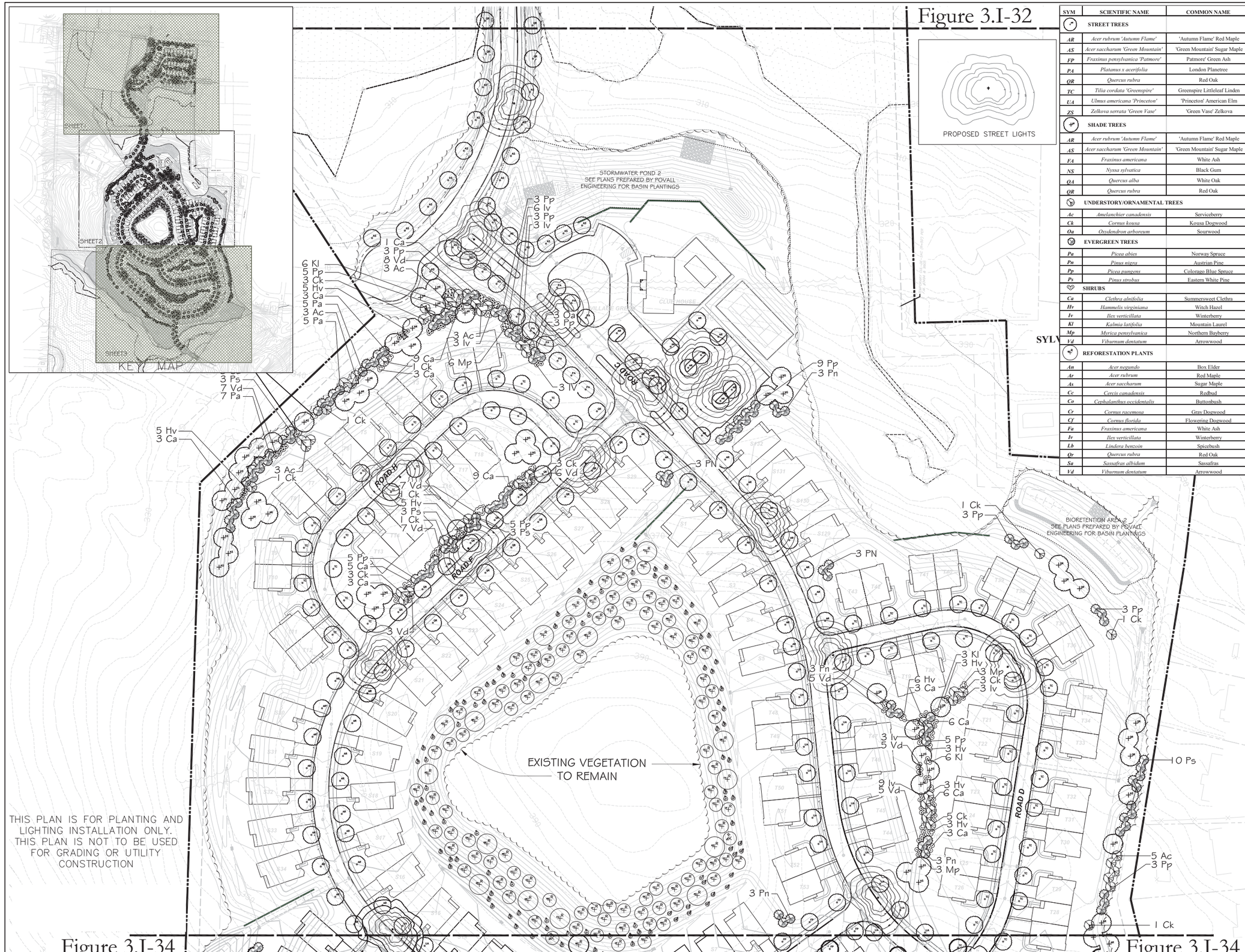
Figure 3.I-32



SYM	SCIENTIFIC NAME	COMMON NAME
	STREET TREES	
AR	*Acer rubrum 'Autumn Flame'*	'Autumn Flame' Red Maple
AS	*Acer saccharum 'Green Mountain'*	'Green Mountain' Sugar Maple
FP	*Fraxinus pensylvanica 'Patmore'*	Patmore' Green Ash
PA	*Platanus x acerifolia*	London Planetree
QR	*Quercus rubra*	Red Oak
TC	*Tilia cordata 'Greenspire'*	Greenspire Littleleaf Linden
UA	*Ulmus americana 'Princeton'*	'Princeton' American Elm
ZS	*Zelkova serrata 'Green Vase'*	'Green Vase' Zelkova
	SHADE TREES	
AR	*Acer rubrum 'Autumn Flame'*	'Autumn Flame' Red Maple
AS	*Acer saccharum 'Green Mountain'*	'Green Mountain' Sugar Maple
FA	*Fraxinus americana*	White Ash
NS	*Nyssa sylvatica*	Black Gum
QA	*Quercus alba*	White Oak
QR	*Quercus rubra*	Red Oak
	UNDERSTORY/ORNAMENTAL TREES	
Ac	*Amelanchier canadensis*	Serviceberry
Ck	*Cornus kousa*	Kousa Dogwood
Oa	*Oxydendron arboreum*	Sourwood
	EVERGREEN TREES	
Pa	*Picea abies*	Norway Spruce
Pn	*Pinus nigra*	Austrian Pine
Pp	*Picea pungens*	Colorago Blue Spruce
Ps	*Pinus strobus*	Eastern White Pine
	SHRUBS	
Ca	*Clethra alnifolia*	Summersweet Clethra
Hv	*Hammelis virginiana*	Witch Hazel
Iv	*Ilex verticillata*	Winterberry
Kl	*Kalmia latifolia*	Mountain Laurel
Mp	*Myrica pensylvanica*	Northern Bayberry
Vd	*Viburnum dentatum*	Arrowwood
	REFORESTATION PLANTS	
An	*Acer negundo*	Box Elder
Ar	*Acer rubrum*	Red Maple
As	*Acer saccharum*	Sugar Maple
Cc	*Cercis canadensis*	Redbud
Co	*Cephalanthus occidentalis*	Buttonbush
Cr	*Cornus racemosa*	Gray Dogwood
Cf	*Cornus florida*	Flowering Dogwood
Fa	*Fraxinus americana*	White Ash
Iv	*Ilex verticillata*	Winterberry
Lb	*Lindera benzoin*	Spicebush
Qr	*Quercus rubra*	Red Oak
Sa	*Sassafras albidum*	Sassafras
Vd	*Viburnum dentatum*	Arrowwood

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ESE Land Planning Engineering Land Surveying

