

3.5 Water Resources - Groundwater

Existing Conditions

The bedrock underlying the property consists of the Manhattan Formation consisting of metamorphic rocks which can vary greatly in composition and metamorphic grade depending upon the location (Geologic Map of New York, Lower Hudson Sheet (1970)). These bedrock types have almost no primary permeability or porosity and therefore, groundwater is found almost exclusively in secondary openings such as joints and fractures in the rock. The yield of an individual well depends on the number of fractures intersected by the borehole and the degree of their connection with other fracture systems.

The gneiss rock in Westchester and southern Putnam County is reported to produce small to moderate quantities of water. Two studies of groundwater resources in Putnam County (Grossman, 1957, Malansky & Rich, 1984) reported that the yield of wells completed in gneiss rocks in Putnam County may range from 3 to 11 gpm (gallons per minute). Well yields can be much greater if they intersect major faults and fracture sets. Well yields for a similar upland site in southern Putnam County, east of the site, ranged from 5 to 8 gpm.

A USGS database indicates there are approximately 10 wells within a one mile radius from the property. The database did not provide well yield information, but did provide well depths and depths to the water table. Local well depths varied from 25 to 203 feet in depth. The depth to water varied between 12 and 40 feet, below surface grade. It is assumed that several of the wells reported in the USGS database are older agricultural wells, based upon their shallow depths.

Groundwater Recharge Analysis

A groundwater recharge analysis, or groundwater balance, typically compares the available recharge to a property with the estimated water-supply demand of a proposed development. Such a comparison does not apply to the Yorktown Farms project since municipal water will supply the development. The development of the site will result in impervious surface being added to the property, potentially impacting the overall on-site groundwater recharge. This analysis reviews the projects potential impacts to groundwater recharge.

Annual precipitation for Putnam and Westchester counties averages between 44 and 48 inches per year, with 48 inches being the annual median annual precipitation measured at the gauging station at West Point, NY. A large portion of precipitation ranging from 75 to 85 percent is returned to the atmosphere by evaporation, transpired by vegetation, and carried away from a given area in surface run-off and streams. Only a small portion of total precipitation (15 to 25 percent) infiltrates the soil to eventually recharge groundwater supplies found in bedrock.

The Yorktown Farms property includes 43.168 acres which drain to wetlands on the western side of the property, to a stream in the southeast corner, as well as overland to off-site drainage areas. Assuming the property receives the lower estimate of 44 inches of annual rainfall, the recharge to the Yorktown Farms property will be 21,387 gallons per day (gpd). A summary of the recharge estimate is provided below.

Table 3.5-1 Groundwater Recharge Estimate	
Acres	43.17
Square Feet	1,880,398
Rainfall (inches)	44
Rainfall (feet)	3.7
Cubic feet of precipitation per year	6,957,472
Gallons of precipitation per year	52,041,895
Amount rainfall lost to evapotranspiration and runoff (85%)	44,235,610
Amount (gallons) available for recharge per year	7,806,284
Amount (gallons) available for recharge per day	21,387

Potential Impacts

The project will utilize municipal water and will not drill wells into the local bedrock aquifer for potable water purposes. The project will result in approximately 5.8 acres of impervious surface added to the project site. This represents approximately 13 percent of the site acreage. As a worst case estimate, the project may reduce groundwater recharge by 13 percent or by 2,780 gpd. The proposed stormwater management systems are designed to collect stormwater from roads and driveways and maintain or reduce stormwater flow volumes from the site. Therefore, the majority of stormwater collected from impervious surfaces will be routed to stormwater detention basins, swales and other stormwater management features, and either reenter existing on-site surface water bodies and wetlands or percolate into the soil, similar to pre-construction conditions. A small percentage of on-site rainfall will evaporate from proposed roadways, driveways, and rooftops. Therefore, project related impacts to groundwater resources are expected to be minimal.

Mitigation Measures

No mitigation measures are proposed for potential impacts to groundwater resources, since these impacts are estimated to be minimal. This assessment is based upon the project's use of municipal water, relatively low percentage of site coverage, and proposed stormwater management features which will maintain groundwater recharge at the site.