

APPENDIX A

Engineering Report

Water Supply Concept Report

Hudson Heritage Project

3532 North Road (U.S. Route 9)
Town of Poughkeepsie
Dutchess County, New York



Engineers
Land Surveyors
Planners
Environmental & Safety Professionals
Landscape Architects

Prepared for:

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December 8, 2015
Revised October 17, 2016

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Prepared by:

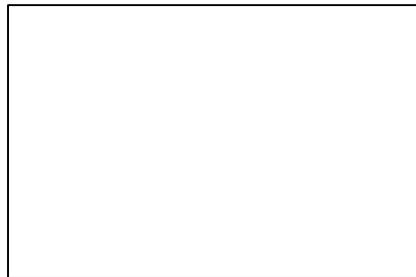
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EXECUTIVE SUMMARY

The Applicant, EFG/DRA Heritage, LLC proposes to redevelop the former site of the Hudson River Psychiatric Center located at 3532 North Road (US Route 9) in the Town of Poughkeepsie with a mixed-use residential and commercial development. The development includes the construction of 750 residential housing units of diverse types, 350,000 square feet (sf) of commercial retail space, a hotel with spa and restaurant, a bed and breakfast and community amenities.

The Hudson Heritage project site lies within the Town of Poughkeepsie Town-wide Water District and Fourth Ward Sewer Improvement Area. Municipal water will be supplied to the Hudson Heritage project site via a new connection to the existing 12-inch Town water main running on Paint Shop Road near the east end of the site. The Poughkeepsie Town-wide Water District has adequate reserve capacity to serve to the proposed development.

The proposed development at full buildout and maximum occupancy is expected to use approximately 237,718 gallons of water per day on average (165.1 gpm) with a maximum daily flow of 475,435 gpd (330 gpm).

Development of the property is expected to proceed in two (2) main phases of construction beginning with development of the commercial areas followed by development of the residential areas.

The Hudson Heritage site contains an extensive network of ageing underground utilities serving the former Psychiatric Center. The existing on-site water distribution system will be abandoned in place and replaced entirely with new water mains as construction progresses.

The on-site water distribution system will consist of a network of water mains of various sizes totaling approximately 18,500 linear feet. The overall water distribution system will be divided into two distinct pressure zones to accommodate the wide range of elevation within the service area and provide acceptable working pressures.

Some of the on-site infrastructure including internal roads, water distribution system and sewer collection system may be offered for conveyance to the Town following completion of construction. At this time, the main collector roads on the Hudson Heritage project site from the two (2) main entrances on Route 9 to Paint Shop Road on the east end of the site are proposed to be conveyed to the Town. It is also anticipated that the Town will request that portions of the on-site water distribution system located within public right-of-ways be dedicated to the Town-wide Water District.

1.0 INTRODUCTION

The Applicant, EFG/DRA Heritage, LLC proposes the Hudson Heritage Project to redevelop the former site of the Hudson River Psychiatric Center located at 3532 North Road (US Route 9) in the Town of Poughkeepsie with a mixed-use residential and commercial development. The project site on which the Hudson Heritage development is proposed consists of 156± acres of land previously owned by the New York State Office of Mental Health and was the site of the former Hudson River Psychiatric Center.

The project sponsor proposes the development of residential housing of various types such as apartments, townhouses and detached single-family dwellings arranged in a pattern of neighborhoods along with commercial retail buildings including a hotel, spa and restaurant.

The development of the property includes the construction of 750 residential housing units of diverse types (apartment, townhouse, single family dwelling), 350,000 square feet (sf) of commercial retail space, a hotel with spa and restaurant, a bed and breakfast and community amenities.

Except for a few buildings identified for re-use, the redevelopment will require demolition of most of the existing buildings and structures on-site because of their deteriorated condition. The project may include adaptive re-use of the main wing of the former Administration Building potentially as a hotel and re-use of the former Library, Amusement Hall and Chapel as a community center with amenities.

The Hudson Heritage project site is currently served by public water and sewer systems and lies within the Town of Poughkeepsie Town-wide Water District and Fourth Ward Sewer Improvement Area. Municipal water will be supplied to the Hudson Heritage project site via a new connection to the existing 12-inch Town water main running on Paint Shop Road near the east end of the site. The Poughkeepsie Town-wide Water District has adequate reserve capacity to serve to the proposed development.

This water supply concept report has been prepared as part of several technical studies completed in support of the Draft Environmental Impact Statement (DEIS) for the Hudson Heritage project. The water supply concept report provides a brief description of the existing condition at the project site, an evaluation of the ability of the Poughkeepsie Town-wide Water District to supply municipal water to the project, and a basis of design for the proposed water distribution system improvements.

2.0 PROJECT SITE

2.1 Location

The Hudson Heritage project site is located east of and adjacent to U.S. Route 9 just north of Winslow Gate road and directly across from Quiet Cove Park and the Marist College campus in the Town of Poughkeepsie. The project site encompasses approximately 156± acres of land on a property identified as tax parcel 6163-03-011149 on the Town of Poughkeepsie tax map. The project site is located within the Historic Revitalization Development District (HRDD) of the Town.

The project site is bordered on the north by commercial and residential development and the Town of Hyde Park town line, on the south by the Mid-Hudson Plaza, on the east by New York State owned property and on the west by New York State Route 9.

Figure 1 is an ortho-photograph of the subject site overlaid with tax map information (hereto attached at the end of this report).

