppermost layer of the ground, which has been exposed to climatic and erosive forces.

B. COMPREHENSIVE DEVELOPMENT PLAN (DGEIS)

EXISTING CONDITIONS

TOPOGRAPHY AND SLOPES

The Project Site's topography is characterized by the lowland valley of Kiamesha Creek that generally runs from north to south through the center of the Site, and its higher elevation uplands to the east and west. Elevations range from a low point of 1,340 feet above sea level near the center of the site to a high point of 1,555 feet above sea level on the western side. The highest point on the Project Site's eastern side is 1,469 feet above sea level.

Nearly the entire Project Site is sloped less than 20 percent (see **Table 4-1**). Steep slopes (>20 percent) are minimal and primarily located within the northeastern forested area of the Project Site where the elevation rises to two distinct high points. Site topography and areas of steep slopes are shown in **Figure 4-1**.

Table 4-1
Slope Categories on the Project Site

Slope Category	Percent of Site
0 – 10%	69%
10-20%	24%
20-30%	6%
30-40%	1%
r>40%	<1%

GEOLOGY

Geologic maps indicate that the Project Site is underlain by bedrock of the Upper and Lower Walton formations of the West Fall Group. This group characterizes the geology of the entire Neversink watershed, and largely consists of sedimentary rocks, including shale, sandstones, and conglomerate covered by glacial till. **Figure 4-2** shows the underlying bedrock mapped for the Project Site and the surrounding vicinity.[1]

The majority of surface material covering bedrock in the Catskills is soil and glacial deposits. Glacial advancement during the Pleistocene Epoch eroded and reduced rock to various forms and sizes, subsequently depositing glacial till as the ice sheets melted and retreated. Maps of unconsolidated deposits show that surficial geology within the Project Site consists of till and kame (see **Figure 4-3**). The kame occurs in a narrow north-south band that underlies the Kiamesha Creek valley east of Kiamesha Creek, and the till underlies the site's higher elevation areas to the west. Characteristics of till include varying texture of clay, silt-clay, or boulder-clay, high impermeability, tendency to be sandy in areas underlain by gneiss or sandstone, varying depths, and potential instability on steep slopes. Kame deposits are formed by glacial meltwater flowing between a glacier and adjacent valley. Kame is usually found along opposite sides of a glacial valley, as illustrated within the Project Site where kame deposits border the eastern portion of the site, east of Kiamesha Creek. Kame is a coarse to fine gravel or sand that occurs in thicknesses of 10 to 30 meters.

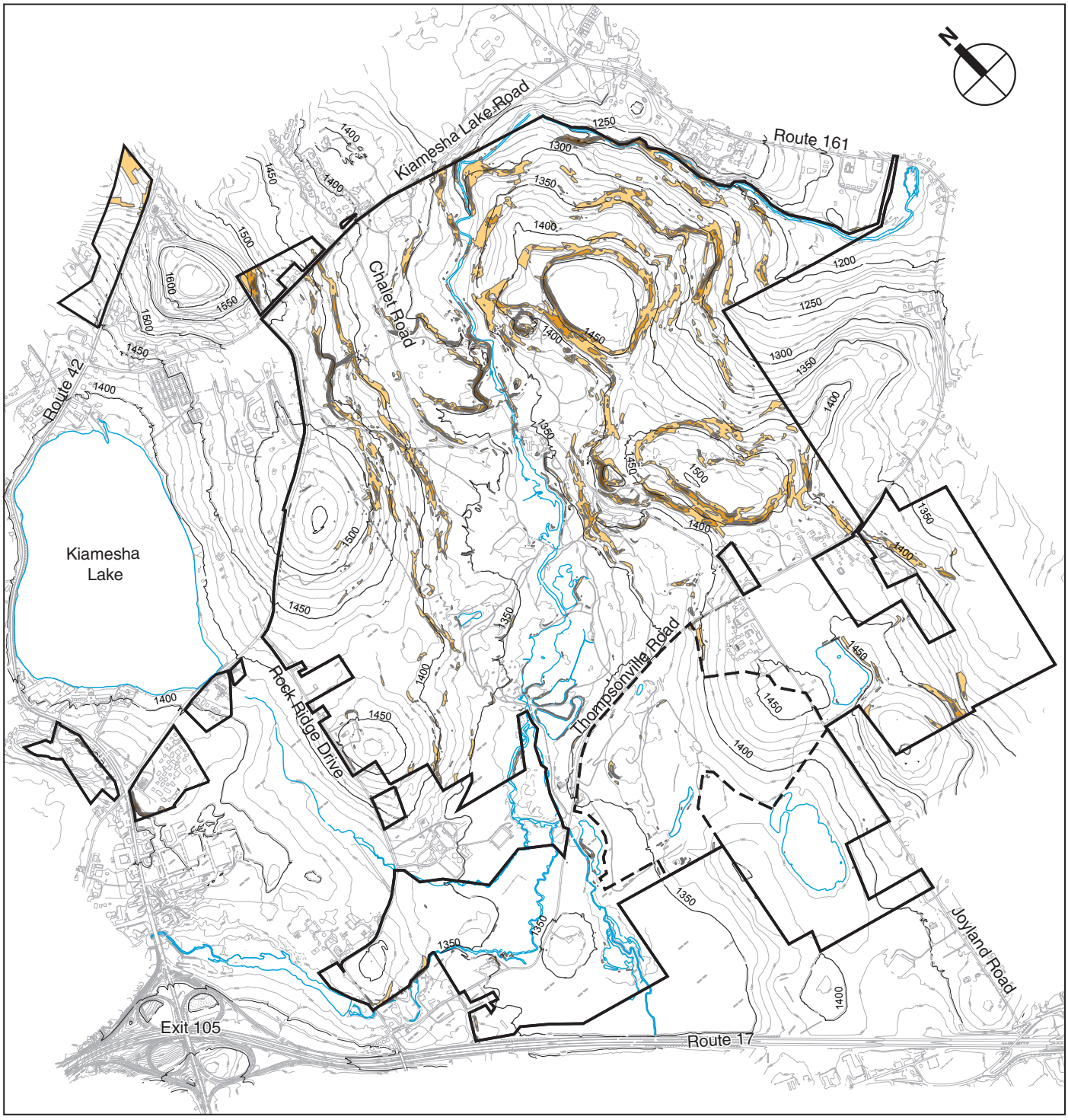
SOILS

The NRCS identifies major classifications of soils that have similar characteristics (such as texture and drainage) into a series. Within each series, soils differ in slope and other characteristics that affect their use. On the basis of these differences, soil series are further divided into phases (soil map units). Different soil phases exhibit variable water storage, erosion potential, and other characteristics that are important from a development perspective. The NRCS also protects and regulates soils designated as prime farmland per the Farmland Protection Policy Act (7 USC 4201; 7 CFR 658). Soil mapping units that are found on the Project Site and Phase 1 Site and that are designated as prime farmland by the NRCS are listed below.

The Project Site contains 27 different soil mapping units, but four units together account for more than 60 percent of the Site's acreage, while the remaining units each account for less than 5 percent of the total acreage. **Table 4-2** contains a complete list of the soil mapping units located within the study area and lists their primary characteristics. The spatial arrangement of these soil types, as mapped by the NRCS Soils Survey of Sullivan County, is shown in **Figure 4-4**.

[1] The DRBC docket issued for the CALP project (Appendix H-4) also confirms that the Project Site is underlain by bedrock of the Upper Walton formation.

