



**IV D**

***Ground Water  
Resources***



## IV D. GROUND WATER RESOURCES

### INTRODUCTION

This section of the DEIS describes existing groundwater resources at the Site, and their potential for use as a water supply for the Project. Potential impacts to groundwater resources are also described in the section.

### 1. EXISTING CONDITIONS

The Site is located within the Town of Bedford's Aquifer Protection Zone. Lands within this zone are subject to additional regulation, as set forth in §125-29.4 of the Town Code. The purpose of this legislation is to:

*"...protect the public health, safety and welfare through the preservation of the Town's major groundwater resources to ensure a future supply of safe and healthful drinking water for the Town of Bedford, local residents and employees and the general public. The designation of Aquifer Protection Zones and careful regulation of development activities within these zones can reduce the potential for groundwater contamination. The purpose of this section is to protect areas having a high potential for use as a water supply and thereby to maintain the existing quality and improve the future quality of the groundwaters of the Town of Bedford."*

The Aquifer Protection Zone legislation is based upon a number of specific findings:

- 1. The groundwater underlying the Town is a major source of its existing and future water supply, including drinking water.*
- 2. The groundwater aquifers are integrally connected with and flow into the surface waters, lakes and streams, which constitute a major source of drinking water for New York City or for parts of the State of Connecticut.*
- 3. Accidental spills and discharges of toxic and hazardous materials have threatened the quality of such groundwater supplies and related water resources in the Town, posing potential public health and safety hazards.*
- 4. Unless preventive measures are adopted to control the discharge and storage of toxic and hazardous materials within the Town, further spills and discharges of such materials will predictably occur and with greater frequency and degree of hazard by reason of*



increasing construction, commercial and industrial development, population and vehicular traffic in the Town.

5. The foregoing conclusions are confirmed by findings set forth in the Water Quality Management Plan of Westchester County, prepared pursuant to Section 208 of the Federal Clean Water Act, and by Town-commissioned studies.
6. There is also a growing concern for control of nitrate-nitrogen in the aquifer within tolerable amounts.

As fully described in Section IV C of this DEIS, the Site lies near the upper boundary of the Manhattan Prong, a geologic sub-province of the New England Upland geologic province. This results in the Site being underlain by glacial outwash deposits which are composed of course to fine gravel and/or sandy material overlying bedrock. This is characteristic of the Riverhead loam, Knickerbocker fine sandy loam and Pompton silt loam soil types found on the Site.

These subsurface characteristics define the groundwater regime found below the Site. The crystalline metamorphic Fordham gneiss formation underlying the Site collects groundwater within fractures and joints. This results in a bedrock aquifer (compared to a surficial aquifer where groundwater resides in pores between sediment grains). Bedrock aquifers generally have lower yields than do surficial aquifers, but are far more common in Northern Westchester County.

Bedrock aquifers are recharged by rainfall. Between 15% - 50% of precipitation on natural surfaces results in aquifer recharge, depending on local conditions. Table IV-D-1 provides an estimate of the amount of water available for recharge from the Site.

<b>TABLE IV-D-1 GROUNDWATER RECHARGE CALCULATIONS</b>	
Acres	17.6
Square Feet	766,656
Rainfall (inches)	42
Rainfall (feet)	3.5
Cubic feet of precipitation per year	2,683,296
Gallons of precipitation per year	20,072,448
Amount lost to evapotranspiration and runoff (60%)	12,043,468
Recharge rate per year (gallons)	8,028,980
Recharge rate per day (gallons)	21,997
Recharge rate per minute (gallons)	15.2



Utilizing a recharge rate of 40%, (the percentage of precipitation available to recharge groundwater), approximately 15.2 gallons of recharge per minute will occur from the Site.

Currently, the Site supports one potable drinking water well and a subsurface sanitary sewage disposal system located on Parcel A. The well provides adequate water yields to support the existing church facility, and the sanitary sewage disposal system operates satisfactorily.