2.2 Description

The project site is occupied by a total of fifty-five (55) buildings, structures and supporting facilities that were originally built to serve the Hudson River Psychiatric Center which operated from 1873 until its closure in the early 2000s. The campus is notable for its main Administration Building, known as "Kirkbride" which has been designated a National Historic Landmark.

The site was closed and abandoned in 2003 and since then the buildings and structures have fallen into a state of disrepair. The site now consists of vacant and abandoned buildings with overgrown open space, roadways, drives and parking lots.

2.3 Topography

The project site consists of a rolling hill top overlooking U.S. Route 9 and the Hudson River to the south and west. The site generally slopes from east to west. Approximately 66% of the site has slopes ranging from 0% to 10%. Portions of the site along the its western edge adjacent to U.S. Route 9 have slopes steeper than 10%. The majority of the mixed-use development is proposed within areas of the site with slopes less than 10%.

Surface elevations on the project site range from approximately 55 feet above mean sea level (amsl) at the edge of U.S Route 9 near the northwest corner of the property to approximately 230 feet amsl near the northeast corner of the property.

2.4 Soils

According to the United States Department of Agriculture (USDA) Dutchess County Soil Survey maps, four (4) major soil types are present on site: Hoosic Urban land complex undulating (HuB), Hoosic Urban land complex nearly level (HuA), Hoosic gravelly loam undulating (HsB) and Dutchess Cardigan complex rolling rocky (DwC). Hoosic soils generally consist of glacial outwash and alluvial deposits along major streams or tributary valleys of the Hudson River. Dutchess-Cardigan soils consist of glacial till over shale bedrock formations.

The HuB, HuA, HsB and DwC soil types cover approximately 75% of the project site. The HuB, HuA and HsB soil types belong to the hydrologic group A whereas the DwC soil type belongs to the hydrologic group B. These soils are well drained and characterized by a depth to bedrock greater than 5 feet and a high water table depth greater than 6 feet. A soil map showing the soil types encountered on the project site is shown in Figure 2, hereto attached.

2.5 Water Resources

An unnamed perennial stream traverses the site from northeast to southwest along the eastern and southern limits of the property. This stream is classified as a Class C stream according to the NYSDEC. This stream flows in a southwesterly direction across the site and then under U.S. Route 9 before discharging into the Hudson River.

According to the National Wetland Inventory (NWI), there are several small federally-regulated wetlands on the southern edge of the property. There are not NYSDEC regulated wetlands on the site. Figure 8 is a map showing existing water resources on-site (hereto attached).

3.0 PROJECT DESCRIPTION

The project sponsor proposes the development of residential housing of various types such as apartments, townhouses and detached single-family dwellings arranged in a pattern of neighborhoods along with commercial retail buildings including a hotel, spa and restaurant.

The Project may also include adaptive re-use of a portion of the main wing of the former Administration Building, potentially as a hotel with spa and restaurant. The Project is also considering re-use of the former Library, Amusement Hall and Avery Chapel as amenities including a community center. The existing Director's residence may also be renovated and converted to a 15-room bed and breakfast facility, museum, or similar facility.

The Project will also incorporate walking paths, recreation areas and open space while preserving the 18-acre "Great Lawn."

More specifically, the project will include the following building program based on the most up-to-date Development Master Plan:

Residential Development

Residential properties will be comprised of apartments, townhouses, and single-family homes in a range of unit sizes dispersed throughout the project site as follows:

- 500 apartments in a mix of one (1) and two (2) bedroom units (800 bedrooms)
- 225 townhouses with three (3) bedrooms each (675 bedrooms)
- 25 single-family residences with four (4) bedrooms each (100 bedrooms)

Commercial Development

- 80-room hotel with spa and restaurant (renovated Kirkbride Building)
- 15-room bed and breakfast, museum, or similar facility (renovated Director's Residence)
- 350,000 sf of commercial retail space

Community Amenities

- Club House
- Community Center (adaptive re-use of former Library, Amusement Hall and Avery Chapel)

The residential component of the development will be located in the northern half of the site. The commercial development will occupy the southern portion of the site adjacent to U.S. Route 9. The hotel, spa and restaurant will be located within the proposed residential development area.

4.0 PROJECT PHASING

Development of the property is expected to proceed in several phases of construction beginning mainly with the commercial buildings located in the southern portion of the site along U.S. Route 9 including all associated site improvements such as paved roadways, parking lots, drainage and utilities including electrical, water and sewer service.

The residential development phase is anticipated to be constructed over a period of ten (10) years subsequently to or concurrently with the commercial development phase depending on future market condition. The construction of the hotel, spa and restaurant is anticipated to coincide with that of the residential development phase.

5.0 PROJECTED WATER DEMAND

The proposed development includes a mix of residential and commercial uses. Projected water demand is based on the Building Program presented in the most up-to-date Development Master Plan.

The anticipated average daily water demand for the proposed development was estimated using typical hydraulic loading rates as recommended in Table B-3 of the latest edition of the New York State Design Standards for Intermediate Sized Wastewater Treatment Systems (March 2014) as summarized in Table 1 below. The estimated flows were adjusted when applicable to take into account the allowed 20% reduction in flow for use of water-saving fixtures as mandated by Section 15-0314 of the Environmental Conservation Law.

The proposed development at full buildout and maximum occupancy is expected to use approximately 237,718 gallons of water per day on average (165.1 gpm) with a maximum daily flow of 475,435 gpd (330 gpm) as shown in Table 1. The peak hourly flow is expected to be 950,870 gpd or 660 gpm assuming a peaking factor of 4.