6.13.12



Project Site Boundary

Phase 1

NYSDEC Regulated Streams

20 - 30% Slopes

30 - 40% Slopes

40% Slopes or Greater

0 1000 2000 FEET

SCALE

Steep Slopes and Topography

Figure 4-1

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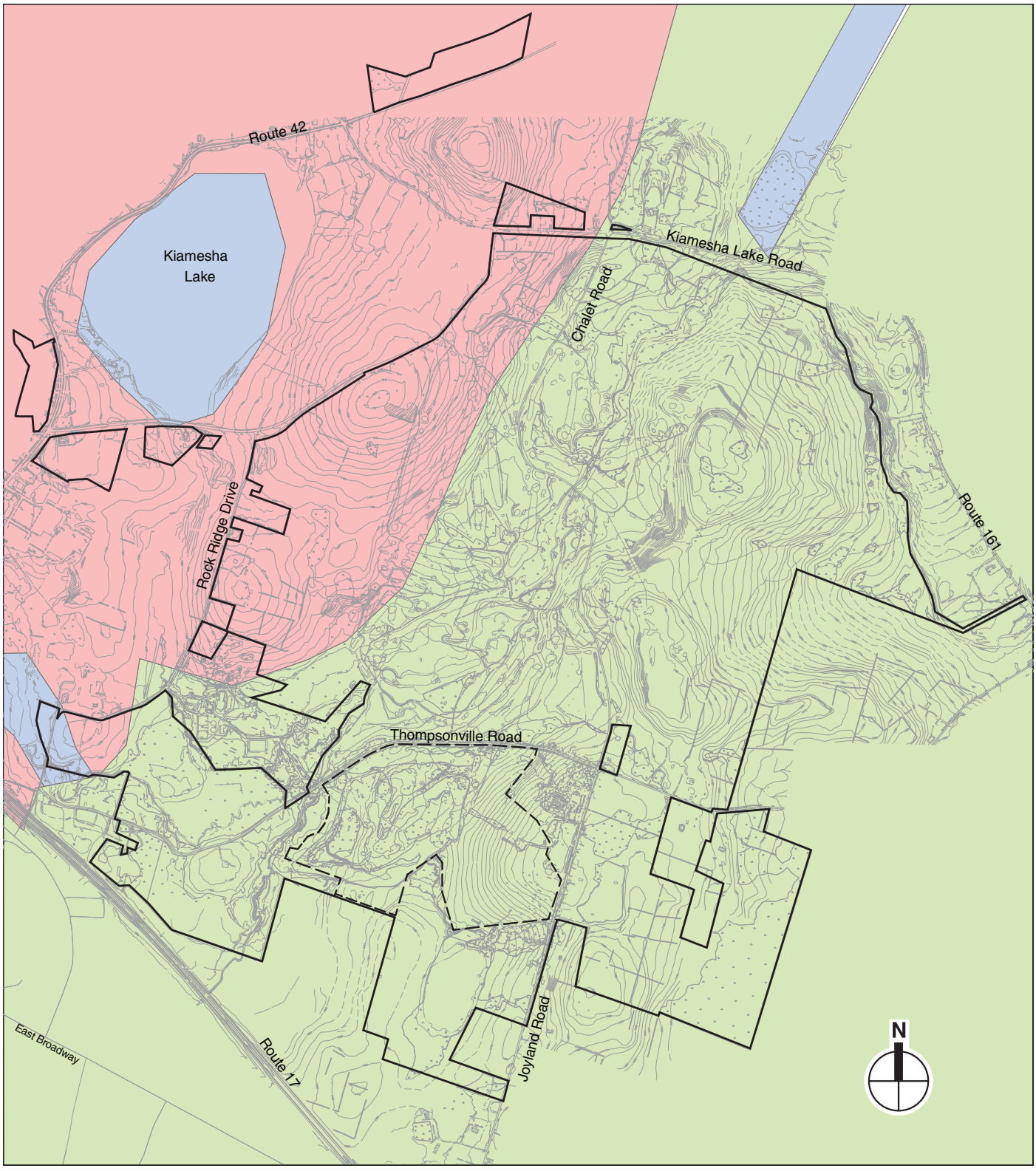

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Bedrock
Figure 4-2

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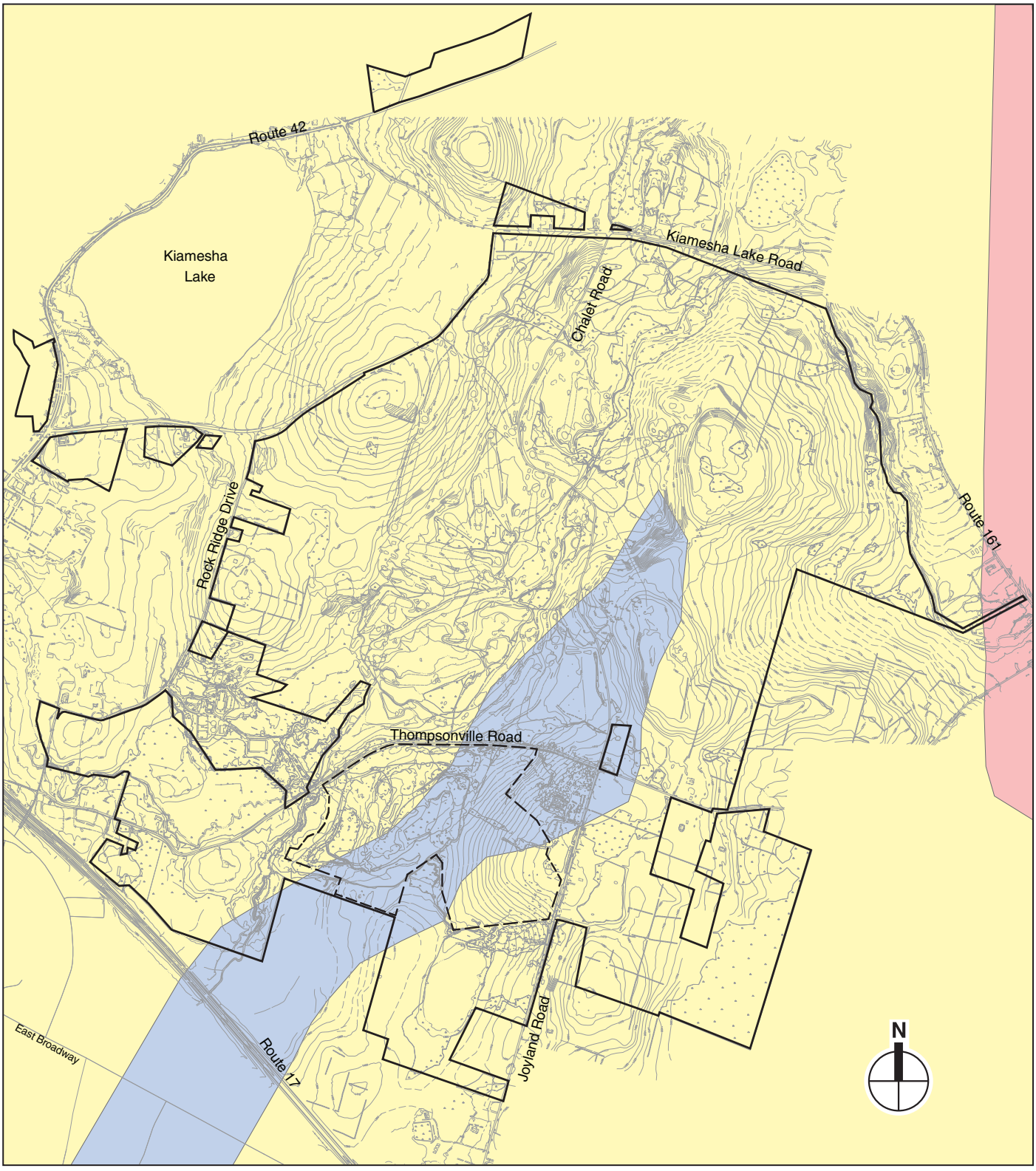
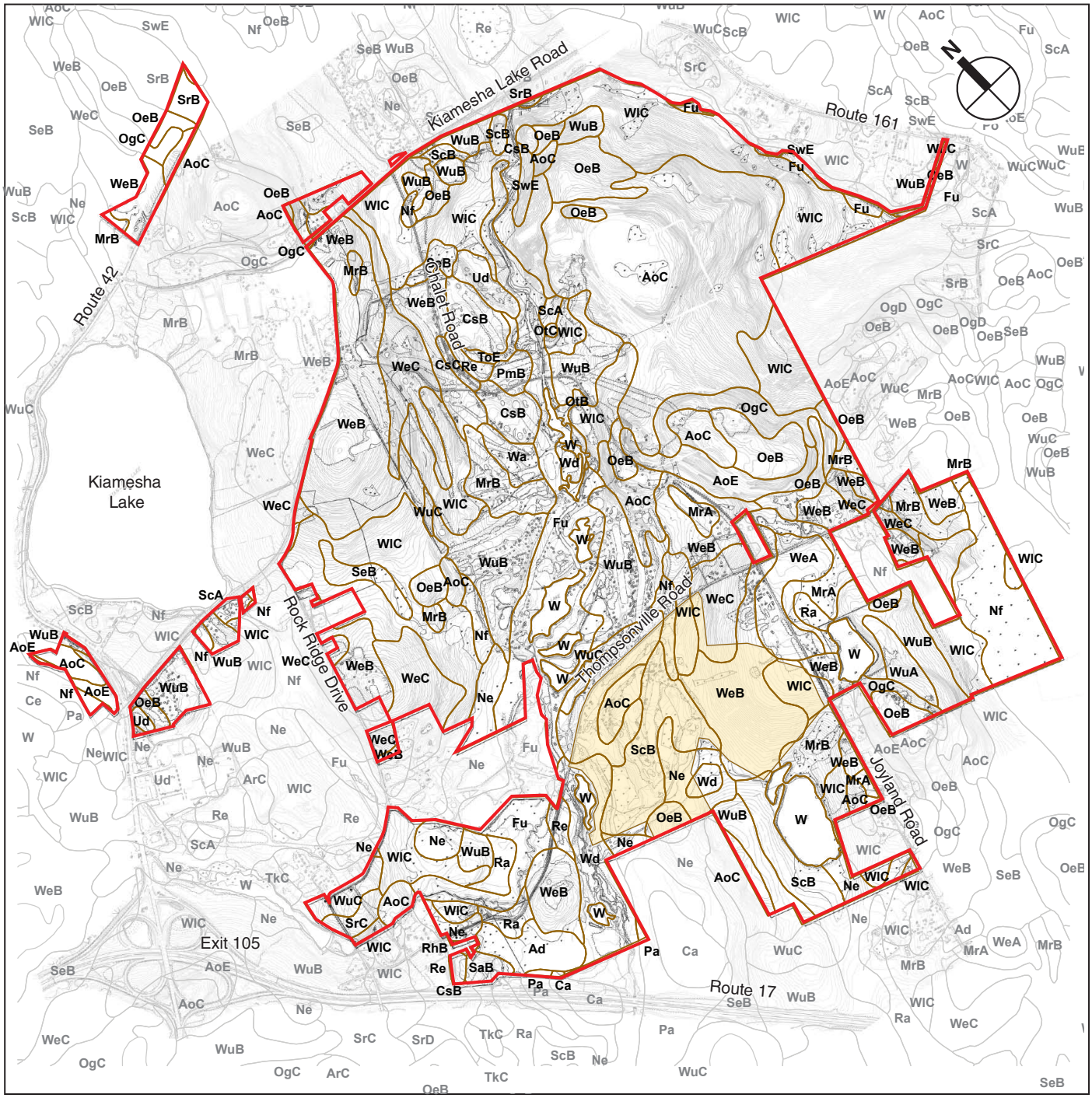