REV.	DATE	DESCRIPTION	DRAWN

NORTH

LANDSCAPE & LIGHTING PLAN
PLANTING PLAN

HILLTOP VILLAGE AT WAPPINGER
TOWN OF WAPPINGER, DUTCHESS COUNTY, NEW YORK

Figure: 3.I-33
Date: 02/2012
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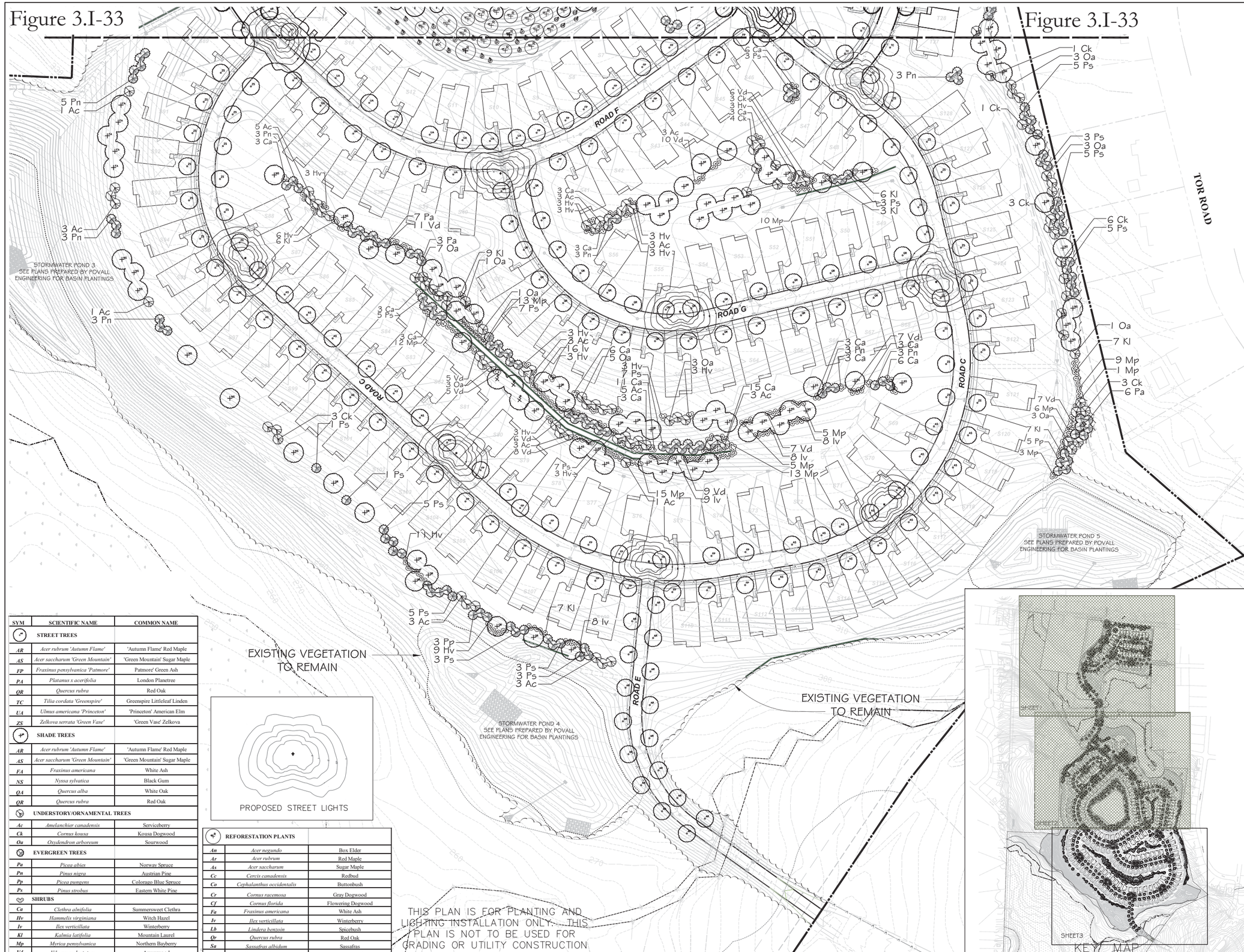
Scale: N.T.S.

Figure 3.I-34

Figure 3.I-34

Figure 3.I-33

Figure 3.I-33



SYM	SCIENTIFIC NAME	COMMON NAME
	STREET TREES	
AR	*Acer rubrum 'Autumn Flame'*	'Autumn Flame' Red Maple
AS	*Acer saccharum 'Green Mountain'*	'Green Mountain' Sugar Maple
FP	*Fraxinus pensylvanica 'Patmore'*	Patmore' Green Ash
PA	*Platanus x acerifolia*	London Planetree
QR	*Quercus rubra*	Red Oak
TC	*Tilia cordata 'Greenspire'*	Greenspire Littleleaf Linden
UA	*Ulmus americana 'Princeton'*	'Princeton' American Elm
ZS	*Zelkova serrata 'Green Vase'*	'Green Vase' Zelkova
	SHADE TREES	
AR	*Acer rubrum 'Autumn Flame'*	'Autumn Flame' Red Maple
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FA	*Fraxinus americana*	White Ash
NS	*Nyssa sylvatica*	Black Gum
QA	*Quercus alba*	White Oak
QR	*Quercus rubra*	Red Oak
	UNDERSTORY/ORNAMENTAL TREES	
Ac	*Amelanchier canadensis*	Serviceberry
Ck	*Cornus kousa*	Kousa Dogwood
Oa	*Oxydendron arboreum*	Sourwood
	EVERGREEN TREES	
Pa	*Picea abies*	Norway Spruce
Pn	*Pinus nigra*	Austrian Pine
Pp	*Picea pungens*	Colorado Blue Spruce
Ps	*Pinus strobus*	Eastern White Pine
	SHRUBS	
Ca	*Clethra alnifolia*	Summersweet Clethra
Hv	*Hamnelis virginiana*	Witch Hazel
Iv	*Ilex verticillata*	Winterberry
Kl	*Kalmia latifolia*	Mountain Laurel
Mp	*Myrica pensylvanica*	Northern Bayberry
Vd	*Viburnum dentatum*	Arrowwood

	REFORESTATION PLANTS	
An	*Acer negundo*	Box Elder
Ar	*Acer rubrum*	Red Maple
As	*Acer saccharum*	Sugar Maple
Cc	*Cercis canadensis*	Redbud
Co	*Cephalanthus occidentalis*	Buttonbush
Cr	*Cornus racemosa*	Gray Dogwood
Cf	*Cornus florida*	Flowering Dogwood
Fa	*Fraxinus americana*	White Ash
Iv	*Ilex verticillata*	Winterberry
Lb	*Lindera benzoin*	Spicebush
Qr	*Quercus rubra*	Red Oak
Sa	*Sassafras albidum*	Sassafras
Vd	*Viburnum dentatum*	Arrowwood

THIS PLAN IS FOR PLANTING AND LIGHTING INSTALLATION ONLY. THIS PLAN IS NOT TO BE USED FOR GRADING OR UTILITY CONSTRUCTION

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ESE Land Planning Engineering Land Surveying

REV.	DATE	DESCRIPTION	DRAWN

LANDSCAPE & LIGHTING PLAN
PLANTING PLAN

HILLTOP VILLAGE AT WAPPINGER
TOWN OF WAPPINGER, DUTCHESS COUNTY, NEW YORK

Figure: 3.I-34
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In general, the view from adjacent properties will not change as a result of the Proposed Action, given the existing and proposed topography coupled with land preservation, wetlands surrounding the developed area, and extensive landscaping. The proposed units will complement the existing dwellings within the vicinity of the property. There are areas where clearing and grading activities will occur close to the property line; however, these areas are isolated and extensive landscaping is proposed in order to maximize screening of the units.

Property Lighting

Types of Lighting

There are hundreds of commercially available lamps that can be categorized into three groups by their construction and operating characteristics: incandescent, fluorescent, and high-intensity discharge (HID).[73] HID lamps are grouped into four major classes: metal halide, low pressure sodium, high pressure sodium, and mercury.[74] The major classes are described below.