**TABLE 1: HUDSON HERITAGE PROJECT
PROJECTED WATER DEMAND/WASTEWATER FLOW⁽¹⁰⁾**

Type of Use	Unit	Unit Qty	Hydraulic Loading Rate ⁽¹⁾ (gpd/unit)	Water Saving Credit ⁽²⁾ (%)	Hydraulic Loading Rate w/ Credit (gpd/unit)	Average Daily Flow (gpd)
Residential						
Multi-Family Apartments	1-Bedroom	200	110 ⁽³⁾	---	110	22,000
	2-Bedroom	300	220 ⁽³⁾	---	220	66,000
Town Homes	3-Bedroom	225	330 ⁽³⁾	---	330	74,250
Single-Family Homes	4-Bedroom	25	440 ⁽³⁾	---	440	11,000
Commercial						
Retail/Gas Station/Bank	sf	350,000	0.1	20%	0.08	28,000
Employees ⁽⁴⁾	employee	875	15	20%	12	10,500
Hotel & Spa						
Hotel Rooms	sleeping unit	80	110 ⁽⁵⁾	---	110	8,800
Restaurant	seat	60	35	20%	28	1,680
Spa (12,000 sf) - 80 patrons	patron	80	20 ⁽⁶⁾	20%	16	1,280
Bed & Breakfast						
Rooms	room	15	110 ⁽⁵⁾	---	110	1,650
Civic/Community						
Club House (3,700 sf) ⁽⁷⁾	seat	148	20 ⁽⁷⁾	20%	16	2,368
Community Center (13,276 sf) ⁽⁸⁾	patron	266	5 ⁽⁸⁾	20%	4	1,064
Employees ⁽⁹⁾	employee	16	15	20%	12	192
Irrigation						
Public Parks/Open Space	acre	13	608 ⁽¹¹⁾	0%	608	7,904
Landscaped Areas along Blvds	acre	1.8	572 ⁽¹¹⁾	0%	572	1,030
Avg Daily Flow:						237,718
Max Day Peak Factor:						2.0
Max Daily Flow (gpd):						475,435
Max Daily Flow (gpm):						330
Hourly Peak Factor:						4.0
Peak Hourly Flow (gpd):						950,870
Peak Hourly Flow (gpm):						660

Notes:

- Hydraulic Loading Rates from Table B-3 of NYS Design Standards for Wastewater Treatment Systems (2014) unless otherwise noted below
- NYSDEC allows for up to 20% reduction in flows for installations equipped with certified water-saving plumbing fixtures.
- Unit rate of 110 gpd/bedroom includes the 20% reduction for use of water-saving post 1994 plumbing fixtures
- Assumed 2.5 employees/1,000 sf of retail floor space per Development Impact Assessment Handbook, Urban Land Institute 1994
- Unit rate for room or sleeping unit includes the 20% reduction for use of water-saving post 1994 plumbing fixtures
- Category or use not specifically listed in Table B-3 of 2014 NYSDEC Standard. In lieu, use Hydraulic Loading Rate of 20 gpd per Health Club patron per Table B-3.
- Assumed 25 sf of gross floor space per seat and rate of 20 gpd/seat for Lounge/Bar per Table B-3 of 2014 NYSDEC Standard
- Assumed 50 sf of gross floor space/occupant and rate of 5 gpd/patron for Library/Museum per Table B-3 of NYSDEC Standard
- Assumed 1.25 employees per 1,000 sf of community center gross floor space
- Projected water demand/wastewater flow assumes full buildout and maximum occupancy of proposed facilities. Water demand taken as equivalent to wastewater flow
- Irrigation demand for turf and landscaped areas estimated using "Guidelines for Estimating Unmetered Landscaping Water Use (PNNL-19498) prepared for the U.S. Dept of Energy assuming 3.31 gal/sf/year for turf and 3.12 gal/sf/year for landscaped areas and 65% sprinkler system efficiency

6.0 CONNECTION TO POUGHKEEPSIE TOWN-WIDE WATER DISTRICT

The Hudson Heritage project site is located within the boundaries of the Town of Poughkeepsie Town-wide Water District. Municipal water will be supplied to the Hudson Heritage project site via a new connection to the existing 12-inch Town water main running on Paint Shop Road near the east end of the site. The Poughkeepsie Town-wide Water District has adequate reserve capacity to serve to the proposed development. No capital improvements to the Poughkeepsie Town-wide Water District or Poughkeepsie Water Treatment Facility are required as a result of the proposed project.

6.1 Background

New York State owned and operated the Hudson River Psychiatric Center in the Town of Poughkeepsie for over 100 years starting in 1873 until its closure in the early 2000's. Historically, the Town has supplied water service to the Psychiatric Center under contract agreements and still continues to serve the property via the Town-wide Water District. The Town also serves customers in areas north of the Psychiatric Center in both the Town of Poughkeepsie and Town of Hyde Park via existing water mains running through and across the Psychiatric Center property. As noted in an Engineer's Report entitled "Hudson River Psychiatric Center – Water system Distribution Improvements" dated July 2010 and prepared by Morris Associates, the Town Engineer, a number of the existing water mains may have been in service for more than 100 years and have exceeded their expected service life.

In 2005, the Town of Poughkeepsie entered into a Memorandum of Understanding (MOU) with the State of New York Office of Mental Health and Hudson Heritage CPR Ventures, LLC (Hudson Heritage) to resolve matters associated with the supply of water to State Lands including the Psychiatric Center. This MOU was executed as part of the overall process to sell the Psychiatric Center property to a private developer.