Surface Geology
Figure 4-3



Soils

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Figure 4-4

Table 4-2
On-site Soils Mapped by NRCS

Symbol	Soil Series Name	% of Project Site	Approx. Acres within LOD	Depth to Bedrock	Drainage Characteristics
Ad	Alden silt loam	1	<1	More than 60 inches	Drainage class: very poorly drained. Depth to water table: 12 inches above to 6 inches below the surface, Nov-Jun. Permeability is moderate in the surface layer, moderately low in the subsoil, and slow or moderately slow in the substratum. Erosion is a slight hazard. Surface runoff is very slow or ponded. Soil erodibility "K" factor: 0.28-0.37. Hydrologic group D and capability subclass is IVw.
AoC/AoE	Arnot-Oquaga complex, 0-15% and 15-35% slopes	14	117	10-40 inches	Drainage class: somewhat excessively drained to moderately well-drained. Depth to water table: >6 feet. Permeability is moderate. Surface runoff is medium to rapid at 0-15% slopes and rapid to very rapid at 15-35% slopes. Erosion hazard not listed. Soil erodibility "K" factor: 0.17-0.24. Hydrologic groups C/D and C, and capability subclasses VIs and VIIs at 0-15% and 15-35% slopes, respectively.
Ca	Carlisle muck	<0.1	0	More than 60 inches	Drainage class: very poorly drained. Depth to water table: 6 inches above to 12 inches below the surface, Sep-Jun. Permeability is moderate; surface runoff is ponded or very slow. Erosion hazard not listed. Soil erodibility "K" factor: Not listed. Hydrologic group A/D and capability subclass Vw.
CsB/CsC	Cheshire channery loam, 3-8% and 8-15% slopes	2	18	More than 60 inches	Drainage class: well-drained. Depth to water table: More than 6 feet. Permeability is moderate to moderately rapid; surface runoff is medium to rapid. Erosion is a moderate hazard. Soil erodibility "K" factor: 0.24-0.37. Hydrologic group B and capability subclasses IIe and IIIe for 3-8% and 8-15% slopes, respectively.
Fu	Fluvaquents-Udifluvents complex, frequently flooded	6	23	Not listed	Drainage class: excessively drained to very poorly drained. Depth to water table: Not listed. Soil erodibility "K" factor: not listed. Permeability not listed. Subject to frequent flooding and stream scour, streambank erosion, and shifting of soil deposits. Hydrologic group not listed; capability subclass Vw.
MrA/MrB	Morris loam, 0-3% and 3-8% slopes	4	18	More than 60 inches	Drainage class: somewhat poorly drained. Depth to water table: 6 to 18 inches, Nov-Mar. Permeability is very slow to moderate and surface runoff is slow to medium. Erosion is a hazard to moderate hazard. Soil erodibility "K" factor:0.24-0.32. Hydrologic group C and capability subclass IIIw.

Table 4-2 (cont'd)
On-site Soils Mapped by NRCS

Symbol	Soil Series Name	% of Site Acreage	Acres within LOD	Depth to Bedrock	Drainage Characteristics
Ne	Neversink loam	3	7	More than 60 inches	Drainage class: poorly drained to very poorly drained. Depth to water table: 0 to 6 inches, Dec-Apr. Permeability is moderate in surface and subsurface layers and slow in subsoil and substratum. Surface runoff is slow or very slow. Erosion is a slight hazard. Soil erodibility "K" factor: 0.20-0.28. Hydrologic group D and capability subclass IVw.
Nf	Neversink and Alden soils, very stony	3	6	More than 60 inches	Drainage class: poorly drained to very poorly drained. Depth to water table: 0 to 6 inches, Dec-Apr. Permeability not listed. Surface runoff is very slow or intermittently ponded. Erosion hazard not listed. Soil erodibility "K" factor: 0.20-0.24. Hydrologic group D and capability subclass VIIs.
OeB	Oquaga very channery silt loam, 3-8% slopes	5	46	20 to 40 inches	Drainage class: well-drained to excessively well-drained. Depth to water table: >6 feet. Permeability is moderate and surface runoff is medium. Erosion hazard is slight. Soil erodibility "K" factor: 0.20. Hydrologic group C and capability subclass IIe.
OgC	Oquaga-Arnot complex, 8-15% slopes	2	13	10 to 40 inches	Drainage class: moderately well-drained to excessively drained. Depth to water table: >6 feet. Permeability is moderate and surface runoff is rapid. Erosion hazard is moderate. Soil erodibility "K" factor: 0.20. Hydrologic groups C and C/D; capability subclass IIIe.
OtB/OtC	Otisville gravelly loamy coarse sand, 3-8% and 8-15% slopes	0.2	<1	More than 60 inches	Drainage class: excessively drained. Depth to water table: >6 feet. Permeability is rapid or very rapid and surface runoff is slow or medium. Erosion hazard not listed. Soil erodibility "K" factor: 0.17. Hydrologic group A and capability subclass IVs.
Pa	Palms muck	<0.1	0	More than 60 inches	Drainage class: very poorly drained. Depth to water table: 6 inches above to 12 inches below the surface, Sep-Jun. Permeability is moderately slow to moderately rapid in the surface layer and subsurface layer and moderately slow or moderate in the substratum. Surface runoff is very slow or ponded. Erosion hazard not listed. Soil erodibility "K" factor: 0.37. Hydrologic group A/D and capability subclass Vw.