Mercury vapor (MV) lamps were the first commercially available HID lamps. They are constructed with an internal quartz tube enclosed in an outer glass envelope. A small amount of liquid mercury is sealed in argon gas in the quartz tube. High pressure MV lamps without color correction produce a blue-white light. Phosphor coatings can be added to improve color rendition. MV lamps are available in wattages ranging from 50 to 1000 watts. They are becoming obsolete since other HID light sources with better efficacy, more accurate color rendering, and improved lumen maintenance are becoming available at lower costs.[75]

Metal halide (MH) lamps are constructed in a similar manner to MV lamps except that in addition to the mercury and argon, various metal halides are included in the gas fill. Use of metal halides increases luminous efficiency and improves color rendition. MH lamps are available in wattages ranging from 32 to 1000 watts. The small 32 watt MH lamp produces 2500 lumens, about as much light as a 150 watt incandescent or a 40 watt fluorescent.[76]

Low pressure sodium (LPS) lamps are a blend between HID and fluorescent technologies. These lamps are constructed of a large sodium-resistant glass tube containing sodium and a neon-argon gas mixture. A LPS discharge arc produces a monochromatic yellow light consisting almost entirely of orange-yellow wavelengths. The monochromatic yellow light creates very poor color rendition, with all surfaces illuminated in an orange-yellow version of blacks and whites.[77]

High pressure sodium (HPS) lamps contain an internal tub made of translucent ceramic material rather than quartz glass due to the high temperature (2350°F/1300°C) at which it operates. A small amount of solid metallic sodium and mercury are sealed in a xenon gas filled ceramic arc tube. HPS lamps are available in wattages ranging from 18 to 1000 watts, and vary more widely than other HID lamps in their efficacy and color quality. Low quality outdoor HPS lamps produce an orange-white light with a very high efficacy, but a CRI (color rating index) of 21. General purpose indoor HPS

[73] F. Dagostino and J. Wujek "Mechanical and Electrical System in Construction and Architecture", 4th edition, pg. 619.
[74] Ibid.
[75] F. Dagostino and J. Wujek "Mechanical and Electrical System in Construction and Architecture", 4th edition, pg. 627.
[76] Ibid.
[77] Ibid.

lamps offer a CRI of about 60 and color enhancing "white" types have achieved a CRI of up to 80, but these lamps have a lower efficacy.[78]

A characteristic comparison by lamp type is provided in *Table 3.I-2* below.

Table 3.I-2: Characteristic Comparison by Lamp Type

Lamp Type	Typical Efficacy (lm/W)	Typical Rated Life (hours)	Typical Operating Life (yrs)	Color Rendition (CRI)	Color Temperature
Mercury Vapor	25-55	12,000-29,000	6-14.5	15-50 (fair to good)	3000-5000 K (4940-8540°F)
Metal Halide	45-100	10,000-20,000	5-10	60-75 (very good)	3000-5000 K (4940-8540°F)
Low Pressure Sodium	80-150	14,000-18,000	7-9	0-10 (poor)	1750 K (2690°F)
High Pressure Sodium	45-110	10,000-29,000	5-14.5	20-25 (fair)	2100 K (3320°F)

Source: F. Dagostino and J. Wujek "Mechanical and Electrical System in Construction and Architecture", 4th edition

A summary of the best applications for each lamp type is provided in *Table 3.I-3* below.

Table 3.I-3: Characteristic Comparison by Lamp Type

Lamp Type	Application
Mercury Vapor	High ceiling spaces (e.g., warehouses, hangers)
Metal Halide	Interior – ambient (medium and large spaces) Sporting arenas (e.g., gyms, hockey rinks, baseball courts) Low ceiling spaces (e.g., offices, classrooms, retail, supermarket, shops) High ceiling spaces (e.g., warehouses, hangers) General exterior (e.g., parking areas, tunnels, roadways)
Low Pressure Sodium	General exterior (e.g., parking areas, tunnels, roadways)
High Pressure Sodium	Interior – ambient (medium and large spaces) Sporting arenas (e.g., gyms, hockey rinks, baseball courts) Low ceiling spaces (e.g., offices, classrooms, retail, supermarket, shops) High ceiling spaces (e.g., warehouses, hangers) General exterior (e.g., parking areas, tunnels, roadways)

Source: F. Dagostino and J. Wujek "Mechanical and Electrical System in Construction and Architecture", 4th edition

Proposed Lighting

The site lighting was designed to ensure no objectionable glare is directed to adjoining streets, homes and properties. Lighting was limited to the amount and intensity necessary for safety, security and to complement architectural character. A maximum of 0.5 footcandles was held at the property line to limit illumination beyond the property line in accordance with the Town of Wappinger regulations. Dark sky compliant fixtures were selected, since they cast light downward only and provide just the right amount of light exactly where it is needed.

[78] F. Dagostino and J. Wujek "Mechanical and Electrical System in Construction and Architecture", 4th edition, pg. 627.

The proposed light fixtures are 100 watt metal halide lantern light fixtures with a Type III cut-off optical assembly. This light fixture will be used extensively throughout the development as shown in *Figure 3.I-32* through *Figure 3.I-34*. The light fixtures will have a cast aluminum roof cap, which will reduce nocturnal glow and glare from urban areas and are considered to be dark sky compliant.

There is one instance where the cast lighting extends over the property line and this occurs at the intersection of Road "A" and All Angels Hill Road. The footcandles at the property line is approximately 0.25 footcandles, which is less than the allowed maximum. Up lighting will only be used to illuminate the proposed entrance feature only. Landscaping will be provided around entrance feature, which will mask the proposed accent lights. However, the proposed lighting as shown is not anticipated to adversely impact adjoining streets, homes and properties. The proposed lighting and photometrics is also provided on Sheets 1 of 5 through 3 of 5 "Landscape & Lighting Plan: Planting Plan" in *Appendix D*.

Signage

An illustrative view of the proposed entrance feature is shown in *Figure 3.I-28*. The proposed entrance feature will consist of decorative piers, decorative fencing, and landscape accent lights. The overall height of the proposed entrance feature will be 10-feet tall and approximately 35-feet long. The decorative fencing consists of two 8-foot wide Old Towne style fence sections and one 16-foot wide Old Towne style fence section. The height of the fencing will range from 6-feet to 10-feet. The decorative piers consists of two 7'-7" tall and two 8'-0" tall piers. The piers will be 9 square feet and will have a cultured stone brick façade. The actual sign will be 4'-0" by 8'-8" ¾-inch pressure treated sign board with a red background color and gold lines, text, and trim. The proposed entrance feature will be lit with Hanover Lantern 'Terralight' series landscape accent spot lights and landscape in-ground up lights. The spot lights are designed to emit a beam of light with usually not more than a 20° divergence (spread) from where it is directed.[79]

The location of the proposed entrance feature is shown in *Figure 3.I-32*. The proposed entrance feature is setback approximately 30 feet from the property line to ensure drivers turning onto All Angels Hill Road from Road "A" will have an unobstructed view of the traffic. The architectural design of the entrance feature complements the architectural design of the proposed homes within the Proposed Action. Landscaping will be provided around entrance feature, which will mask the proposed accent lights and mute the lighting cast.

3.I.2.3 Mitigation Measures

Views to the Property

The Proposed Action will introduce single-family homes and townhomes onto the project site. Residential development in this part of the Town generally consists of single-family homes. The Proposed Action clusters the majority of the residences and club house toward the interior of the property utilizing the existing topography and landscape.

Undeveloped areas will continue to exist along most of the property boundaries. Approximately 73.72 acres (51 percent of the property) is proposed to remain in open space. The existing

[79] F. Dagostino and J. Wujek "Mechanical and Electrical System in Construction and Architecture", 4th edition, pg. 631.

vegetation was retained to the greatest extent in order to provide a natural buffer between the Proposed Action and the adjoining properties. Landscaping and additional trees are provided along the northern, eastern, and southern property lines in order to supplement the existing vegetation, further improve the aesthetics of the Proposed Action, and provide additional natural screening of the property from the adjacent properties. The use of fencing for screening was avoided, since a natural blend between the existing landscape and the Proposed Action was preferred.

Within the development, the Applicant will provide trees on both sides of the street, outside of the street right-of-way which will be spaced approximately 50 feet on center. The internal street trees will provide a natural blend of colors which aesthetically, will marry the developed areas within the clustered property with the open space areas and natural corridors. Street trees will include a combination of the following trees:

Table 3.I-4: Street Trees

Botanical Name	Common Name
Acer rubrum 'Autumn Flame'	'Autumn Flame' Red Maple
Acer saccharum 'Green Mountain'	'Green Mountain' Sugar Maple
Fraxinus pensylvanica 'Patmore'	'Patmore' Green Ash
Platanus x acerifolia	London Planetree
Quercus rubra	Red Oak
Tilia cordata 'Greenspire'	Greenspire Littleleaf Linden
Ulmus americana 'Princeton'	'Princeton' American Elm
Zelkova serrata 'Green Vase'	'Green Vase' Zelkova

The Applicant intends on developing the site with a variety of architectural designs to avoid creating a monotonous housing development. The proposed homes will consist of an attractive ranch style house, two-story house, and townhouse unit with an attached, two car garage. A one car garage option will also be available. Illustrative examples of the proposed building designs area provided in *Figure 3.G-13* through *Figure 3.G-19*. The use of multi-leveled gables, ornamental cornices, arches, decorative windows, architectural roof materials, and landscaping will provide a residential development which exceeds the architectural design of most of the existing and new developments within the region. The combination of natural corridors and street trees will further join developed areas with open space areas. The proposed building designs are at a minimum consistent with the existing homes in the surrounding area.

