

SECTION VII HYDROGEOLOGIC STUDY AND REPORT

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SECTION VII HYDROGEOLOGIC STUDY AND REPORT

A. Introduction

As part of the information accompanying a Permit application, a hydrogeologic study should be conducted in the area of a proposed OWRS and a report thereon submitted to the Department.

1. General

The study and report should:

- a) Describe the regional and local hydrogeologic conditions.
- b) Indicate if the discharge from the proposed OWRS will occur within a designated aquifer protection area or public water supply watershed.
- c) Define the areal extent and physical properties of the site soils that will assimilate and transmit the discharge.
- d) Describe the effects on the water table due to the proposed discharge to the ground water.

The information required in a hydrogeologic study is technical and can be quite complex. Therefore, only persons with significant experience in the fields of hydrogeology and soils should be retained for the study. Preliminary desktop and field studies should be conducted in sufficient detail to determine if there is a reasonable possibility for constructing an OWRS at the project site that will meet the objectives of the Department. These preliminary studies are important to minimize unnecessary effort by the consultant(s) and Department staff.

Where the results of the preliminary studies indicate there is a reasonable possibility for constructing an OWRS at the project site, and prior to beginning a final hydrogeologic study, a plan for the study should be discussed with Department staff for input. Such input will not guarantee approval of the Applicant's hydrogeologic study or permit application, but will help in determining the site-specific requirements for the study and may eliminate the need for multiple and costly iterations of the study. The Department may require the Plan and Hydrogeologic Study and Report to contain some or all of the following elements:

- a. Narrative of proposed project.
- b. Characterization of site soils in conformance with U.S. Department of Agriculture Natural Resource Conservation Service (NRCS) descriptions.
- c. Ground water characterization, including depth from existing ground to seasonal high water table, hydraulic gradient and local direction of ground water flow.
- d. Maps - Area Map, Site Plan, Surficial Geology Map, Bedrock Geology Map, Soils Map based on NRCS soil mapping, and Groundwater Contour Map.
- e. Description and quantification of proposed discharges to the ground water.
- f. Supporting calculations, tables and figures.
- g. Conclusions as to project requirements for meeting the Department's criteria for a discharge to the ground waters of the State.

B. Elements

1. Narrative

The narrative portion of the hydrogeologic report should contain the following:

- Purpose and scope of the hydrogeologic study.
- Historical land use of the site.
- Land use in the vicinity of the site.
- Regional and local bedrock and surficial geology.
- Surface waters and drainage patterns in the project area.
- Wetlands and watercourses in the general area of the project, mapped by a Certified Professional Soil Scientist.
- State Water Quality Classifications of surface waters and ground waters in the general area of the project.
- Location of proposed OWRS with respect to any nearby designated public drinking water supply watersheds, aquifer protection areas and other points of concern.
- Discussion of field activities.
- Conclusions relative to the hydrogeologic conditions at the site, including depth from surface to seasonal high water table (SHWT), soil hydraulic capacity, any limiting conditions such as impermeable soils, highly permeable soils, perched water tables, shallow bedrock, fractured bedrock with water table in the bedrock, etc.

2. Characterization of Site Soil Conditions

Site soil conditions shall be characterized by the following field and laboratory activities:

- Soil borings and/or test pits, of sufficient number and depth to characterize site soils that will assimilate and transmit the proposed discharge.
- Soil samples collected by standard soil sampling techniques.
- Particle size distribution, by both sieve and hydrometer.
- Soil horizon classifications under the U.S. Department of Agriculture NRCS soil classification system.
- Sampling and testing for saturated horizontal and vertical hydraulic conductivities, in sufficient numbers to define the hydrogeologic regime on the site. (Discuss method(s) of sampling, testing and statistical analysis of test results).

3. Ground Water Characterization

Ground water conditions beneath the site, characterized as follows:

- Depth to seasonal high water table (SHWT).
- Local aquifer gradients.
- Direction of ground water flow.
- Horizontal velocity of ground water flow.
- Aquifer boundary conditions.