Table 4-2 (cont'd)
On-site Soils Mapped by NRCS

Symbol	Soil Series Name	% of Site Acreage	Acres within LOD	Depth to Bedrock	Drainage Characteristics
PmB	Pompton gravelly fine sandy loam, 3-8% slopes	0.3	1	More than 60 inches	Drainage class: moderately well-drained or somewhat poorly drained. Depth to water table: 1 to 2 feet, Oct-May. Permeability is moderate or moderately rapid in surface layer and subsoil. Surface runoff is medium. Erosion hazard is not listed. Soil erodibility "K" factor: 0.17-0.24. Hydrologic group B and capability subclass IIw.
Ra	Raynham silt loam	0.9	1	More than 60 inches	Drainage class: Somewhat poorly drained or poorly drained. Depth to water table: 6 to 24 inches, Nov-May. Permeability is moderate in the surface layer, moderate or moderately low in the subsoil, and slow in the substratum. Surface runoff is slow. Erosion hazard is not listed. Soil erodibility "K" factor: 0.49-0.64. Hydrologic group C and capability subclass IIIw.
Re	Red Hook sandy loam	0.5	2	More than 60 inches	Drainage class: somewhat poorly drained. Depth to water table: 6 to 18 inches, Dec-May. Permeability is moderate in upper layers and moderate or moderately slow in lower layers. Surface runoff is slow and some areas subject to rare flooding. Erosion hazard is not listed. Soil erodibility "K" factor: 0.17-0.32. Hydrologic group C and capability subclass IIIw.
RhB	Riverhead sandy loam, 3-8% slopes	<0.1	0	More than 60 inches	Drainage class: well drained. Depth to water table: >6 feet. Permeability is moderately rapid in surface layer and subsoil and moderately rapid to very rapid in substratum. Surface runoff is slow or medium. Erosion is a slight hazard on longer slopes. Soil erodibility "K" factor: 0.28. Hydrologic group B and capability subclass IIs.
SaB	Scio silt loam, 2-6% slopes	0.3	0	More than 60 inches	Drainage class: moderately well-drained. Depth to water table: 18 to 24 inches, Mar-May. Permeability is moderate in the surface layer and subsoil and rapid or moderately rapid below. Surface runoff is slow or medium. Erosion hazard is not listed. Soil erodibility "K" factor: 0.17-0.64. Hydrologic group B and capability subclass IIe.
ScA/ScB	Scriba loam, 0-3% and 3-8% slopes, stony	4	28	More than 60 inches	Drainage class: somewhat poorly drained. Depth to water table: 6 to 18 inches, Feb-Mar. Permeability is moderate or slow above the fragipan and slow in the fragipan. Surface runoff is slow. Erosion hazard is not listed. Soil erodibility "K" factor: 0.20-0.28. Hydrologic group C and capability subclass IIIw.

Table 4-2 (cont'd)
On-site Soils Mapped by NRCS

Symbol	Soil Series Name	% of Site Acreage	Acres within LOD	Depth to Bedrock	Drainage Characteristics
SeB	Scriba and Morris loams, gently sloping, extremely stony	0.8	2	More than 60 inches	Drainage class: somewhat poorly drained. Depth to water table: 6 to 18 inches, Feb-Apr. Permeability is slow to moderate above the fragipan and very slow to slow in the fragipan. Surface runoff is slow or medium. Erosion hazard is not listed. Soil erodibility "K" factor: 0.20. Hydrologic group C and capability subclass VIIs.
SrB/SrC	Swartswood gravelly loam, 3-8% and 8-15% slopes, stony	0.7	6	More than 60 inches	Drainage class: well-drained. Depth to water table: 2.5 to 6 feet, Nov-Mar. Permeability is moderate above the fragipan and slow to moderately slow within. Surface runoff is slow to medium. Erosion hazard is not listed. Soil erodibility "K" factor: 0.20. Hydrologic group C and capability subclasses IIe and IIIe.
SwE	Swartswood and Lackawanna soils, steep, very stony	0.3	<1	More than 60 inches	Drainage class: well-drained. Depth to water table: 2.5 to 6 feet, Nov-Mar. Permeability is moderate in the surface layer and upper part of the subsoil, and slow in the lower part. Surface runoff is very rapid. Erosion hazard is not listed. Soil erodibility "K" factor: 0.17-0.24. Hydrologic group C and capability subclass VIIe.
ToE	Tunkhannock and Otisville soils, steep	0.2	1	More than 60 inches	Drainage class: well-drained to somewhat excessively drained. Depth to water table: >6 feet Permeability is moderately rapid to rapid in the surface layer and subsoil and moderately rapid to very rapid in the substratum. Surface runoff is rapid. Erosion hazard makes soils unsuitable for cultivation and places severe limitation on building structures. Soil erodibility "K" factor: 0.17-0.24. Hydrologic group A and capability subclass Vie.
Ud	Udorthents, smoothed	0.6	6	More than 60 inches	Drainage class: moderately well-drained to excessively drained. Depth to water table: not listed. Permeability and surface runoff are highly variable. Erosion hazard is not listed. Soil erodibility "K" factor: not listed. Hydrologic group not listed. Capability subclass not assigned.
Wa	Wallington silt loam	0.5	3	More than 60 inches	Drainage class: somewhat poorly drained. Depth to water table: 6 to 18 inches, Jan-Apr. Permeability is moderate above the fragipan and slow in the fragipan and substratum. Surface runoff is slow. Erosion hazard is not listed. Soil erodibility "K" factor: 0.49-0.64. Hydrologic group C and capability subclass IIIw.

Table 4-2 (cont'd)
On-site Soils Mapped by NRCS

Symbol	Soil Series Name	% of Site Acreage	Acres within LOD	Depth to Bedrock	Drainage Characteristics
Wd	Wayland silt loam	2	5	More than 60 inches	Drainage class: poorly drained to very poorly drained. Depth to water table: 0 to 6 inches, Nov-Jun. Permeability is moderate in the surface layer and slow in the subsoil and substratum. Surface runoff is slow. Erosion hazard is not listed. Soil erodibility "K" factor: 0.43. Hydrologic group C/D and capability subclass Vw.
WeA/WeB/WeC	Wellsboro gravelly loam, 0-3%, 3-8%, 8-15% slopes	20	158	More than 60 inches	Drainage class: moderately well-drained Depth to water table: 18 to 36 inches, Nov-Mar. Permeability is moderate above the fragipan and slow in the fragipan. Surface runoff is slow to rapid. Erosion is a hazard on long slopes. Soil erodibility "K" factor: 0.28. Hydrologic group C and capability subclasses IIw (0-3% and 3-8% slopes) and IIIe (8-15% slopes).
WlC	Wellsboro and Wurtsboro soils, strongly sloping, extremely stony	19	108	More than 60 inches	Drainage class: moderately well-drained. Depth to water table: 18-36 inches, Nov-Mar. Permeability is moderate above the fragipan and slow in the fragipan. Surface runoff is medium or rapid. Erosion hazard is not listed. Soil erodibility "K" factor: 0.24-0.28. Hydrologic group C and capability subclass VIIs.
WuA/WuB/WuC	Wurtsboro loam, 0-3%, 3-8%, 8-15% slopes	11	116	More than 60 inches	Drainage class: moderately well-drained. Depth to water table: 1 to 3 feet, Nov-Mar. Permeability is moderate to a depth of 26 inches and slow beyond. Surface runoff is slow (0-3% slopes), medium (3-8% slopes), and medium to rapid (8-15% slopes). Erosion is a hazard at 3-8% slopes; erosion hazard not listed for 0-3% and 8-15% slopes. Soil erodibility "K" factor: 0.28. Hydrologic group C and capability subclasses IIw (0-3% and 3-5% slopes) and IIIe (8-15% slopes).

Note: K Factor indicates the erosion potential of each soil type. This indicates the susceptibility of a soil to sheet and rill erosion by water. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to erosion.
Land capability class indicates the suitability of a soil for field crops, with Class I having few limitations, descending to Class VIII which have severe limitations that nearly preclude their use for commercial crop production.
Source: NRCS Soil Survey of Sullivan County, New York.

The four dominant soils, in decreasing order of coverage (percent of total area) within the Project Site, include Wellsboro and Wurtsboro soils, strongly sloping, extremely stony (19 percent); Wellsboro gravely loam (19 percent); Arnot-Oquaga complex (14 percent); and Wurtsboro loam (11 percent). These are described below.

WIC: Wellsboro and Wurtsboro soils, strongly sloping, extremely stony

This soil is very deep, moderately well-drained, and formed in areas of glacial till. It contains Wellsboro soils, Wurtsboro soils, and mixtures of both. The surface is stony, with stones more than 10 inches in diameter and 2.5-5 feet apart covering 3-15 percent of the surface; the remainder of the surface is composed of gravelly silt loam or gravelly loam. The surface is about 7 inches deep, and the subsurface can extend 60 inches or more in depth to bedrock.