The design and placement of all of the buildings will not have an adverse impact on the community character. The site layout utilizes the existing topography to minimize visibility and perceived scale of the buildings and to blend with the existing landscape. In addition, decorative landscaping and screening will be installed within the developed areas to reduce the visibility of the Proposed Action from the surrounding area. As a result of the preservation of the existing vegetation and the proposed landscaping, the residences will not be highly visible to where they would seem out of character with other existing homes in the immediate surrounding area. Therefore, no additional mitigation measures are proposed.

Property Lighting

As previously discussed, the site lighting was designed to ensure no objectionable glare was directed to adjoining streets, homes and properties. Lighting was limited to the amount and intensity necessary for safety, security and to complement architectural character. A maximum of 0.5 footcandles was held at the property line to limit illumination beyond the property line in accordance with the Town of Wappinger regulations. Dark sky compliant fixtures were selected, since they cast light downward only and provide just the right amount of light exactly where it is needed.

The proposed light fixtures are 100 watt metal halide lantern light fixtures with a Type III cut-off optical assembly and a maximum height of 12 feet. The light fixtures will have a cast aluminum roof cap, which will reduce nocturnal glow and glare from urban areas and are considered to be dark sky compliant. The proposed light fixtures are placed at key locations, such as intersections and the clubhouse parking, and throughout the development.

There is one instance where the cast lighting extends over the property line and this occurs at the intersection of Road "A" and All Angels Hill Road. Approximately 0.25 footcandles is measured at the property line, which is less than the allowed maximum. The hours of operation will be from to dusk to dawn in order to ensure the safety of the residents. Up lighting will only be used to illuminate the proposed entrance feature only. Landscaping will be provided around entrance feature, which will mask the proposed accent lights and mute the lighting cast. The proposed lighting as shown is not anticipated to adversely impact adjoining streets, homes and properties. Therefore, no additional mitigation measures are proposed.

Signage

The proposed entrance feature is setback approximately 30 feet from the property and will not obstruct a driver's view of traffic on All Angels Hill Road. The architectural design of the entrance feature complements the architectural design of the proposed homes within the Proposed Action, which will not adversely impact the community character. The proposed accent lights will have a low wattage and therefore, will not produce objectionable glare onto adjoining streets, homes and properties. Landscaping will be provided around entrance feature, which will mask the proposed accent lights and mute the lighting cast. Therefore, no mitigation measures are necessary.

3.I.3 Future Development Parcel

As previously discussed, an example use of the Future Development Parcel (*Figure 3.F-5*) was developed in order to access any potential impacts as a result of the parcel being developed.

3.I.3.1 Historic and Archaeological Resources

Based upon the Phase 1A and Phase 1B results, no adverse impacts to places listed or eligible for listing on the State or National Register of Historic Places are anticipated as a result of the Future Development Parcel. Therefore, no mitigation measures are necessary.

3.I.3.2 Visual Resources

Views to the Property

The views to the Future Development Parcel that would be seen from the adjacent properties and All Angels Hill Road are described below.

- The view looking north from All Angels Hill Road will be changed. The existing trees along the property line will be preserved to the greatest extent; however, the trees will be removed to construct the potential layout. A new building with associated parking, outdoor patio area, and landscaping will be seen.

- The view looking east across the constructed Road "A" will be changed. The view seen will be the same as the view looking north.

- The view looking south from All Angels Hill Road will be changed. The view seen will be the same as the view looking north.

- The view looking south from the Church will be primarily the same. The existing trees along the property line will be preserved to the greatest extent, which will screen the potential layout.

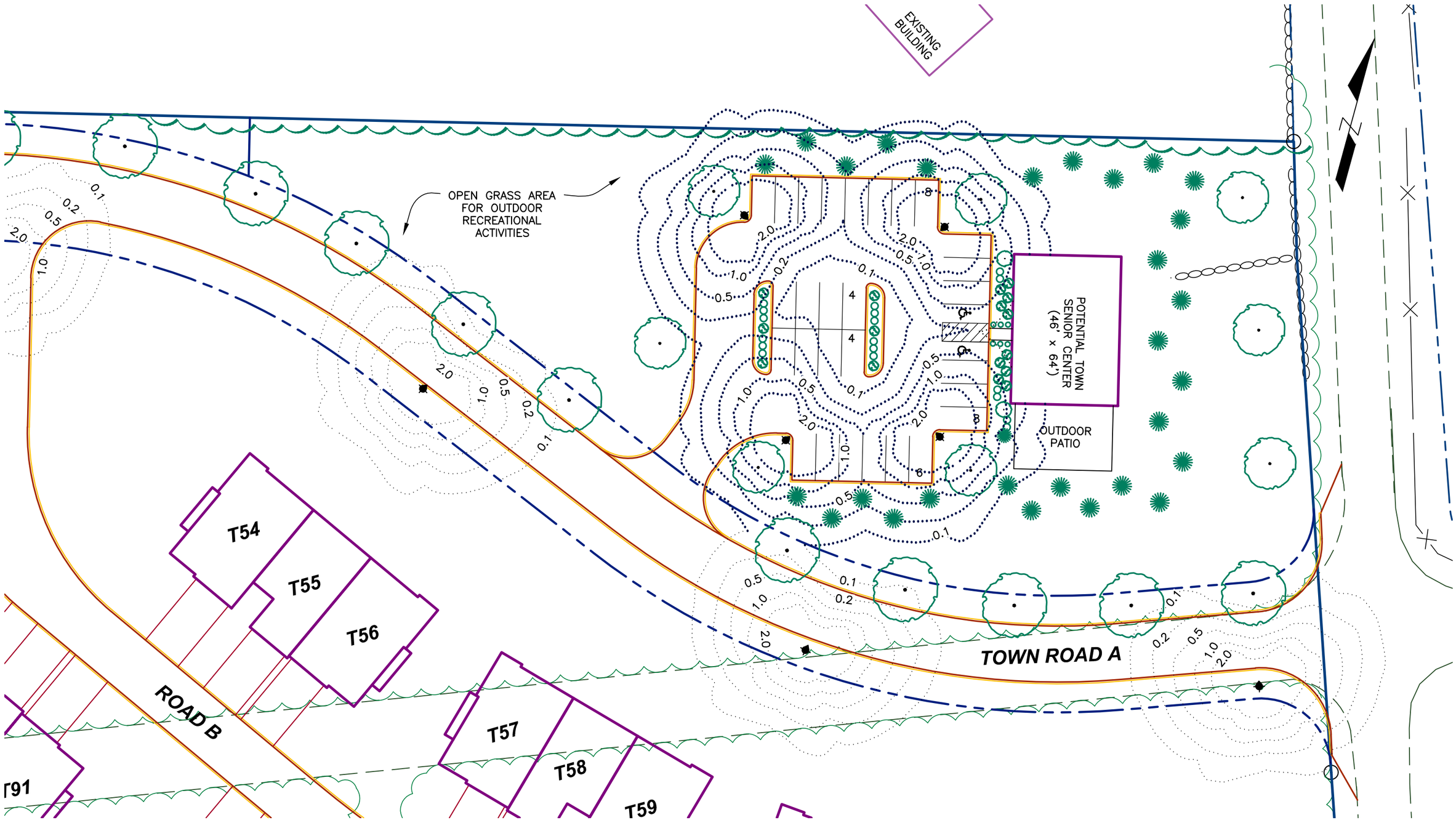
- The view looking west from across All Angels Hill Road will be changed. The view seen will be the same as the view looking north.

