

ENGINEERING REPORT

for

CASCADE CREEK

SUBDIVISION

COMMUNITY WATER SUPPLY SYSTEM

APPLICANT: Hudson River Housing Inc.
313 Mill Street
Poughkeepsie, NY 12601

LOCATION: 34 Cascade Creek Road & NYS Rte. 22/44
Town of Amenia
Dutchess County, New York

Tax Map I.D. #: 132000-7167-00-245925

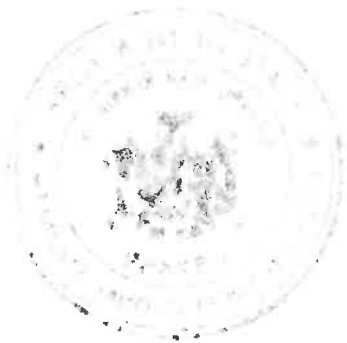
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**Cascade Creek Subdivision
Water System Engineering Report**

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Cascade Creek Subdivision Well Head Protection Exhibit

Table 1: Separation Distances to Protect Public Water Supply Wells from
Contamination

APPENDIX B

Subdivision Grading and Utility Plan

Reference Documents by Reference

NYSDOH - Part 5. Drinking Water Supplies Subpart 5-1. Public Water Systems

1.0 EXECUTIVE SUMMARY

This report evaluates and proposes the development of a new community public water supply to serve the Cascade Creek 26-lot subdivision, located within the Town of Amenia, Dutchess County, New York. The existing 24.13-acre site is currently vacant, with historically agricultural uses.

The proposed 26-lot subdivision consists of 26 single family residences, with up to 4-bedrooms per home.

The report finds that Cascade Creek subdivision and the surrounding area are located within one of Dutchess County's higher yield bedrock and gravel overburden aquifer areas providing considerable volumes of water for both the project and surrounding properties.

The project proposes a minimum of two new wells be developed to meet the project's requirements.

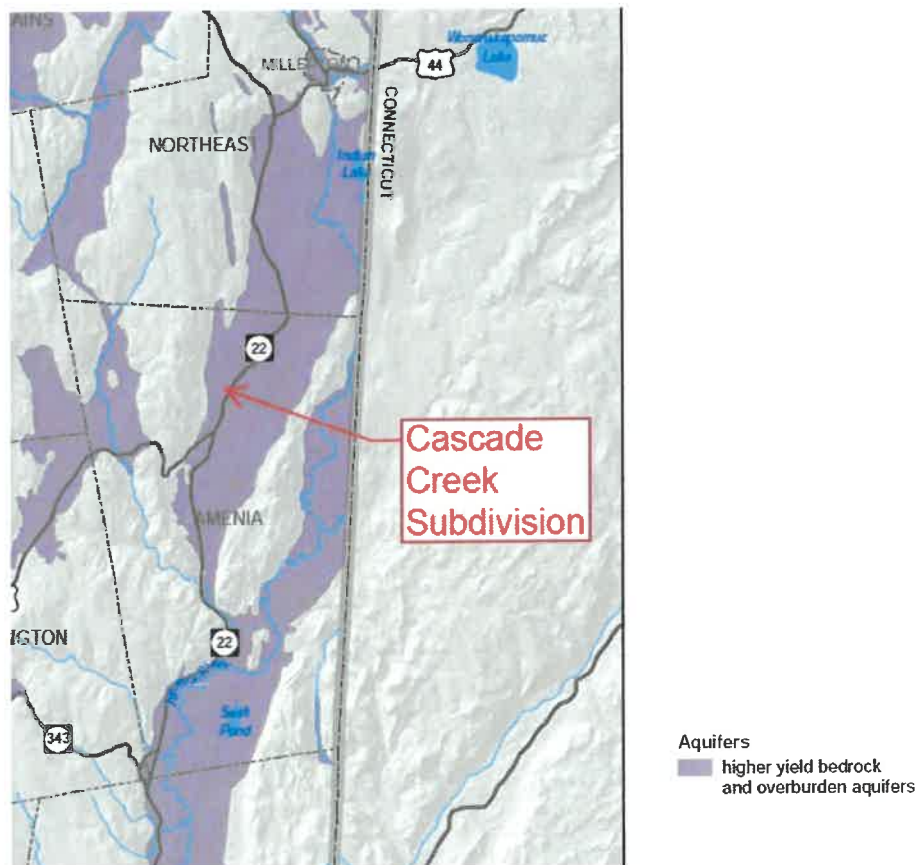
The report describes the proposed water system supply, treatment and distribution necessary to meet the water supply needs of the subdivision and meet the applicable regulations. The report will describe the water treatment system that will be designed to comply with the New York State Department of Health "Part 5" requirements. The water treatment system consists of both filtration and disinfection.

2.0 WATER SOURCE WELLS

2.1 Aquifer

According to the Town of Amenia Comprehensive Plan Update, dated July 19, 2007, much of Amenia is underlain by a prolific sand and gravel aquifer from which many residents draw their water supply. The Cascade Creek parcel is located within a generally high yielding bedrock and sand & gravel aquifer that is part of the Wassaic Creek watershed area. The Cascade Creek Subdivision parcel lies low in this watershed so groundwater flows toward it from a large upwatershed area that extends to the north. The anticipated sand and gravel deposits under the Cascade Creek Subdivision site should allow it to have very good water-bearing characteristics and to have high hydraulic conductivity tendencies producing high yielding wells. The highly porous sand and gravel deposits hold considerable volumes of water and allow the water to flow easily toward wells, springs, and streams.