The seasonal high water table places severe limitations on structures with basements and moderate limitations on buildings without basements. These limitations can be overcome with proper site construction – including use of foundation drains and fill materials to facilitate drainage. The potential frost action in addition to the seasonal high water table place severe limitations on roads and streets, and the slow permeability places severe limitations on siting septic tank absorption fields. These limitations can also be overcome with standard development techniques including use of roadway sub-base material, mounded septic systems, or centralized, tertiary sewage treatment.

This soil mapping unit is randomly distributed throughout the Project Site, with most areas spanning less than 10 acres. The largest continuous area of this soil is at the northern extent of the Project Site and covers approximately 142 acres.

We: Wellsboro gravely loam

Three phases of the Wellsboro gravely loam series are represented within the Project Site: 0-3 percent slopes (WeA), 3-8 percent slopes (WeB), and 8-15 percent slopes (WeC). These are deep, moderately well-drained soils that occur on till plains (0-3 percent slopes), hillsides and hilltops (3-8 percent and 8-15 percent slopes). Depth to bedrock is more than 60 inches. On shallow slopes, Wellsboro gravely loam is well-suited to crop cultivation. The seasonal high water table places moderate limitations on buildings without basements, and along with slow permeability, places severe limitations on siting septic tank absorption fields. The potential frost action is a severe limitation on roads and streets. As discussed above, these soil limitations can be overcome with standard site development techniques which may add cost to the installation of roadways and other site amenities.

Wellsboro gravely loam mainly occurs in the Project Site in patches that are 1-20 acres in size. The largest continuous areas of this soil are near the western and southern boundaries of the Project Site and cover approximately 59 and 80 acres.

Ao: Arnot-Oquaga complex

The Arnot-Oquaga complex is present in the Project Site in two phases: 0-15 percent slopes (AoC) and 15-35 percent slopes (AoE). The complex generally consists of 45 percent Arnot soil, 40 percent Oquaga soil, and 15 percent other soils. The Arnot soil is shallow (16 inches to bedrock), whereas the Oquaga soil is moderately deep (34 inches to bedrock). Both soils are well-drained. Outcrops of sandstone or shale bedrock are characteristic of areas with these soils, generally making up 2 to 10 percent of the ground cover. Shallow soil depths and rock outcrops make these soils poorly suited to cultivation of crops, limit rooting such that trees are vulnerable to windthrow, and place severe limitations on urban uses including building structures without basements. As discussed above, construction related soil limitations, such as shallow depth to bedrock, can be overcome with standard site development techniques which may add cost to the installation of foundations, roadways, and other site amenities.

The 0-15 percent phase of the Arnot-Oquaga complex occurs within the Project Site in multiple areas, mostly ranging from less than 1 acre to 12 acres. The largest area is 152 acres and occupies the majority of the forested area in the northeastern section of the Project Site. The 15-35 percent phase within the Project Site is limited to three small areas that total only 20 acres.

Wu: Wurtsboro loam, stony

Wurtsboro loam phases of 0-3 percent, 3-8 percent, and 8-15 percent slopes are each represented within the Project Site, although the 3-8 percent slopes (WuB) phase accounts for the vast majority of these areas. Wurtsboro loam, stony, 3-8 percent slopes is a very deep, gently sloping, and moderately well-drained soil that occurs on hillsides and hilltops. Depth to bedrock is generally 60 inches or more. The soil can be extremely acidic. It is well suited to farming varieties that can tolerate wet conditions. The seasonal high water table is a moderate limitation to buildings without basements, and along with potential frost action, is a moderate limitation to roads and streets. The seasonal high water table and slow permeability place severe limitations on siting septic tank absorption fields. As discussed above, these soil limitations can be overcome with standard site development techniques which may add cost to the installation of roadways and other site amenities.

Wurtsboro loam occurs in patches of less than 1 acre to 29 acres throughout the Project Site. It occurs in lowland areas where the golf course is located as well as upland forested areas to the east and west.

Prime Farmland

Prime farmland soils that are present within the Project Site include Pompton gravelly fine sandy loam, 3-8 percent slopes (PmB), Raynham silt loam (Ra), Red Hook sandy loam (Re), Riverhead sandy loam, 3-8 percent slopes (RhB), Scio silt loam, 2-6 percent slopes (SaB), and Wallington silt loam (Wa). These soils account for a small proportion of the soils within the Project Site, each covering less than 13 total acres of the approximately 1,538-acre Project Site. Riverhead sandy loam, 3-8 percent slopes, covers less than 1 acre.

THE FUTURE WITHOUT THE PROPOSED ACTIONS AND PROPOSED PROJECT

Without the Proposed Project, the Project Site is expected to remain in its current condition with no disturbance to geology, soils and topography. No offsite projects in the vicinity of the Project Site are expected to have an effect on the geologic and soil resources of the Project Site. Steep slopes on the Project Site will not be disturbed by other approved projects. Construction activities on the CALP parcels (refer to Chapters 1 and 2 for a complete description of the CALP project) would occur in both previously developed/disturbed areas and in undisturbed areas. Significant disturbance to geology, soils, or topography on the Project Site are not expected to occur in the future without the Proposed Project.

PROBABLE IMPACTS OF THE PROPOSED ACTIONS AND PROPOSED PROJECT

TOPOGRAPHY AND SLOPES

The EPT Concord Resort design largely conforms to the Project Site's existing contours. Additionally, nearly the entire Project Site has slopes of less than 20 percent, such that development of the Proposed Project would require minimal grading or other alteration of the site's topography. Steep slopes (>20 percent) are primarily located in the northern section of the

Project Site. There, elevation rises to two distinct peaks and steep slopes occur on the hillsides. Proposed development in these areas includes the Sporting Club (hotel, age-targeted residences, outdoor amenities) and the Residential Village (civic center, retail/service space, innovative health care facility, apartments, townhouses), respectively, and would require measures to stabilize and maintain the integrity of slopes during and following construction. Refer to Chapter 7, "Stormwater Management," for details on the measures that would be taken to avoid impacts from erosion. Areas of impact to steep slopes are shown in **Figure 4-5** and shown in **Table 4-3** below.

Table 4-3
Impacts to Slopes

Slope Category	Acres of Impact
0 – 20%	634.9
20-30%	39.9
30-40%	8.2
>40%	1.0

GEOLOGY

Substantial bedrock excavation is not expected to occur due to the depth of bedrock throughout the majority of the Project Site and the moderate depths of excavation required to implement the Proposed Project. Small outcrops of rock that exist in some places within the Project Site would likely require removal.