To supplement vegetation in areas where it is required to be removed, additional screening of the property from adjacent properties was shown along the property line in the example use (*Figure 3.F-5*). Screening plants are also shown along the building, outdoor patio area and parking lot. Street trees (see *Table 3.I-4*) are shown along Road "A", outside of the street right-of-way, spaced approximately 50 feet on center. The addition of the street trees will provide a natural blend of colors will marry the developed areas with the Proposed Action, open spaces and natural corridors. No additional mitigation measures would be necessary.

Property Lighting

The site lighting shown on the example use (*Figure 3.I-35*) was selected to ensure no objectionable glare is directed to adjoining streets, homes and properties. Lighting was limited to the amount and intensity necessary for safety, security and to complement architectural character. A maximum of 0.5 footcandles was held at the property line to limit illumination beyond the property line in accordance with the Town of Wappinger regulations. Dark sky compliant fixtures were selected, since they cast light downward only and provide just the right amount of light exactly where it is needed.

The light fixtures shown are 100 watt metal halide lantern light fixtures with a Type III cut-off optical assembly, which are the same fixtures used in the Proposed Action. The potential light locations and photometrics are shown in *Figure 3.I-35*. The light fixtures would have a cast aluminum roof cap, which will reduce nocturnal glow and glare from urban areas, and are considered to be dark sky compliant. The potential lighting as shown is not anticipated to adversely impact adjoining streets, homes and properties. Therefore, no additional mitigation measures would be necessary.



PREPARED BY:

POVALL ENGINEERING, PLLC

LEGEND

- LIGHT POLE
- 2.0 — PROPOSED ACTION PHOTOMETRICS/FOOTCANDLES
- 2.0 — FUTURE DEVELOPMENT PARCEL PHOTOMETRICS/FOOTCANDLES

HILLTOP VILLAGE AT WAPPINGER

FUTURE DEVELOPMENT PARCEL EXAMPLE USE POTENTIAL LIGHTING PLAN

FIGURE 3.I-35
DATE: 02/2012
PAGE 338
SCALE: 1"=40'

3.J Stormwater Management

This section evaluates the existing and proposed hydrologic and hydraulic conditions. These conditions are evaluated based on mapping provided by the United States Geological Service (USGS) 7.5-minute topographic maps, aerial photographs, a topographic property survey, soil surveys, and site investigations. Potential impacts were identified and mitigation measures, if any, are provided.

3.J.1 Existing Conditions

The property is located within the Wappinger Creek watershed and the Sprout Creek watershed. According to the Dutchess Watersheds website, the Wappinger Creek watershed covers approximately 211 square miles (134,871 acres) of land within 11 towns and 2 villages. Approximately 95.80 acres or 64 percent of the site is located within the Wappinger Creek watershed. According to the June 2005 "Natural Resource Management Plan for the Fishkill Creek Watershed" report, the Sprout Creek watershed is a subwatershed of the Fishkill Creek watershed and covers approximately 29,342 acres. Approximately 53.55 acres or 36 percent of the property is located within the Sprout Creek watershed. According to the "Final New York State 2010 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy", neither of these creeks are listed as an impaired water.

Stormwater runoff generated from the site generally flows overland to the northern property line; to the northwestern stream (#H-101-4-2-1); and to the eastern stream (#H-95-10-1-1). Stormwater runoff flowing to the northern property line continues offsite flowing overland and into a stream that flows into the eastern side of Lake Oniad. Stormwater runoff flowing to the northwestern stream continues offsite flowing into the southern side of Lake Oniad. The released stormwater from Lake Oniad ultimately flows into the Wappinger Creek. Stormwater runoff flowing to the eastern stream continues offsite and ultimately flows into the Sprout Creek.

3.J.1.1 Groundwater

According to the United States Department of Agriculture (USDA) Soil Conservation Service Soil Survey for Dutchess County, the depth to groundwater varies across the site. The depth to groundwater ranges from half a foot to six (6) feet. The depth to groundwater for each of the soil types is summarized in *Table 3.J-1* below.

Table 3.J-1: USDA Soil Data – Depth to Groundwater

Map Symbol	Description	Depth to Groundwater (ft)
BeB	Bernardston silt loam, 3 to 8 percent slopes	1.5-2.0 (Feb-Apr)
BeC	Bernardston silt loam, 8 to 15 percent slopes	1.5-2.0 (Feb-Apr)
BeD	Bernardston silt loam, 15 to 25 percent slopes	1.5-2.0 (Feb-Apr)
Ca	Canandaigua silt loam, neutral substratum	+1-1.0 (Nov-May)
Cc	Carlisle muck	+0.5-1.0 (Sep-June)
DwB	Dutchess-Cardigan complex, undulating, rocky	>6.0
HsA	Hoosic gravelly loam, nearly level	>6.0
HsC	Hoosic gravelly loam, rolling	>6.0

Map Symbol	Description	Depth to Groundwater (ft)
PwB	Pittstown silt loam, 3 to 8 percent slopes	1.5-3.0 (Nov-Apr)
PzB	Punsit silt loam, 3 to 8 percent slopes	0.5-1.5 (Feb-Apr)
Ur	Urban land	>2.0

Aquifer mapping was reviewed to determine if the project site is located over a sole source, primary, or principal aquifer. The EPA Soil Source Aquifers Map shows that there are no sole source aquifers within Dutchess County. The NYSDEC "Primary Aquifers in New York State" Map shows that the only primary aquifer within Dutchess County is located in Fishkill. The NYSDEC "Primary and Principal Aquifers in New York State" Map shows that there are several primary or principal aquifers within Dutchess County. Since the only primary aquifer within Dutchess County is located in Fishkill, the remaining aquifers shown are principal aquifers. The United States Aquifer Map website shows the edge of the carbonate-rock aquifer, which is a principal aquifer, is located approximate 0.5 miles to the south of the project site and that no part of the site is located over this aquifer. Therefore, the project site is not located over a sole source, primary, or principal aquifer.