The MOU stipulated that a water district shall be formed for the parcels of Land between Route 9 and Route 9G currently owned by the State for the distribution of water to the benefitted lands. One of those State parcels became the Hudson Heritage parcel following its sale in 2003.

The MOU also identified the need for the installation of a new water distribution line to serve the benefitted State and Hudson Heritage parcels as well as customers in the Windsor Court area of the Town and customers in the Arbors development in the Town of Hyde Park. The MOU also stated that both State and Hudson Heritage were to provide the necessary easements and right-of-ways on their respective properties for the benefit of the Town to access and maintain the new water line.

6.2 New Water Distribution Main

Construction of the proposed new water distribution line was completed in 2010-2011. The new water distribution line consists of approximately 5,300 linear feet of 12-inch diameter ductile iron water mains. The new water line is connected to the existing 12-inch Town water main on Inwood Avenue at the intersection with Recreation Drive. The new water line then proceeds westerly and northerly along Recreation Drive and Hudson View Drive to Paint Shop Road and then traverses the Hudson Heritage property in a northerly direction in the vicinity of the former Powerhouse building to connect to the existing 6-inch water distribution main serving Windsor Court and Arbors development.

According to the Engineer's Report entitled "Hudson River Psychiatric Center – Water system Distribution Improvements" dated July 2010 and prepared by Morris Associates, the available fire flow within this portion of the Town water distribution system is limited by the residual pressure at the existing Town water booster pump station located at the east end of Paint Shop Road. Results of hydraulic modeling conducted by Morris Associates with the new 12-inch water distribution main indicated available fire flows in the range of 1,500 to 1,800 gpm on Paint Shop Road in the vicinity of the former Powerhouse building on the Hudson Heritage parcel.

The new 12-inch water distribution main is owned, operated and maintained by the Poughkeepsie Town-wide Water District.

6.3 Poughkeepsie Town-Wide Water District

The Poughkeepsie Town-wide Water District serves a population of approximately 45,000 residents through 10,535 service connections. In addition to serving customers within the Town boundaries, the Town-wide Water District also provides water service to portions of the City of Poughkeepsie, Village of Wappingers Falls and the Town of Hyde Park.

The primary source of water for the Poughkeepsie Town-wide Water District is treated surface water from the Hudson River purchased from the jointly-owned Town and City of Poughkeepsie Water Treatment Facility. The Poughkeepsie Water Treatment Facility is located along the Hudson River within the Marist College Campus on Route 9 and has capacity to treat up to 19.3 million gallons of water per day (MGD). River water is chemically conditioned, clarified, filtered, disinfected with ultraviolet light and chlorine and finally treated with phosphoric prior to distribution.

According to its 2013 Annual Drinking Water Quality report, the Poughkeepsie Water Treatment Facility produced approximately 9.59 MGD of potable water with a maximum daily production of 14.29 MGD. Comparatively, the amount of water purchased by the Poughkeepsie Town-wide Water District in 2014 was 6.24 MGD on average according to its 2014 Annual Drinking Water Quality report.

The Town-wide Water District maintains two (2) major pumping stations capable of delivering an average of 5 million gallons of water per day (MGD) in addition to five (5) water booster stations. The Water District also owns and operates two (2) 5 million gallons (MG) distribution water storage tanks.

7.0 ON-SITE WATER DISTRIBUTION SYSTEM

7.1 Existing On-site Water Infrastructures

The Hudson Heritage site contains an extensive network of ageing underground utilities including water and sewer mains, storm drainage system and numerous utility tunnels to convey steam and electrical power to the former Psychiatric Center.

Limited information is available on the existing on-site water distribution system. However, we believe that the existing on-site water distribution system consists of an extensive network of pipes of various sizes and materials. We suspect that a significant portion of the water distribution mains has reached or exceeded their useful service life. In addition, the arrangement of the existing water distribution main does not suit the needs of the proposed development.

As a result, the existing water distribution system will be abandoned in place and replaced entirely with new water mains as construction progresses. Sections of existing water mains in conflict with the proposed development will be physically removed and disposed of according to Federal, State and local regulations.

7.2 Water Distribution Piping

The on-site water distribution system should be designed and sized to deliver the required quantity of water at adequate pressure to provide a satisfactory level of service to all areas of the proposed development. This section of the report describes the conceptual basis of design for the proposed on-site water distribution system.

It is envisioned that the on-site water distribution system will consist of a primary water distribution system installed along the main collector roads and several secondary water distribution systems to provide water to the various residential and commercial areas of development.

The primary water distribution system will consist of approximately 6,500 linear feet of 8-inch and 10-inch water mains installed under the main collector roads. The primary water distribution system will connect to the existing 12-inch Town water main on Paint Shop Road near Hudson View Drive. Water will be delivered to the residential and commercial areas of development within the project site by secondary water distribution systems. These secondary

systems will generally consist of a network of smaller diameter water mains (6-inch or 8-inch) totaling approximately 12,000 linear feet in length.

Proposed water mains will be ductile iron cement lined (D.I.C.L.) Class 52 pipes complying with AWWA C151 and AWWA C104 standards. Water mains will be generally installed with a minimum earthen cover of five (5) feet using conventional open cut trenching method. Main isolation valves will be installed at all water main intersections and at a maximum spacing of 800 feet between valves. Hydrants will be installed throughout the distribution system at all road intersections, dead end lines and all high points, and will be spaced at intervals between 300 and 600 feet. Water mains, valves and fittings will be properly restrained against thrust forces by the appropriate use of restrained joint gaskets and mechanical joint restraint fittings.