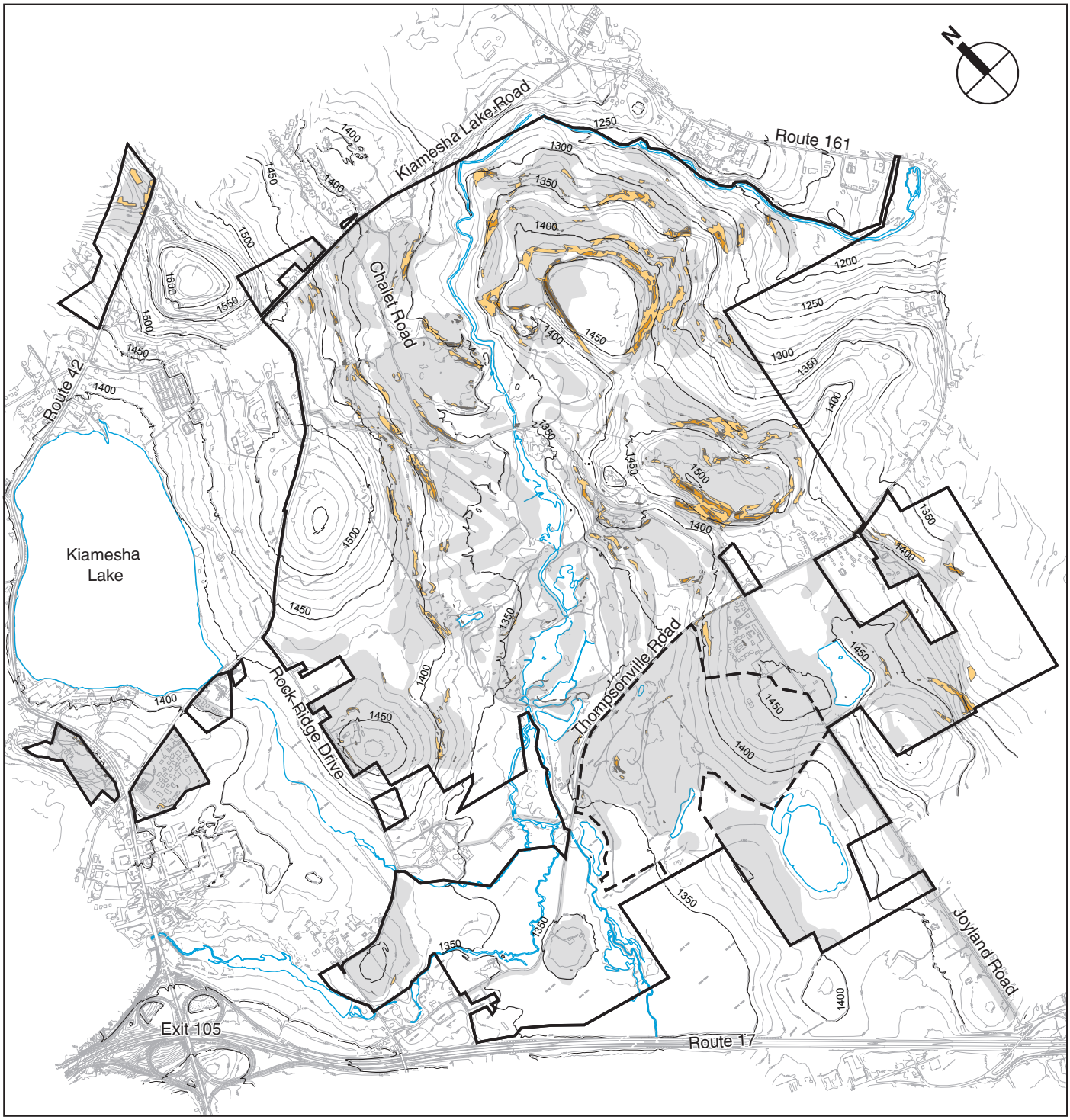
Should bedrock removal be required, standard construction equipment is typically sufficient to excavate or "rip" the bedrock. If the rock is less weathered and stronger, additional mechanical devices, such as a hydraulic hammer mounted on an excavator, may be required to break the rock down into removable size pieces for excavation. As a last resort, to break apart massive, strong, and fresh (non-weathered) bedrock, drill and blast operations would be used if required to fragment the rock so that it can be excavated. By using a combination of these techniques, rock excavation can be performed in a responsible manner.

SOILS

Acreages for each soil type present within the limit of disturbance for the CDP are provided in Table 4-2. The erosion hazard for most of these soil types is slight to moderate, and therefore, impacts from construction activities would be avoidable through implementation of standard erosion and sediment control practices, as discussed below. Two of the most abundant soil types within the Project Site, Wellsboro gravelly loam and Wurtsboro loam, are classified as having higher erosion risk, but only in areas with slopes >8 percent (WeC and WuC soil types). There is only a small proportion (<6 percent) of the Project Site's acreage where these soils and slopes that exceed 8 percent are both present.

The soils on the Project Site are suitable to support building foundations. When locations of new buildings for future project phases are finalized and floor elevations are established, test pit and/or boring explorations would need to be undertaken to evaluate the subsurface soil, rock, and groundwater conditions within the proposed building areas.

To prevent the potential negative effects of soil erosion, the Proposed Project would conform to the requirements of NYSDEC State Pollution Discharge Elimination System (SPDES) General



Project Site Boundary

Phase 1

NYSDEC Regulated Streams

Limit of Disturbance

20 - 30% Slopes Disturbance

30 - 40% Slopes Disturbance

40% Slopes or Greater Disturbance

0 1000 2000 FEET

SCALE

Impact to Steep Slopes

Figure 4-5

Permit for Stormwater Discharges Associated with Construction Activity. This permit requires that projects disturbing more than one acre of land must develop a Stormwater Pollution Prevention Plan (SWPPP), containing both temporary erosion control measures during construction and post-construction stormwater management practices to avoid flooding and water quality impacts in the long term. By conforming to the approved SWPPP, and diligent monitoring of erosion control measures now required for all new developments, the Project would avoid any significant amounts of particulate matter from being transported into any surface water features on or adjacent to the Project Site. Thus, the proposed excavation and grading activities would not cause any significant adverse impacts.

In all areas of land disturbance that would be landscaped post-construction, topsoil that has been removed from areas of development and stockpiled would be replaced as an appropriate planting medium. Outside of the specific areas of disturbance, no changes to plant species composition or coverage would occur from erosion or soil movement due to strict adherence to the erosion control specifications and post-construction stormwater management requirements contained in the SWPPP. Details on the SWPPP are provided in Chapter 7, "Stormwater Management."

Prime Farmland Soils occurring within the limit of disturbance are minimal and include less than one acre of PmB, less than one acre of Ra, two acres of Re, and three acres of Wa.

MITIGATION

Through the implementation of a New York State approved SWPPP, the Proposed Project would avoid any adverse impacts to soils and topographic resources. Principally through use of sedimentation and erosion control measures, discussed in Chapter 7, "Stormwater Management," the movement of soil downslope or downstream would be avoided. This would prevent detrimental impacts to receiving waters and wetlands. These measures would be installed prior to construction, and would be monitored and maintained constantly during construction.

Due to the fact that none of the Prime Farmland soils that would be disturbed by the Proposed Project are currently used for agriculture, this is not considered an adverse impact and does not require mitigation.

Impacts to site soils are not anticipated and mitigation is not proposed.

If it is determined that blasting is necessary for bedrock removal on-site, it would be carried out in conformance with all local, State, and Federal laws and regulations. To ensure compliance with the appropriate laws and regulations, a site-specific blasting plan would be developed and provided to the Town. This plan would include schedules for blasting and rock ripping (day, hour, and duration), safety protocols associated with both blasting activities and the handling and transport of blasting materials and measures to reduce noise-related impacts. Compliance with the blasting plan will minimize potential impacts associated with blasting.

With the implementation of the measures noted above, the potential cumulative impacts on the geology, soils, and/or topography on or in the vicinity of the Project Site resulting from the development of the Proposed Project in conjunction with those associated with other approved projects in the area are not expected to be significant.

C. SITE-SPECIFIC DEVELOPMENT OF PHASE 1

EXISTING CONDITIONS

TOPOGRAPHY AND SLOPES

Elevation within the Phase 1 Site increases slightly from west to east, with a low point of 1,340 feet above sea level on the golf course on the site's western side to a high point of 1,456 feet above sea level in the mixed coniferous-deciduous forest on the site's eastern side. With the exception of a very small area adjacent to Thompsonville Road, slopes are less than 20 percent throughout the Phase 1 development area (see **Figure 4-6**).

GEOLOGY

The Phase 1 development area is within the Lower Walton formation of the West Falls Group, consisting of shale, sandstones, and conglomerate in higher elevation areas (see Figure 4-2). Surficial geology within the Phase 1 development area includes kame and till deposits. Kame occurs in a northeast to southwest direction through the Phase 1 development area, underlying parts of the golf course and mixed coniferous-deciduous forest. Till underlies the southeastern portion of the Phase 1 development area, surrounding the freshwater pond beyond the parcel's southern boundary, and underlies the areas of the golf course on the parcel's far western side. (see Figure 4-3)

A geotechnical survey was conducted at the Phase 1 Site and along the route of the proposed sanitary sewer line. This investigation found subsurface conditions that consisted of a surficial layer of topsoil approximately 6 to 12 inches deep followed by 12 to 36 inches of surficial natural sands. Below the looser stratum, glacial soils were medium dense to very dense and contained varying amounts of silt, gravel, cobble, and boulders. Depth to bedrock exceeded completion depth (approximately 50 feet) in 19 of the 32 borings; bedrock was encountered at 19 to 46 feet below surface grade in the other 13 borings. Stabilized groundwater elevations measured by piezometer in three borings were at levels of 24 to 30 feet below grade.