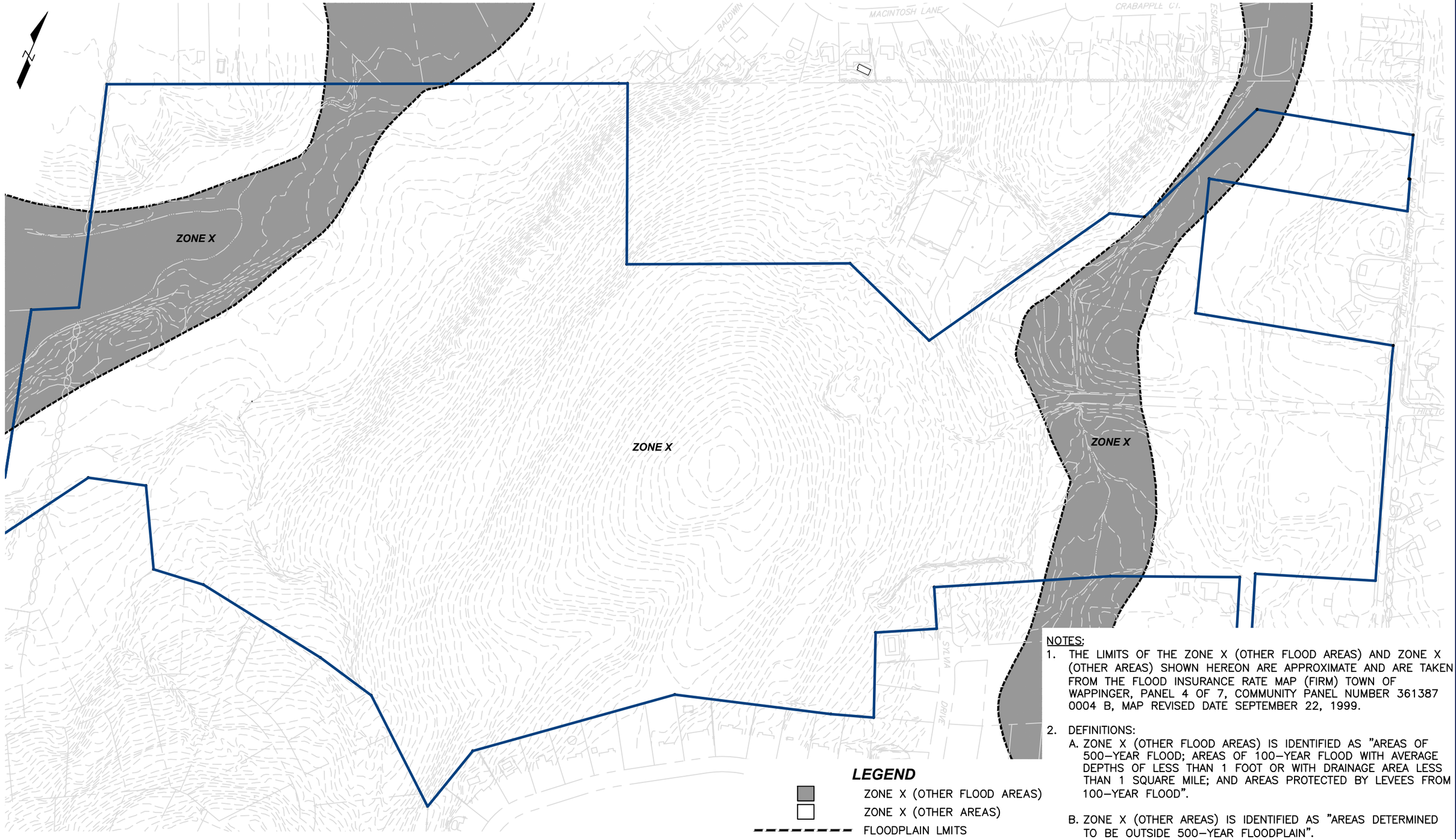
3.J.1.2 Surface Waters

The eastern stream (#H-95-10-1-1) originates from the Ye Olde Apple Orchard Pond, which is approximately 120 feet to the north of the property, and is a subtributary to Sprout Creek. The onsite portion of the stream is approximate 1,890 linear feet in length and travels in a southerly direction to the southern property line, where it leaves the site flowing in a south/southeast direction and ultimately into the Sprout Creek. According to the NYSDEC Environmental Resource Mapper, the stream is classified as Class C and is not regulated by the NYSDEC.

The northwestern stream (#H-101-4-2-1) originates offsite to the southwest of the southern property line and is a subtributary to Wappinger Creek. The onsite portion of the stream is approximately 1,580 linear feet in length and travels in a northeasterly direction to the northern property line, where it leaves the site flowing in a northeast direction into Lake Oniad, which is located approximately 600 feet to the north of the property. The released stormwater from Lake Oniad flows in a northwesterly direction and ultimately into the Wappinger Creek. According to the NYSDEC Environmental Resource Mapper, the stream is classified as Class B and is regulated by the NYSDEC.

3.J.1.3 Floodplains

The property is located within Zone X (other flood areas) and Zone X (other areas) according to the Flood Insurance Rate Map (FIRM) Town of Wappinger, New York, Panel 4 of 7, Community Panel Number 361387 0004 B, Map revised date September 22, 1999. Zone X (other flood areas) is defined as "areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood". Zone X (other areas) is defined as "areas determined to be outside 500-year floodplain". The zones are shown in *Figure 3.J-1*.



NOTES:

1. THE LIMITS OF THE ZONE X (OTHER FLOOD AREAS) AND ZONE X (OTHER AREAS) SHOWN HEREON ARE APPROXIMATE AND ARE TAKEN FROM THE FLOOD INSURANCE RATE MAP (FIRM) TOWN OF WAPPINGER, PANEL 4 OF 7, COMMUNITY PANEL NUMBER 361387 0004 B, MAP REVISED DATE SEPTEMBER 22, 1999.

2. DEFINITIONS:
   A. ZONE X (OTHER FLOOD AREAS) IS IDENTIFIED AS "AREAS OF 500–YEAR FLOOD; AREAS OF 100–YEAR FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREA LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 100–YEAR FLOOD".

   B. ZONE X (OTHER AREAS) IS IDENTIFIED AS "AREAS DETERMINED TO BE OUTSIDE 500–YEAR FLOODPLAIN".

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HILLTOP VILLAGE AT WAPPINGER

FLOODPLAIN MAP

FIGURE 3.J-1

DATE: 02/2012

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SCALE: 1"=300'

3.J.1.4 Design Points

The study area consists of an overall watershed that encompasses approximately 717.86 acres and contains the entire property. The overall watershed was broken down into smaller watersheds, or subcatchments, to allow for analysis of runoff conditions at several locations throughout the study area. Each of these locations was defined as a Design Point (DP) in order to compare the effects of the proposed development. Descriptions of each of the selected design points are provided below:

- Design Point 1: Entrance to culvert beneath Tor Road.
  Onsite and offsite stormwater runoff flows to the onsite stream, which continues offsite to a culvert beneath Tor Road.

- Design Point 2: Stream entrance to eastern part of Lake Oniad.
  Onsite and offsite stormwater runoff flows to a stream that discharges to Lake Oniad.

- Design Point 3: Stream entrance to southern part Lake Oniad.
  Onsite and offsite stormwater runoff flows to a stream that discharges to Lake Oniad.

The pre-development watersheds and design points are shown in *Figure 3.J-2 through Figure 3.J-4*.