The alignment of the existing 12-inch Town water main on the Hudson Heritage project site will conflict with portions of the residential development proposed north of Paint Shop Road. As a result, sections of the existing 12-inch Town water main may have to be relocated within the proposed roadways to avoid such conflicts.

Note that the Town water distribution system extends up to and terminates at the northern edge of the Marist College Campus on the west side of U.S. Route 9 across from Winslow Gate Road. There is currently no plan to connect the Hudson Heritage water distribution system to the existing Town water main on the opposite side of U.S. Route 9.

A map showing a concept layout of the proposed water distribution system is presented in Appendix A.

7.3 Service Area and Pressure Zone

The contemplated areas of residential and commercial development are situated east and south of the Great Lawn area respectively. Surface elevations for the areas contemplated to be developed vary from approximately 105 feet amsl near Winslow Gate Road to approximately 215 feet amsl near the northeast corner of the proposed residential development.

The water distribution system should be designed and operated to maintain a minimum residual pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow. In addition, normal working pressures in the distribution system should be maintained between 35 and 100 psi at ground level.

The Poughkeepsie Town-wide Water District operates and maintains a 5 MG welded steel finished water storage tank on Barnes Drive near Route 44 in Arlington community of the Town of Poughkeepsie. The elevation at the base of the tank is 359'± amsl. This tank “floats” over the entire District’s water distribution system. The hydraulic grade elevation of the tank is 384 feet amsl assuming that the tank is full with 25 feet of water.

Neglecting friction losses in the water distribution system, the highest elevation that can be served by this tank with a minimum working pressure of 35 psi is 303 feet amsl [$384 - (35 \text{ psi} \times 2.31 \text{ feet/psi}) = 303$]. Similarly, the lowest elevation that can be served by this tank to maintain the 100 psi maximum pressure is 153 feet amsl [$384 - (100 \text{ psi} \times 2.31 \text{ feet/psi}) = 153$].

Areas of development located at an elevation below 153 feet amsl would normally experience unacceptable pressure exceeding 100 psi. Such areas should be served through pressure reducing valve (PRV) station installed at specific locations to reduce pressure within the normal working range. PRVs will be located in an underground concrete vault in the road right-of-way or on parcels deeded to the water company.

The overall water distribution system will be divided into two distinct pressure zones, denoted PZ-1 and PZ-2, to accommodate the wide range of elevation within the service area and provide acceptable working pressures. Pressure zone PZ-1 will serve the proposed residential development areas on the northern portion of the site and is an extension of the tank core atmospheric pressure zone. Pressure zone PZ-2 will serve the proposed commercial development areas on the southern portion of the site through a PRV installed on the main collector road.

7.4 Fire Suppression and Fire Flow

7.4.1 Fire Suppression System

In accordance with the Building Code of New York State, buildings requiring fire protection and suppression systems shall comply with Chapter 9 “*Fire Protection Systems*” and related provisions of the Fire Code of New York State. Buildings requiring automatic fire sprinkler systems shall comply with Section 903 of the Building Code, in required areas as defined in Section 903.2.

Where provisions of the code require that a building or portion thereof be equipped throughout with an automatic sprinkler system, sprinklers shall comply with NFPA 13 except as provided for in the Building Code. Automatic sprinkler systems, where required for residential buildings, shall comply with NFPA 13R.

Where provisions of the Building Code of New York State require that a building or portion thereof be equipped with fire protection and suppression systems including automatic sprinkler system, such systems should be designed by the building’s Mechanical/Electrical/Plumbing (MEP) engineer or fire protection consultant according to the Town Code, NYS Building Code, Fire Code of New York State and applicable NFPA Standards.

7.4.2 Fire Flow

Although water supply systems are not required to be designed to meet fire flow requirements, attempts should be made to design water distribution system capable of providing significant fire flows adequate to meet needed fire flows (NFF) recommended by the Insurance Services Office (ISO). The proposed water distribution system will be designed to provide for both domestic supply and fire flow capacity.

The *Guide for Determination of Needed Fire Flow* prepared by ISO provides a method to determine needed fire flows for buildings based upon the type of construction, occupancy, exposure and location. Needed fire flows for one- and two-family dwellings not exceeding two stories in height can be estimated using recommended values presented in Chapter 7 of ISO *Guide for Determination of Needed Fire Flow*. The needed fire flows recommended by ISO for such structures are based on the distance between the buildings and vary between 500 and 1,500 gpm. For other types of habitational buildings, the needed fire flow has to be calculated using the method presented in the ISO Guide and will vary from a minimum of 500 gpm to a maximum value of 3,500 gpm.

The needed fire flows for commercial buildings are calculated per the methodology presented in the ISO Guide. Needed fire flows for light commercial structures can range from 500 to 3,500 gpm depending on the building size, location and type of construction. Higher fire flows may be required for large commercial structures.

It should be noted that ISO does not determine needed fire flows for buildings provided with automatic fire suppression systems compliant with applicable NFPA Standards. Installation of automatic fire suppression systems such as sprinkler system in a building can also significantly reduce the demand for fire flows.

A detailed analysis of needed fire flow (NFF) and Fire Code requirements applicable to the proposed Hudson Heritage development project will be conducted during site plan review process.

8.0 DEDICATION TO TOWN-WIDE WATER DISTRICT

Some of the on-site infrastructure including internal roads, water distribution system and sewer collection system may be offered for conveyance to the Town following completion of construction. At this time, the main collector roads on the Hudson Heritage project site from the two (2) main entrances on Route 9 to Paint Shop Road on the east end of the site are proposed to be conveyed to the Town.

