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Site-Specific Soil Mapping Standards For New Hampshire and Vermont

For Making Soil Survey Map Products Following the Standards of the USDA/NRCS National Cooperative Soil Survey

Version 4.0

February 2011

SSSNNE Special Publication No. 3

Society of Soil Scientists of Northern New England

SITE-SPECIFIC SOIL MAPPING STANDARDS FOR NEW HAMPSHIRE AND VERMONT

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SITE-SPECIFIC SOIL MAPPING STANDARDS FOR NEW HAMPSHIRE AND VERMONT

SSSNNE Special Publication No. 3
Version 4.0, February, 2011

I. INTRODUCTION

This document represents a cooperative effort between the Society of Soil Scientists of Northern New England (SSSNNE) and the USDA/NRCS National Cooperative Soil Survey. This document is not copyrighted and is provided by SSSNNE. The Site-Specific Soil Mapping Standards for New Hampshire and Vermont (SSSMS) described in this document represents an update to the Soil Scientists Society of Northern New England, Special Publication No.3, Version 2.0 published in January, 1999. These standards have been effect in New Hampshire and Vermont for over ten years. This version represents an enhancement of previous versions as a result of the experience of direct application of these standards in the field along with updates of supporting documents.

Site-specific soil mapping is conducted for very intensive land uses requiring very detailed information about soils, generally in small areas. Some site specific activities do not produce a survey per se (such as transect logs). Site-specific soil mapping is synonymous with Order 1 soil surveys completed by the National Cooperative Soil Survey. The information can be used in planning individual building sites, experimental agricultural plots, and other uses requiring detailed and precise knowledge of the soils and their variability. Field procedures permit observation of soil boundaries throughout their length. The soils within each delineation are identified by transecting or traversing. Map units are mostly consociations (with some complexes) and are phases of soil series or are miscellaneous areas. Base map scale is generally 1:12,000 (1"=1000') or larger and more typically 1:1,200 (1"=100').

II. NRCS ORDER 1 AND SITE-SPECIFIC SOIL MAPPING STANDARDS

The term "Order 1" is used by the USDA/NRCS National Cooperative Soil Survey (NCSS) to describe the most detailed level of soils mapping performed under this Federal Program (See Appendix E). Site-specific soil mapping is synonymous with Order 1 soil mapping. The primary distinction is that site specific standards include enhancements in specific soil mapping requirements to reflect local environmental conditions, soils and landscapes, as well as to recognize specific state regulatory policies and compliance requirements for the land-use permitting process. The soil mapping criteria identified in these standards are appropriate for subdivision and site plan review, biosolids management and other specific land uses that are regulated in New Hampshire and Vermont. These standards are designed to augment the basic criteria with a supplement specific to each state (see NH Supplement, p.37 or Vermont Supplement, p.46).

Waiver Request

Site Specific Soil Mapping

1509.03 (a) (4)

The New Hampshire Code of Administrative Rules, Chapter Env-Wq 1500 "Alteration of Terrain", Part Env-Wq 1504 "Plans and Calculations", Section Env-Wq 1504.09 (b) (2)b requires that a site-specific soil map be prepared in accordance with the Society of Soil Scientists of Northern New England (SSSNNE) Special Publication No. 3, Site-Specific Soil Mapping Standards for New Hampshire and Vermont, December 2006, for all proposed areas of disturbance.

1509.03 (a) (5)

The applicant is requesting a waiver of this rule as a result of a conversation with NHDES staff during the Alteration of Terrain (AoT) permit pre-application meeting. This waiver has been granted in the past for similar projects. According to the document referenced above, "Site specific soil mapping is conducted for very intensive land uses requiring very detailed information about soils, generally in small areas. … The information can be used in planning individual building sites, experimental agricultural plots, and other uses requiring detailed and precise knowledge of the soils and their variability."

The proposed project is linear in nature, essentially a four (4) mile long crushed stone roadway that will connect ten (10) wind turbine generator sites. The project site lies predominantly along the top of a ridge, and straddles four (4) expansive, largely undeveloped watersheds. An examination of the Natural Resources Conservation Service (NRCS) Medium Intensity Soil Survey of Hillsborough County, NH indicates that the majority of the project will be built on Hydrologic Soil Group C soils. A relatively short length of road will be built on HSG D soils, through an area of ledge and outcrop. No infiltration BMPs are proposed for the stormwater management system. In addition, sensitive areas such as streams, wetlands and vernal pools have been mapped and are shown on the site plans. This is not the type of project for which a site-specific soil map is intended, nor would the information produced by such a study provide any real benefit. That level of detail is not required.