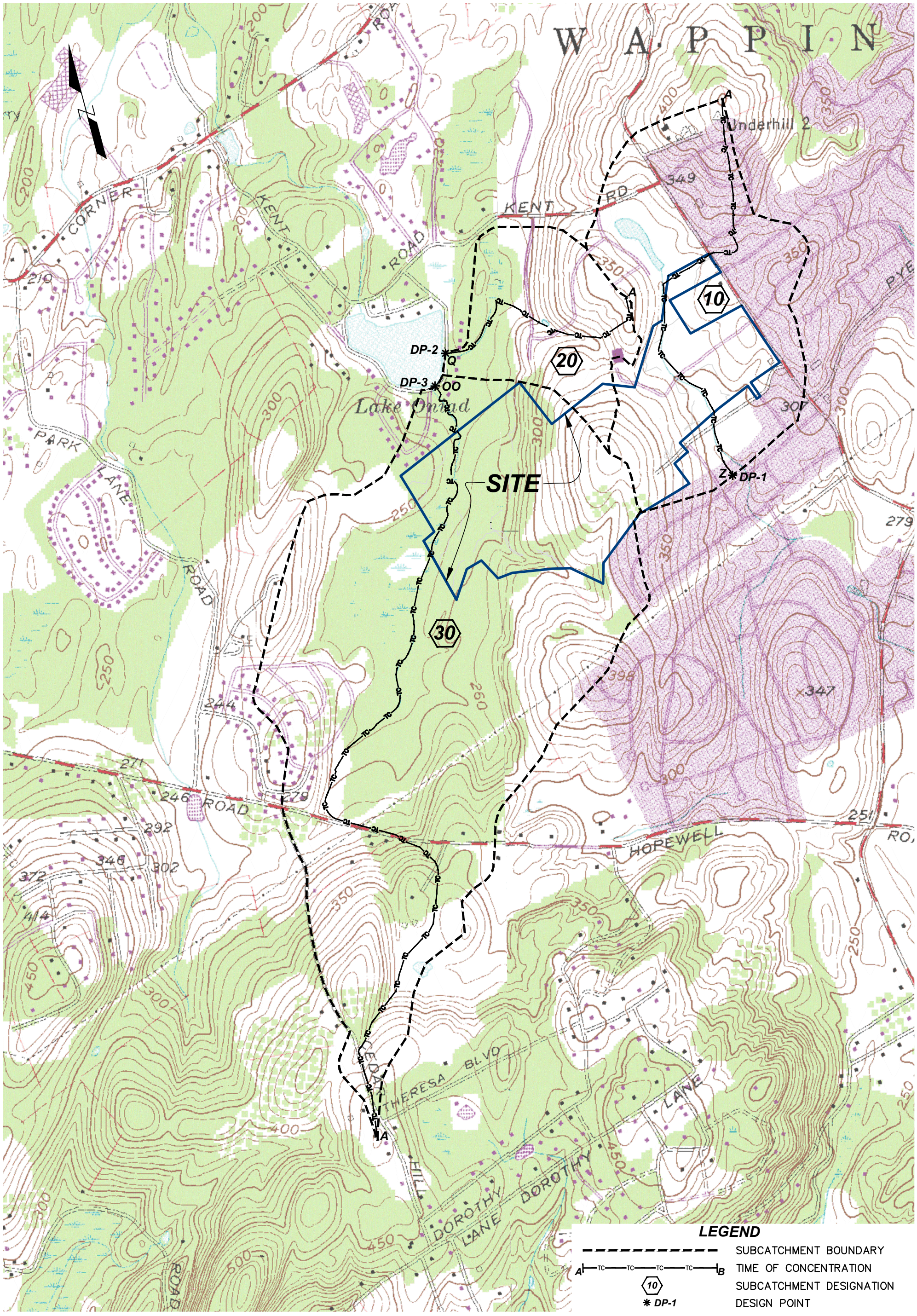
3.J.1.5 Quantitative Method of Analysis

An analysis was performed using the methods and procedures outlined in *Technical Release #20 (TR-20)* and *Technical Release #55 (TR-55), Urban Hydrology for Small Watersheds*, published by the US Department of Agriculture, Soil Conservation Service. A Type III Dutchess County rainfall distribution was used to generate hydrographs for the 1-, 10-, 25-, and 100-year 24-hour storm events. Rainfall data utilized in the modeling and analysis was taken from National Weather Service (NWS) Technical Paper 40 (TP-40), Rainfall Frequency Atlas of the U.S. Weather Bureau, published by the U.S. Department of Commerce. Rainfall data specific to the portion of Dutchess County under consideration is provided in *Table 3.J-2* below.

Table 3.J-2: Rainfall Data

Storm Event	24-Hour Rainfall
1-year	2.80 inches
10-year	5.00 inches
25-year	6.00 inches
100-year	8.00 inches

The study area was divided into subcatchments for pre- and post-development conditions. The separation of the watershed into subcatchments was dictated by watershed conditions, methods of collection, conveyance, and points of discharge. Watershed delineations were defined using the United States Geological Service (USGS) 7.5-minute topographic maps, aerial photographs, a topographical survey, soil surveys, and site investigations.



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HILLTOP VILLAGE AT WAPPINGER

PRE-DEVELOPMENT WATERSHED DELINEATION MAP I

FIGURE 3.J-2
DATE: 02/2012
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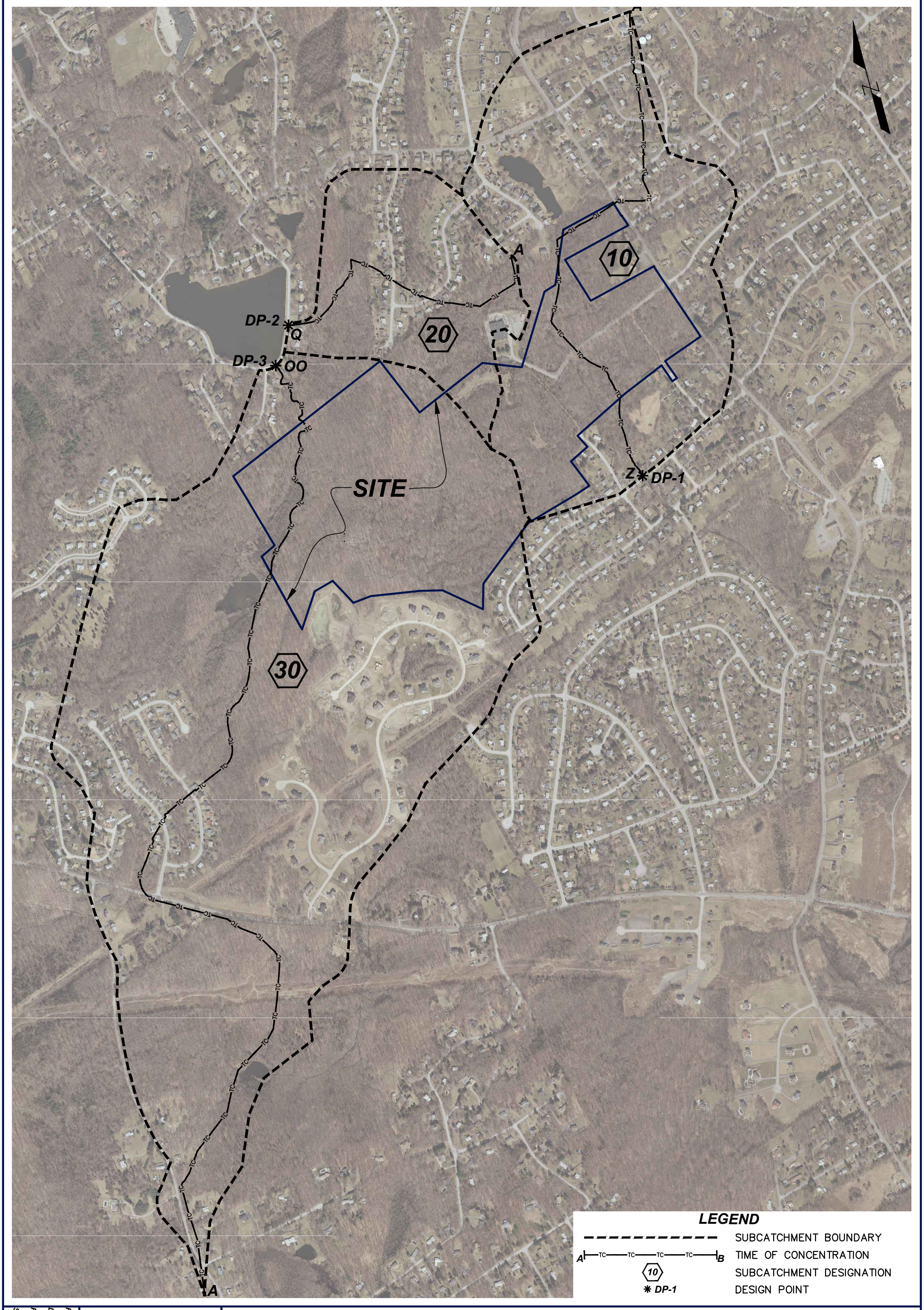
SCALE: 1"=1,000'



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HILLTOP VILLAGE AT WAPPINGER