## **2. POTENTIAL IMPACTS**

The development of the Project will require the installation of a new well and subsurface sanitary sewage disposal system on Parcel B. The location of the well has been established in the eastern portion of the Site, between the upper and lower parking lots, near the I-684 property line (refer to Figure II-7). The Applicant shall perform drawdown tests to determine the impact of the proposed well on neighboring wells. The results of these tests will be included in the Final Environmental Impact Statement. The septic field and the 100% expansion area have been sited in the southern end of the Site, where Knickerbocker fine sandy loam soils predominate. The Project will generate up to 4,000 gallons per day of domestic sewage, which must be disposed of via the subsurface sanitary sewage disposal system. The impact of this can be calculated as follows:

<b><u>Calculated Assumptions:</u></b>		<b><u>Calculated Knows:</u></b>	
Annual Precipitation (inches)	46	Lot Area (SqFt)	579,914
Runoff Coefficient (%)	0.15	Lot Area (acres)	13.313
Interception (%)	0.8	Gallons/Ft <sup>3</sup>	7.48
Infiltration, Evapotranspiration (%)	0.85	Litters/Gallon	3.785
Total Nitrogen (mg/L) in effluent	40	Days/Year	365
Nitrogen in Rainfall (mg/L)	0.5	Total Recharge	132,543

In order to determine if the proposed subsurface sanitary sewage disposal system complies with the Town of Bedford code, an Aquifer Impact Assessment must be



completed to evaluate the potential impact of the nitrogen component of the sewage effluent on the underlying groundwater. The following calculations apply:

**Infiltration & Interception:**

0.85 x 46 inches/year rainfall =	39.10	inches/year rainfall infiltration & interception
	3.26	feet/year rainfall infiltration & interception
0.8 x 39.10 inches/year =	31.28	inches/year infiltration after interception
	2.61	feet/year infiltration after interception

**Rainfall Discharge:**

2.61 ft x 579,914 ft <sup>2</sup> x 7.48 gallons/ft <sup>3</sup> =	11,321,545 gallons
	42,852,048 Liters/year
42,852,048 (Liters/year)/365 (days/year) =	117,403 Liters/day infiltration and rainfall
117,403 Liters/day x 0.5 mg/L Nitrogen in rainfall =	58,701 mg Nitrogen in rainfall/day

**Septic Discharge:**

Septic Discharge =	4,000 gallons/day
	15,140 Liters/day

**NITROGEN LOADING ESTIMATES**

**Nitrate Concentration in Septic Effluent:**

Septic Discharge = 15,140 Liters/day x 40 mg/L N =	605,600 mg/day N
Rainfall = 117,403 Liters/day x 0.5 mg/L N in Rainfall =	58,701 mg/day N
Total Combined N – 117,403 (Infiltration + Rainfall) + 15,140 (Septic Recharge) =	132,543 Liters/day
(664,301 mg/day N)/132,543 L/day Total Recharge =	5.01 mg/L Nitrate

Based upon the above calculations for nitrogen loading estimates, the nitrogen level beneath the Site resulting from the Project’s on-site subsurface sanitary sewage disposal system would be within the Town of Bedford mandated allowable concentration of 6.0 mg/L.

All construction activities will take place in areas of the Site where the depth to ground water exceeds three feet. Furthermore, it is not anticipated that blasting will be necessary to accommodate the Project. As a result, no construction related groundwater impacts are anticipated. The Site’s Pompton soils, located around the Broad Brook, which do exhibit shallow groundwater depths, will remain undisturbed by the Project.

Upon completion of the Project, the Site’s groundwater resources face the threat of contamination due to the use of pesticides and fertilizers during routine maintenance of the grounds of the church. The application of these chemicals can



result in elevated levels of various carcinogens and nitrates in the groundwater supply.

## **2. MITIGATION MEASURES**

The on-site subsurface sanitary sewage disposal system required for the Project will not result in the nitrogen discharges above the Town's mandated standard. As a result, no mitigation measures are required.

Upon completion of the Project, several mitigation measures will be imposed to eliminate the potential adverse impacts of fertilizer and pesticide application; as follows:

- Incorporate weed prevention and control into Project layout and landscaping plan.
- Install and maintain landscaping that requires minimal application of chemical fertilizers, pesticides and herbicides.
- Emphasize xeriscape landscaping that reduces the need for irrigation by minimizing the use of turf in decorative landscaping, using plant materials adapted to local conditions and efficient irrigation.
- Avoid creating soil conditions that promote weed germination and establishment.
- Minimize irrigation overspray - do not permit use of sprinkler and spray irrigation in areas less than 8 feet wide.
- Utilize organic, slow-release chemical fertilizers and herbicides and avoid application prior to scheduled irrigation.
- When applying pesticides and herbicides, avoid water contamination by complying with all label instructions and restrictions.



- The cleaning and disposal of pesticide containers must be done in accordance with Federal, State and local laws, regulations, and directives. Specific procedures for the cleaning and disposal of pesticide containers are documented in State and local laws and in the Pesticide Storage, Transportation, and Spills Handbook, FSH 2109.12.