In addition, test pit explorations were performed within the proposed building, parking, and harness horse racetrack locations. Groundwater was found at 1 to 21 feet below grade in most locations indicative of seasonally saturated conditions and seepage from groundwater perching. Prior to reuse, some dewatering, aeration, and drying of the shallower surficial materials may be necessary. Controlling groundwater through diversion trenches or similar measures during construction may be required. See Appendix D for the complete Subsurface Investigation Report (Melick-Tully and Associates, P.C., May 1, 2012).

SOILS

The Natural Resources Conservation Service (NRCS) identifies major classifications of soils that have similar characteristics (such as texture and drainage) into a series. Within each series, soils differ in slope and other characteristics that affect their use. On the basis of these differences, soil series are further divided into phases (soil map units). Different soil phases exhibit variable water storage, erosion potential, and other characteristics that are important from a development perspective. The NRCS also protects and regulates soils designated as prime farmland per the Farmland Protection Policy Act (7 USC 4201; 7 CFR 658). Soil mapping units

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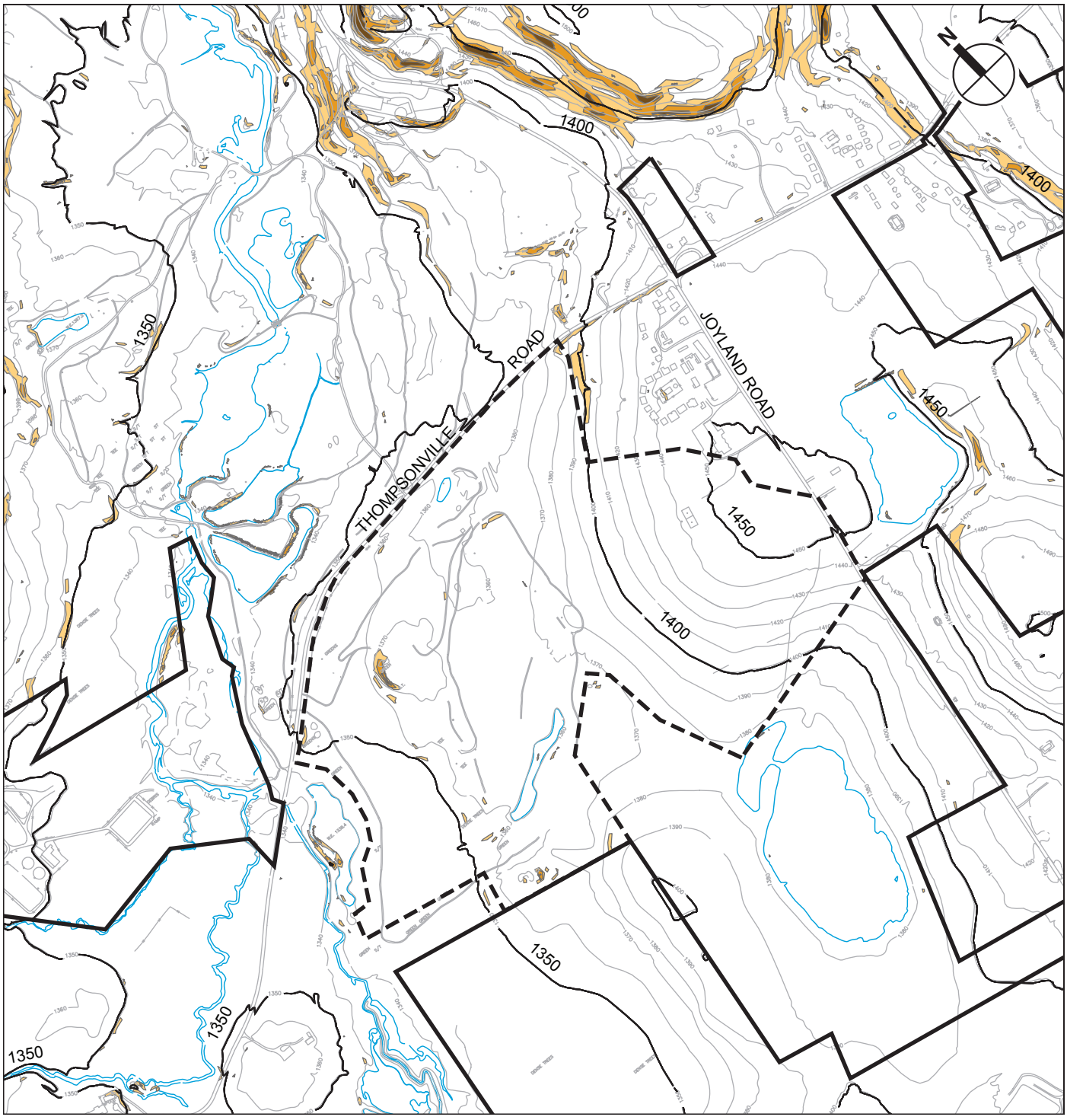

Project Site Boundary

Phase 1

NYSDEC Regulated Streams

20 - 30% Slopes

30 - 40% Slopes

40% Slopes or Greater

0 500 1000 FEET

SCALE

Phase 1 Steep Slopes and Topography

Figure 4-6

that are found on the Project Site and Phase 1 development area that are designated as prime farmland by the NRCS are listed below.

Of the 27 soil mapping units present within the Project Site, nine occur within the Phase 1 development area specifically. These include: Wellsboro gravelly loam, 0-3 percent, 3-8 percent, and 8-15 percent slopes (WeA/WeB/WeC); Wellsboro and Wurtsboro soils, strongly sloping, extremely stony (WIC); Wayland silt loam (Wd); Wurtsboro loam, 3-8 percent slopes (WuB); Neversink loam (Ne); Scriba loam, 3-8 percent slopes, stony (ScB); Arnot-Oquaga complex, 0-15 percent slopes (AoC); Morris loam, 3-8 percent slopes (MrB); and Neversink and Alden soils, very stony (Nf). Refer to Figure 4-4 for a depiction of mapped soils within the Phase 1 Site. In addition, small amounts of soil types Ad, Fu, MrA, OeB, and OgC are present within the areas being disturbed for the off-site infrastructure (water supply, wastewater conveyance, and roadway improvements) that is being constructed to support Phase 1.

Soils in the eastern, forested section of the Phase 1 development area are dominated by WeB, with WeC and WIC also present. Soils underlying the golf course on the site's western side are composed of ScB, Ne, and WuB, and smaller areas of Aoc and Wd.

None of the soils present within the Phase 1 Site are designated as Prime Farmland by the NRCS.

A geotechnical investigation was performed in April 2012 to characterize subsurface conditions at the Phase 1 Site. Soil borings were taken at 32 locations within the Phase 1 development area. Detailed results of the survey are reported in full in Appendix D. In general, the first stratum consisted of topsoil ranging in depth from 6 to 12 inches. The second stratum usually consisted of "red-brown fine to coarse sand, and silt, little fine gravel (moist) (loose to dense)" and extended 1 to 3 feet below surface grade in most locations, but in some locations extended as far as 10 feet below surface grade. The third stratum and beyond was also usually "red-brown fine to coarse sand" but more dense and containing varying amounts of silt, gravel, cobbles, and boulders. Depth to bedrock exceeded completion depth (approximately 50 feet) in 19 of the 32 borings, and was 19 feet or greater in the other 13 boring locations. In most locations, groundwater was encountered at depths ranging from 7 to 21 feet. At locations C-1, C-7, and C-12, where piezometers were installed and groundwater levels were measured multiple times, stabilized groundwater levels were observed at depths of 24 to 30 feet. The variable groundwater depths are likely due to seepage through less pervious materials, and percolation of surface water through loose surficial soils place some restrictions on construction (see "Probable Impacts of the Proposed Project" below).

THE FUTURE WITHOUT THE DEVELOPMENT OF PHASE 1

In the future without the Proposed Project, no changes to existing topography, slopes, geology, or soils are expected to occur.

PROBABLE IMPACTS OF THE DEVELOPMENT OF PHASE 1

TOPOGRAPHY AND SLOPES

The Phase 1 development area contains almost no slopes greater than 20 percent. Development of the casino building, harness horse racetrack, parking lot, and other associated facilities would therefore require minimal grading, and would disturb less than half an acre of slopes greater than 20 percent (see **Figure 4-7**). An additional approximately half acre of slopes greater than 20

percent would be disturbed off of the Phase 1 Site to support the infrastructure required for Phase 1. Overall, the proposed Phase 1 development would not significantly alter the Phase 1 Site's existing topography. The current engineering design plans include measures to minimize erosion, sedimentation, stormwater runoff and flooding, and ultimately avoid slope disturbance within the Phase 1 development area.