PRE-DEVELOPMENT WATERSHED DELINEATION MAP II

FIGURE 3.J-3
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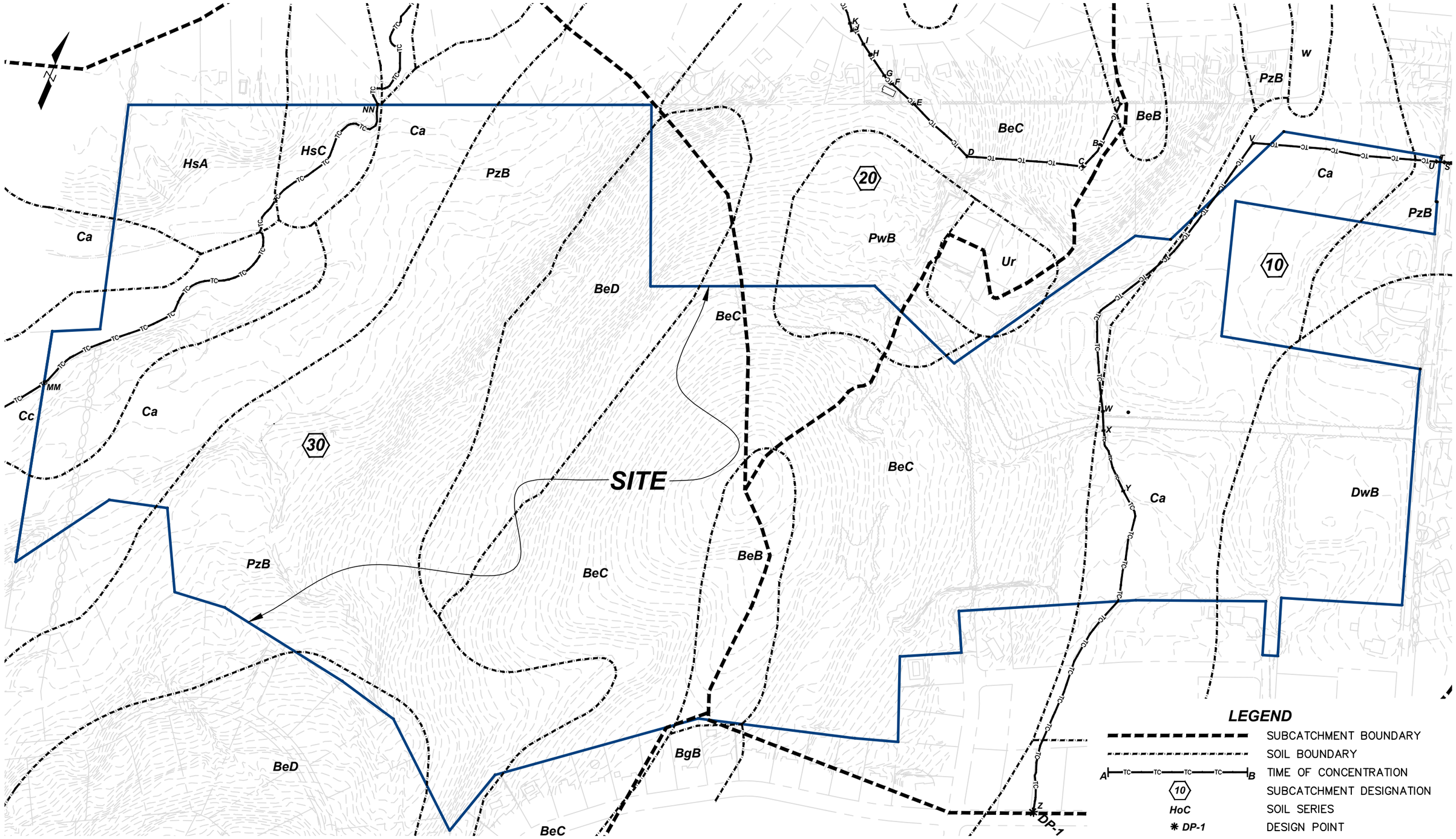
SCALE: 1"=800'



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HILLTOP VILLAGE AT WAPPINGER

PRE-DEVELOPMENT WATERSHED DELINEATION MAP III

FIGURE 3.J-4

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SCALE: 1"=300

HydroCAD, a Computer-Aided-Design (CAD) program, was used to analyze the hydrologic and hydraulic characteristics of the pre-development watershed conditions, post-development watershed conditions, and proposed stormwater management systems. HydroCAD has the capability of computing hydrographs (which represents discharge rates characteristic of specified watershed conditions, precipitation, and geologic factors), combining hydrographs, and routing flows though pipes, streams, channels, and ponds.

3.J.1.6 Analysis of Pre-Development Watersheds

The pre-development peak discharge rates are summarized in *Table 3.J-3* below.

Table 3.J-3: Pre-Development Peak Discharge Rates

DP	1-year Event (cfs)	10-year Event (cfs)	25-year Event (cfs)	100-year Event (cfs)
1	63.93	203.40	274.14	421.13
2	27.49	84.33	113.07	172.35
3	54.38	208.74	292.90	473.88

Refer to Appendix G in the SWPPP in *Appendix C.3* for the complete pre-development analysis.

3.J.2 Potential Impacts

3.J.2.1 Post-Development Conditions

The post-development ground cover will consist of impervious surfaces (e.g., pavement, buildings, and sidewalks), woods, grass, and water surfaces (i.e., stormwater management ponds). Additional grass and landscaping areas will be added to the site. Approximately 24.20 acres of additional impervious coverage will be added to the site. Therefore, the total impervious coverage is 25.53 acres, or 17.1 percent of the site.

The topography outside the residential development will remain unchanged. The lowest and highest elevations will remain unchanged. Slopes range from 1 to greater than 25 percent in undisturbed areas. The majority of the proposed slopes range from 2 to 7 percent in paved areas and 2 to greater than 25 percent in grass areas.

As previously discussed, the property is located within the Wappinger Creek watershed and the Sprout Creek watershed. As a result of the proposed development, approximately 89.81 acres, or 60 percent of the site will be within the Wappinger Creek watershed and approximately 59.53 acres, or 40 percent of the site will be within the Sprout Creek watershed. Even though there is a change in the areas located within the two watersheds, the proposed stormwater management facilities will treat the stormwater runoff generated from the proposed development prior to discharging in a controlled manner. Therefore, no adverse impacts to the two watersheds and creeks are anticipated as a result of the development.

Stormwater runoff outside the residential development will continue to flow overland in the same direction as in the pre-development conditions. The proposed topography of the residential development will generally convey stormwater runoff via sheet flow to onsite catch basins within the

paved roads, parking areas or to grass swales. Localized low and high points have been created to aid in the collection of stormwater runoff. The collected stormwater will be conveyed via a closed pipe network or via grass swales to stormwater management systems for treatment. The stormwater management systems consist of five micropool wet extended detention ponds and two bioretention areas. The treated stormwater will be released in a controlled manner to the wetlands prior to entering the northwestern and eastern streams. Stormwater runoff will be released from the site at a rate equal to or less than that which existed prior to development of the Proposed Action.

3.J.2.2 Potential Water Quality Impacts

Stormwater runoff from developed land is recognized as a significant contributor of pollution that can adversely affect the quality of the receiving waters. Stormwater runoff can contain winter maintenance materials, fertilizers, and pesticides.

Winter Deicing and Traction Materials

The application and storage of winter maintenance materials to combat snow and ice can lead to water quality problems for surrounding areas. Traditional winter maintenance materials are salt, such as sodium chloride, and sand. Salt is used to melt snow and ice and sand is used to provide traction for cars and pedestrians. Salts are very soluble when they come into contact with stormwater. Even when applied in relatively small quantities, salt can damage and kill vegetation, disrupt fish spawning in streams, reduce oxygen solubility in surface water, migrate into groundwater used for public water supplies, contaminate surfaces waters, deteriorate pavement, and cause metal corrosion of bridges, cars and plumbing. Similarly, sand can bury aquatic floor life, fill in aquatic habitats, cloud surface waters, erode stream banks and other landscapes, accumulate in catch basins, and plug storm lines. Sources of winter maintenance materials include improper storage and highway, road, and parking applications.

Fertilizers

Lawns produce significant amounts of nutrient-rich stormwater runoff. Elevated concentrations of phosphorus and nitrogen can cause eutrophication in streams, lakes, reservoirs, and estuaries. Chemical and organic fertilizers both can poison aquatic animals and lead to destructive algae blooms, which depletes oxygen levels in water. Significant sources of phosphorus and nitrogen include fertilizer, atmospheric deposition, animal waste, and organic matter.

Pesticides

The major categories of pesticides are herbicides, insecticides, and fungicides. Pesticides in stormwater runoff directly affect the health of both aquatic and human life. Some of the more commonly used household and garden insecticides have been detected in urban and suburban streams at higher frequencies and concentrations than in agricultural streams. The concentrations approached or exceeded the toxicity thresholds for aquatic life. Sources of pesticides include applications to urban lawns, urban gardens, and highway median and shoulder areas.