- Location of existing ground water discharges to surface water.
- Ground water mounding calculations.
- Background ground water quality, if there are existing discharges to ground water in close proximity to the proposed discharge site (Discuss need for this information with Department staff).

4. Maps

- a. A detailed Area Map, at a scale of one inch equals 500 feet or less, with scale indicated both numerically and graphically, showing:
 - Boundaries of the site on which the OWRS is proposed to be located.
 - Topography, with existing surficial contours at contour intervals of 10 feet or less,
 - Planimetric features.
 - All public drinking water supply wells within one-half mile radius of the boundaries of the proposed OWRS and, if available, any associated aquifer protection or wellhead protection boundaries.
 - Surface water bodies and watercourses within one-half mile radius of the boundaries of the proposed SWAS.
 - Private drinking water wells within 1000 ft of the boundaries of the proposed OWRS.
 - Coastal boundaries, if any, as defined by section 22a-94 of the General Statutes as amended to date.
 - 10 year and 100 year flood boundaries as defined by FEMA, if any.

- b. A Site Plan, drawn to a scale of one inch equals 50 feet or less, with scale indicated both numerically and graphically, showing:
 - Property boundaries, as determined by a Licensed Land Surveyor.
 - Surficial contours, both existing and proposed, at contour intervals of 2 ft or less, and planimetric features, including but not limited to existing and proposed buildings, as determined by a Licensed Land Surveyor.
 - Boundaries of soil map units derived from NRCS Soil Surveys.
 - Location of existing or proposed wastewater pretreatment facilities and SWAS.
 - All existing and proposed wells on the site.
 - All subsurface pipes (water, sewer, gas, drainage including underdrains).
 - All surface waters and wetlands located on the site and immediately adjacent thereto, (wetlands to field delineated by a Certified Professional Soil Scientist and mapped by a Licensed Land Surveyor).
 - Ground water contours at intervals of 1 foot or less.
 - Locations and depths of all water table monitoring wells, soil test pits, borings, slug tests, test wells, pump tests, hydraulic conductivity test pits, etc., located and mapped by a Licensed Land Surveyor.
 - Proposed locations and depths of ground water level monitoring wells.¹
 - Proposed locations and depths of ground water quality monitoring wells.²

¹ Subject to revision after review by the Department.

² Subject to revision after review by the Department.

- Bedrock Geology and Surficial Geology, derived from maps published by the U.S. Geological Survey, showing boundaries of proposed project, covering an area extending to 1000 feet outward from the project boundaries.

5. Calculations

Appendices should include calculations for each of the following:

- Ground water flow direction.
- Ground water flow velocity.
- Hydraulic gradient of the aquifer.
- Hydraulic conductivities.
- Ground water mounding, and depth to SHWT from existing ground after superpositioning of ground water mound on SHWT.
- Site hydraulic capacity.
- Travel Time(s) from SWAS to points of concern

6. Raw Data

The following raw data should be included in each hydrogeologic report (All data logs must show the date the data was obtained. Undated data will not be accepted.):

- Logs of soil borings, test pits, monitoring wells, hydraulic conductivity field tests.
- Potable water well logs within 1000 feet of the discharge, if available.
- Laboratory data sheets for:
 - Soil particle size data.
 - Hydraulic conductivity data.
 - Background ground water quality data, if required by the Department.

7. Locating Soil Borings, Test Pits and Water Table Monitoring Wells

All soil borings, test pits, test wells and ground water monitoring wells shall be located from known and recoverable reference points or benchmarks so that they may be accurately located on the Site Plan.

8. Confirmatory Site Testing By Department Staff

Upon completion of preliminary studies by the Applicant's consultant(s) that conclude there is a reasonable possibility for constructing the proposed OWRS at the project site, and tentative concurrence by the Department with the conclusions thereof, a Department staff member and local health department staff member may perform a site reconnaissance prior to conducting confirmatory site testing. This would allow the Department staff member to get a first hand look at the site, which may affect the site testing to be conducted.