GEOLOGY

No bedrock excavation or blasting is expected to occur within the Phase 1 development area due to the depth of bedrock in the disturbance area and the moderate depths of excavation required for building Phase 1 facilities. During the geotechnical investigation, relatively sound sandstone bedrock was encountered 20 to 46 feet below surface grade which is expected to be below the levels required to construct the proposed facilities within the Phase 1 development area. Large boulders were encountered in some areas during the geotechnical survey and may need to be excavated. No rock outcrops are known to occur within the Phase 1 development area.

SOILS

Development within the Phase 1 Site would disturb approximately 7 acres of AoC, <1 acre of MrB, 3 acres of Ne, 3 acres of Nf, 21 acres of ScB, 3 acres of Wd, 37 acres of WeA/WeB/WeC, 13 acres of WIC, and 14 acres of WuB, totaling approximately 101 acres of disturbance. No Prime Farmland Soils occur within the Phase 1 limit of disturbance. The erosion hazard for the majority of the nine soil types present within the Phase 1 development area is slight to moderate. Wellsboro gravelly loam 8-15 percent slopes (WeC) has a higher risk of erosion and is present in the northeastern section of the Phase 1 Site, along Thompsonville Road. Approximately 4 acres of this soil would fall within the limit of disturbance. As discussed above for the Project Site, impacts from construction activities within the Phase 1 Site would be avoidable through implementation of the erosion and sediment control practices described in Chapter 7, "Stormwater Management."

Approximately 31 acres will be disturbed to construct the infrastructure required for Phase 1, including the widening of Joyland Road. This Phase 1 Infrastructure will disturb approximately 2 acres of MrA, 1 acre of MrB, 3 acres of OeB, 17 acres of WeA/WeB/WeC, 4 acres of WIC, and 2 acres of WuB, as well as less than 1 acre each of Ad, AoC, Fu, Ne, Nf, OgC, and Wd soils.

Buildings, parking lots and the harness horse racetrack have been sited to conform to the existing topography to the maximum extent practicable. A site-specific grading plan has been generated for the Phase 1 development. To provide a level site for the development of Phase 1 would require excavation of approximately 226,333 cubic yards of earth material and approximately 442,449 cubic yards of fill. Removal of bedrock is not anticipated. The deficit of 216,116 cubic yards of fill material would be delivered to the Project Site. The origin and/or destination of the truck trips will be determined once the project construction management team identifies a source(s) for the required fill.

The majority of soils within the Phase 1 development area are classified as suitable to support building foundations. The results of the geotechnical investigation indicate that the proposed buildings and parking lot within Phase 1 could be supported by conventional shallow foundations of a minimum of 4 feet below surface grade. Compacted fill may be required for greater bearing pressures in some areas, such as the below-grade parking area. On the basis of their moisture levels, the glacial soils on site could be used as controlled compacted fill, but their high silt content renders the soils susceptible to disturbance from slight changes in moisture. Over-excavation of foundations and a layer of fill materials such as crushed stone or gravel may be beneficial due to the high

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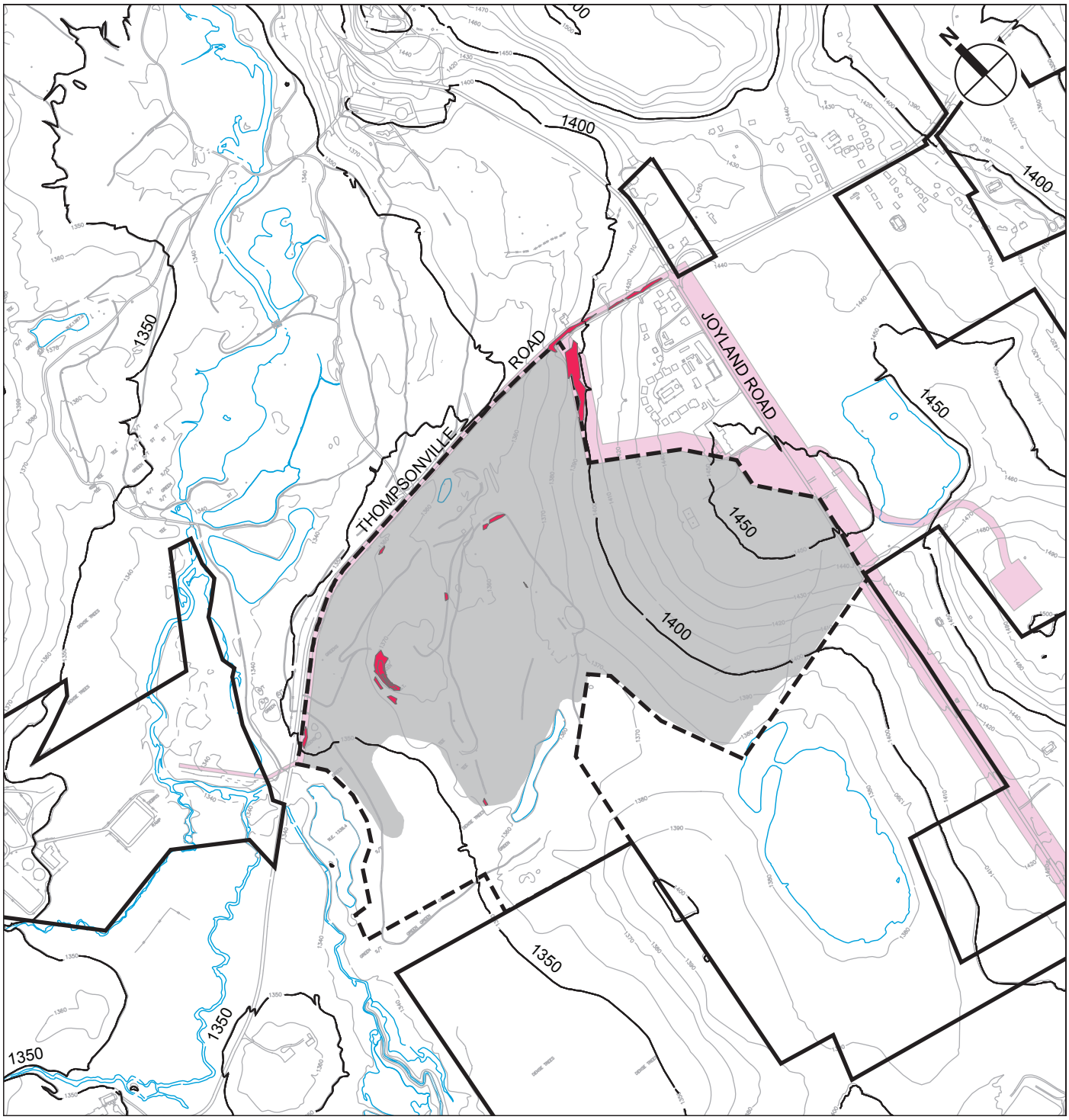

Project Site Boundary

Phase 1

NYSDEC Regulated Streams

Steep Slope Disturbance

Phase 1 Disturbance

Phase 1 Infrastructure Disturbance

0 500 1000 FEET

SCALE

Impact to Phase 1 Steep Slopes

percentages of fines in the soils and the variation in groundwater levels throughout the site. Variable groundwater levels may necessitate control of groundwater through drains and diversion trenches, in addition to standard dewatering during and after construction. It is anticipated that below-grade walls for lower building levels would require a vertical drainage system to prevent buildup of hydrostatic pressure behind the walls. Bottom floor slabs would require a drainage system to remove water accumulated below.

MITIGATION

Through the implementation of a New York State approved Stormwater Pollution Prevention Plan, Phase 1 would avoid any adverse impacts to soils and topographic resources. Principally through use of sedimentation and erosion control measures, discussed in Chapter 7, "Stormwater Management," the movement of soil downslope or downstream would be avoided. This would prevent detrimental impacts to receiving waters and wetlands. These measures would be installed prior to construction and would be monitored and maintained constantly during construction.

Impacts to site soils are not anticipated and mitigation is not proposed.

With the implementation of the measures noted above, the potential cumulative impacts on the geology, soils, and/or topography on or in the vicinity of the Phase 1Site resulting from the development of the Proposed Project in conjunction with those associated with other approved projects in the area are not expected to be significant. ✷