It is expected that the Town will assume responsibility for the maintenance of the collector roads following conveyance. It is also anticipated that the Town will request that portions of the on-site water distribution system located within public right-of-ways be dedicated to the Town-

wide Water District. The Town will then assume responsibility for operation and maintenance of the water mains and associated appurtenances within the public right-of-way.

The Project sponsor may create one or more condominium or homeowner's associations for portions of residential and commercial areas beyond the public right-of-way under private ownership. It is anticipated that the Town will not take ownership of portions of the water distribution system located on private residential and commercial properties served by private roads. In this instance, the respective condominium or homeowner's associations will assume responsibility for operation and maintenance of the water mains and associated appurtenances on private properties.

The Town will also request installation of a master water meter near the property line for all residential and commercial areas under private ownership. The master water meter will be used by the Town to bill the condominium or homeowner's associations for their actual water usage. The condominium or homeowner's associations may at their own discretion install sub-meters to charge back each tenant and homeowner for their share of water usage.

9.0 STANDARDS FOR WATER SYSTEM

The proposed water system improvements shall be designed in accordance with applicable standards and guidelines including Subpart 5-1 – *Public Water Systems* and associated Appendix 5-A - *Recommended Standards for Water Works (2007)* (a.k.a. Ten States Standards).

10.0 PERMITS AND APPROVALS

Development of the proposed Hudson Heritage project will necessitate approvals and permits from local and County authorities and possibly State and Federal agencies. At a minimum, the proposed water distribution system improvements will require approvals from the noted local and County agencies noted below:

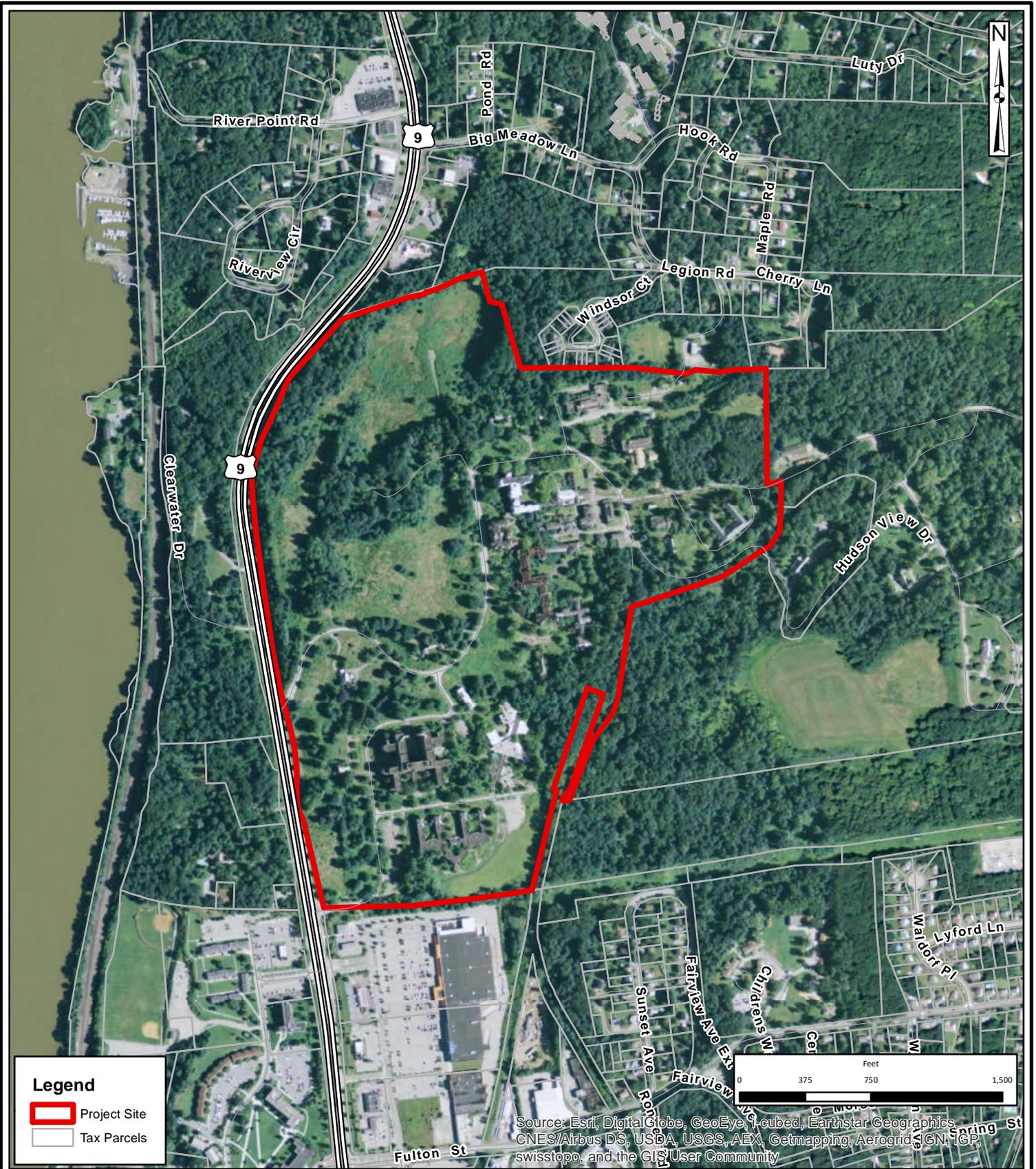
Town of Poughkeepsie:

- Planning & Zoning Board Approvals (Master Development plan/Site Plan)

Dutchess County Department of Health:

- Approval of Engineering Plans and Specifications for water distribution system improvements.