According to the Natural Resource Inventory (NRI) of Dutchess County, NY dated November 2010 the Cascade Creek parcel and surrounding areas are located within one of the county's "higher yield bedrock and overburden aquifers" as shown in the below map section.



*Adapted from Map 5.2: Aquifers Dutchess County, New York

2.2 Wells

Two new public water supply wells are proposed to serve the subdivision. Their locations were chosen to provide the required separations to sources of contamination and to provide the required 200-foot zone of protection around the wells.

As part of the planning for the conservation analysis process for this project, the well locations and their respective water sources were assessed to ensure the land area that contributes water to the drinking water supply is free of pollution and that external sources of pollution are minimized. This involved investigating the areas outside of each potential well head looking for potential contaminant sources. This also involved very specific planning to locate all sewage disposal areas and stormwater infiltration areas outside of any land areas with influence on the well heads. Refer to Appendix A for the Cascade Creek Subdivision Well Head Protection Exhibit.

The wells will be required to have their locations approved by the Dutchess County Health Department, then be drilled and tested in accordance with NYSDOH Part 5, Subpart 5-1 Standards for Water Wells - Appendix 5B to confirm their available yields and a full batch of water quality testing for all required NYS Part 5 contaminants to confirm what the treatment requirements will be.

Section 5-B.2 of the New York State Department of Health Part 5, Subpart 5-1 Standards for Water Wells provides certain requirements for the protection of water sources. Specifically minimum horizontal separation distances from potential sources of contamination are provided. An assessment of these separation distances and potential sources of contamination as they relate to the Cascade Creek Subdivision are shown in Table 1 located in Appendix A. It is important to note that all required separation distances are either met or exceeded for the project.

3.0 DESCRIPTION OF THE WATER SYSTEM

The following is a summary of the proposed water system development, and the supporting calculations.

3.1 Current Water Demand

The current average daily demand for the site is 0 gallons per day (gpd), as it is currently undeveloped.

3.2 Future Water Demand

The anticipated future average daily demand for the site after all 26 single family homes are complete is 11,440 gallons per day (gpd) or 7.94 gpm.

See Table 3-2 below for the future daily flow rate calculation.

Table 3-2: Water System Daily Usage Calculation

Description	Quantity	Demand(GPD/PER)	Flow (GPD)
Bedrooms	(26-lots @ 4-bdrms ea.) = 104	110	11,440

3.3 Pumping & Treatment Location

The subdivision plans propose a pump house/treatment building in one of the Home Owner's Association (HOA) easements that will house any required treatment system and distribution pumps, with a direct connection to the proposed buried storage tanks.

3.4 Disinfection

The anticipated disinfection treatment system for this project will utilize sodium hypochlorite for bacteria inactivation and virus inactivation. The chlorine injection system will be sized to provide 4-Log inactivation of viruses. The system design will meet the required NYSDOH disinfection criteria.

3.5 Filtration

In order to remove any particulate matter or impurities it is anticipated that high flow rate cartridge filters will be utilized as part of the treatment system to provide roughing filtration.

The typical system will use twin 5-micron cartridge filters connected in parallel designed to provide redundant filter trains. All components will be specified as NSF 61 certified.

3.6 Water Storage System

Currently, the plans propose two (2) 6,000 gallon buried water storage tanks to provide approximately 1 days' worth of storage for the project. They will be buried next to and connected to the pump house building. Currently, the basis for design is the ZCL, Xerxes NSF 61 listed potable water tank. The storage sizing is preliminary, until the wells are developed and the yields are confirmed, at which time, the sizing will be confirmed.

3.7 Distribution System

The water distribution system will originate from the proposed pump house, then utilize proposed buried 4" diameter NSF-61 certified HDPE piping buried under the proposed loop road to distribute the water to the residents. Flushing type hydrants are proposed for maintenance at the high and low points of the system. These water lines will be pressurized by constant pressure type dual booster pumps sized for the appropriate demands.

It is anticipated that the water distribution will be a non-fire-rated community-based water system that will be designed solely for domestic and other public uses, not for providing the high volume and pressure of water required for effective fire suppression.

4.0 CONCLUSIONS

This report outlines the water system requirements to serve the Cascade Creek Subdivision. As noted above, certain aspects of the water system design, such as source, storage and treatment requirements will need to be further evaluated, once the wells are installed and tested.

This water system will be fully developed for conformance with the New York State Department of Health "Part 5" requirements as well as local Dutchess County Department of Health requirements. Additionally, all required separation distances are either met or exceeded for the Cascade Creek Subdivision.

In order to remove any particulate matter or impurities it is anticipated that high flow rate cartridge filters will be utilized to provide roughing filtration.

The anticipated disinfection treatment system for this project will utilize sodium hypochlorite for bacteria inactivation and virus inactivation.

The Cascade Creek Subdivision parcel and its proposed wells are located within a generally high yielding bedrock and sand & gravel aquifer that is part of the Wassaic Creek watershed area. The highly porous sand and gravel deposits in and around the Cascade Creek site hold considerable volumes of water that can provide an ample supply of water for both the proposed subdivision and the surrounding neighbors.