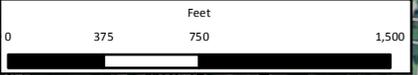
Figures:



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Legend

- Project Site
- Tax Parcels



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 ENGINEERS
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 PLANNERS
 ENVIRONMENTAL & SAFETY PROFESSIONALS
 LANDSCAPE ARCHITECTS

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 Phone: (845) 454-3980

Capital District Office:
 547 River Street, Troy, NY 12180
 Phone: (518) 273-0055

North Country Office:
 375 Bay Road, Queensbury, NY 12804
 Phone: (518) 812-0513

Hudson Heritage Park

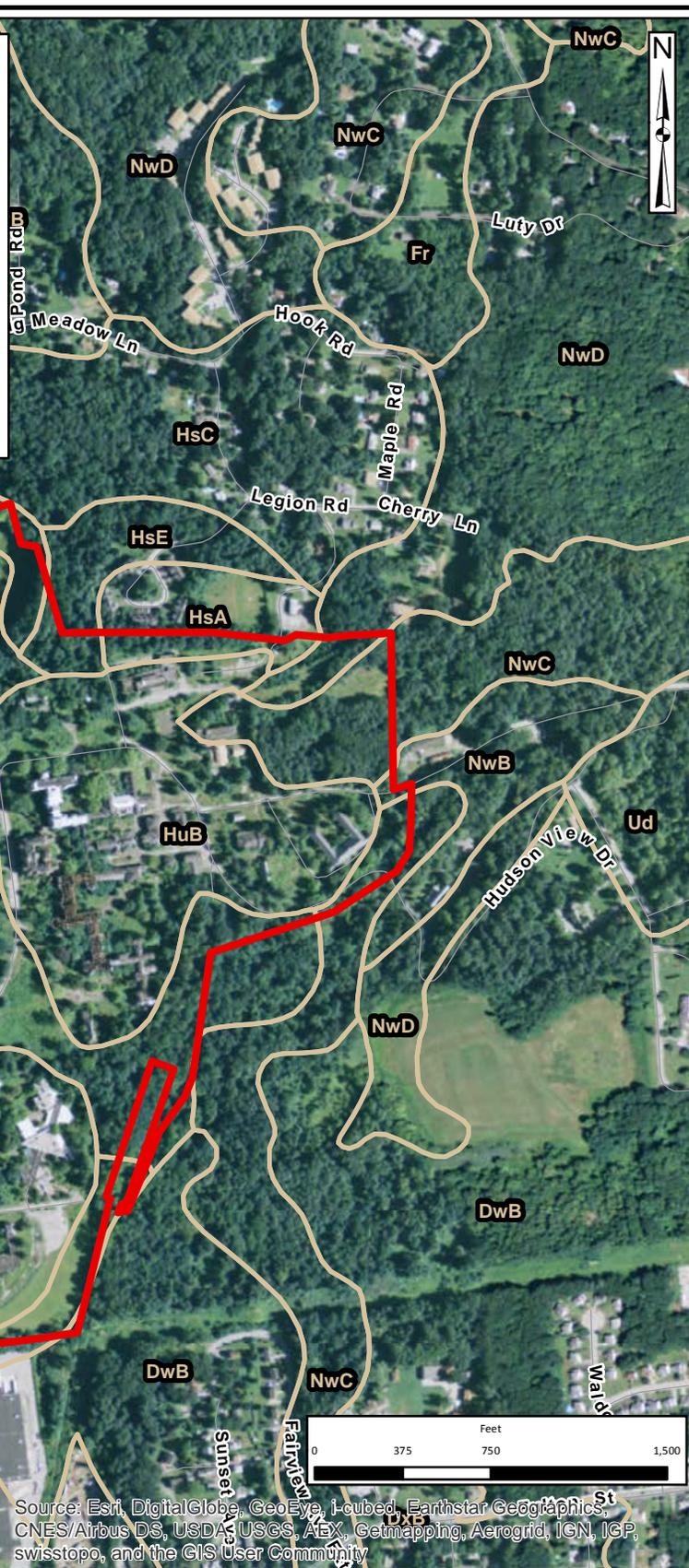
Orthophoto Tax Map

Town of Poughkeepsie - Dutchess County, New York

Drawn:	GHM
Date:	05/13/2015
Scale:	1 inch=750 feet
Project:	81402.00
Figure:	1

Project Site Soils

- DwB Dutchess-Cardigan complex, undulating, rocky
- DwC Dutchess-Cardigan complex, rolling, rocky
- HsA Hoosic gravelly loam, nearly level
- HsB Hoosic gravelly loam, undulating
- HsE Hoosic gravelly loam, 25 to 45 percent slopes
- HuA Hoosic-Urban land complex, nearly level
- HuB Hoosic-Urban land complex, undulating
- NwB Nassau-Cardigan complex, undulating, very rocky
- NwC Nassau-Cardigan complex, rolling, very rocky
- NwD Nassau-Cardigan complex, hilly, very rocky
- NxE Nassau-Rock Outcrop complex, steep
- Wy Wayland silt loam



Legend

- Project Site
- Soils



Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA/USGS, AeroX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



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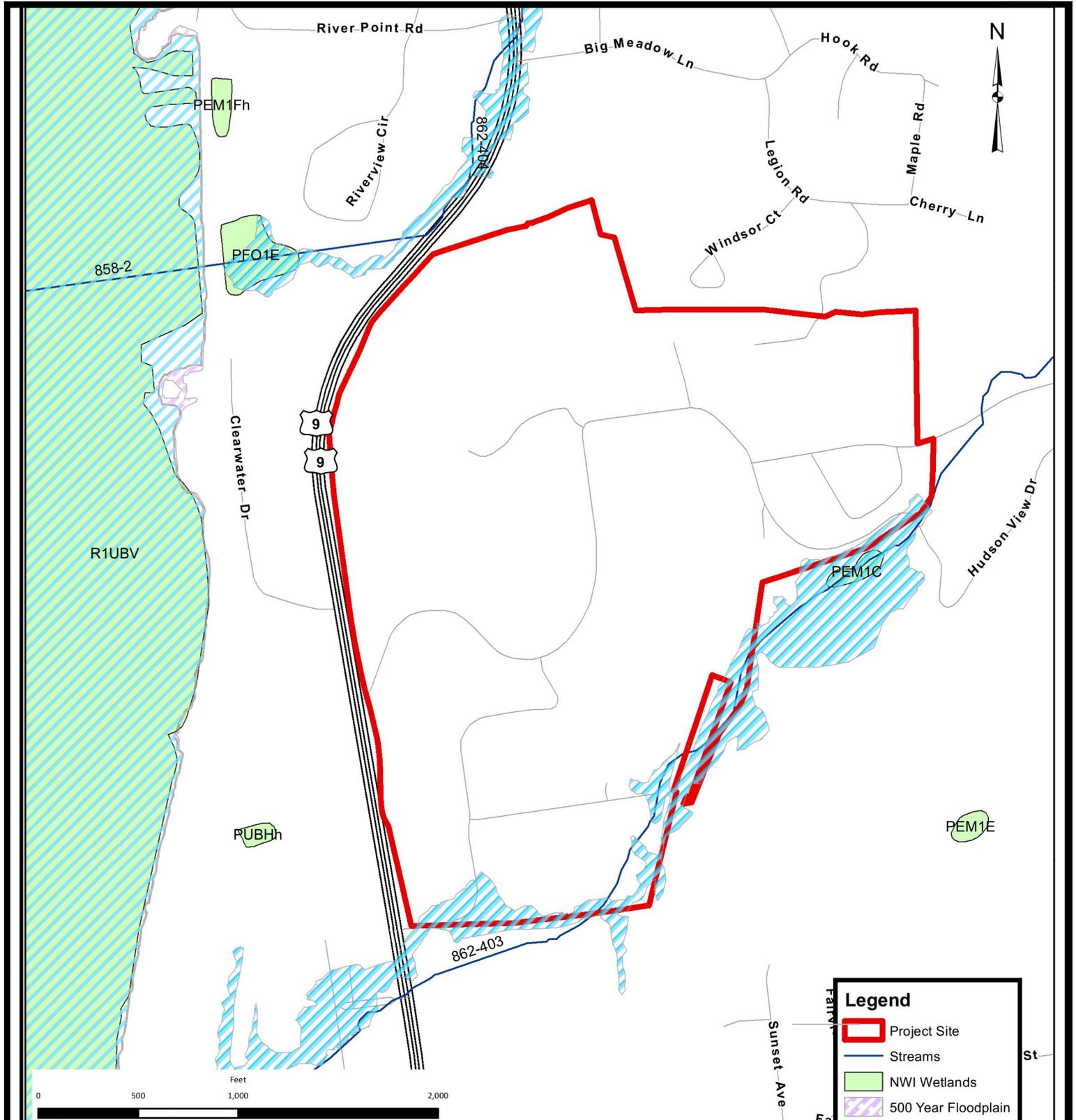
North Country Office:
375 Bay Road, Queensbury, NY 12804
Phone: (518) 812-0513

Hudson Heritage Park

Soils Map

Town of Poughkeepsie - Dutchess County, New York

Drawn:	GHM
Date:	05/13/2015
Scale:	1 inch=750 feet
Project:	81402.00
Figure:	3



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HUDSON HERITAGE

WATER RESOURCES

TOWN OF POUGHKEEPSIE, DUTCHESS COUNTY, NEW YORK

drawn SL	checked SM
date 03/26/15	scale 1"=8000'
project no. 81402.00	
sheet no. 8	

Appendix A: Water Distribution System – Conceptual Layout

Drawing Name: Z:\projects\81400-81499\81402.00 - Hudson Heritage\DWG\EIS_WATER_CONCEPT.dwg Date Printed: Aug 02, 2016, 11:38am



EXISTING TOWN WATER MAIN TO BE ABANDONED AND RELOCATED

CONNECTION TO EXISTING TOWN WATER MAIN

CONNECTION TO EXISTING TOWN WATER MAIN

PAINT SHOP ROAD

HUDSON VIEW DRIVE

US ROUTE 9

WINSLOW GATE ROAD

LEGEND:

- EXISTING 12" DIAMETER TOWN WATER MAIN
- PROPOSED WATER MAIN
- PROPERTY LINE



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HUDSON HERITAGE

**WATER MAIN DISTRIBUTION
CONCEPT PLAN**

TOWN OF POUGHKEEPSIE, DUTCHESS COUNTY, NEW YORK

designed KB	checked PB
date 02/18/16	scale 1"=400'
project no. 81402.00	
sheet no. FIG 1	