1509.03 (a) (6)

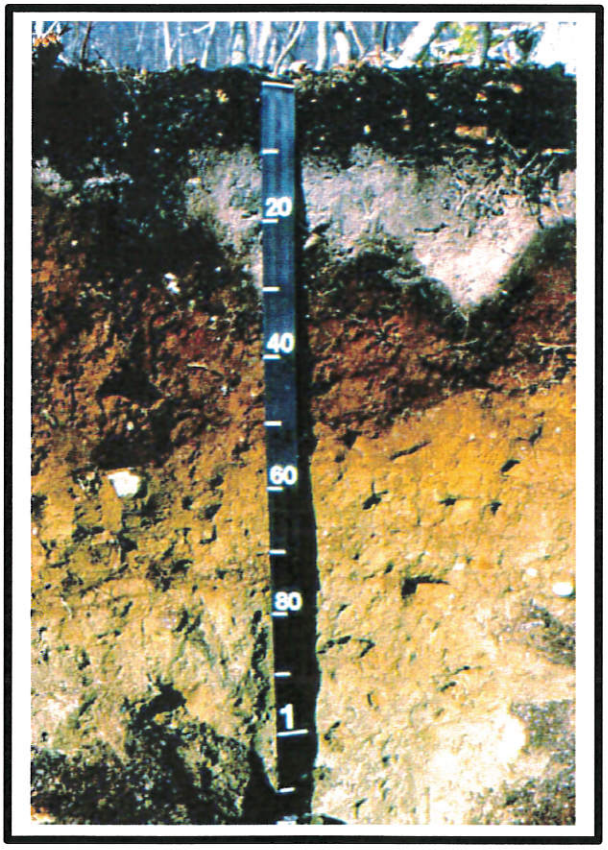
The waiver will not be temporary.

1509.03 (a) (7)

As an alternative to a site-specific soil map, the site plans have been prepared using delineations from the NRCS Medium Intensity Soil Survey obtained from the Web Soil Survey website.

Soil Based Lot Sizing

Environmental Planning for Onsite Wastewater Treatment in New Hampshire



Marlow fine sandy loam

This soil is the State Soil for New Hampshire. It is classified as a Coarse-loamy, isotic, frigid, Oxyaquic Haplorthod. This soil occurs on over 250,000 acres statewide and has been recognized in 9 of the 10 counties in the state.

This well drained soil formed in friable loamy material overlying very firm, slowly permeable, glacial till. The very firm glacial till is a moderately deep restrictive feature that restricts the soil's ability to absorb wastewater or provide groundwater recharge.

Where this soil occurs on slopes of less than 8 percent, the recommended minimum lot size is 54,500 square feet.

Sponsored by:
Society of Soil Scientists of Northern New England

SSSNNE Special Publication No. 4
Version I

September, 2003

See pages 4-5 history on soils mapping

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SOCIETY OF SOIL SCIENTISTS OF NORTHERN NEW ENGLAND
P.O. BOX 76
DURHAM, NH 03824

Soil Based Lot Sizing

Environmental Planning for On-Site Wastewater Treatment in New Hampshire

I. Introduction

This report and the Model Lot Size by soil Type Regulation presented within it represents the cumulative efforts and experience of a great number of professional land use planners, soil scientists, septic system designers, hydrogeologists and wetland scientists over a period of greater than twenty years. The concept of soil based lot sizing to protect groundwater quality grew out of the efforts to improve wastewater treatment to implement the requirements of the Clean Water Act back in the 1970's. It was clear that the urban solution of constructing wastewater treatment plants would not work in rural areas of New Hampshire, where the population is largely served by on-site septic systems and private individual wells. To address this scenario, planners and soil scientists in Rockingham County developed a model subdivision regulation that prescribed lot sizes by soil type. The intent was to assure that the area of house lots was adequate to accommodate a potable drinking water supply and wastewater treatment through septic systems located on-site.

Background

Soil based lot sizing is based on the capabilities of the soil to assimilate nitrate loading from septic systems. The goal is to provide nitrate levels in groundwater at drinking water quality. This concept has been adopted by the state in the form of their administrative rules for subsurface wastewater disposal systems. Many New Hampshire municipalities have also accepted and successfully implemented the concept of soil based lot sizing by adopting area requirements according to soil type in their local subdivision regulations.

The intensity of land development that has occurred in New Hampshire since the 1980's accentuated the need for site specific soils information for use by land use decision makers. To address this need, the Society of Soil Scientists of Northern New England (SSSNNE) developed High Intensity Soil Maps for New Hampshire, Standards SSSNNE Special Publication No. 1 in 1987. The resulting HISS standards provide uniform criteria for soil maps that can be used to interpret lot size by soil type ordinances. They can also be used to interpret local subdivision regulations that have set back requirements for leach fields, limiting soil conditions and hydric soils. HISS requires documentation of four of the soil physical properties that are most limiting to use and management of the landscape. These are drainage class, parent material, restrictive features and slope class.

As the value of using site specific soils information gained widespread recognition, local planning boards began to require HISS maps to make land use decisions that went beyond their intended purposes. There is no direct conversion between the USDA/NRCS soils series classification/interpretations and a soil map symbol derived from the HISS Key To Soil Types. To resolve this potential conflict and to provide soil mapping standards that are consistent with USDA standards and DES subsurface permitting requirements SSSNNE sponsored SSSNNE Special Publication No. 3 Site-Specific Soil Mapping Standards for New Hampshire and Vermont (Version 2.0, January 1999).

The increased use of soils information in state and local regulatory processes and in the popularity of soil based lot size regulations gave rise to the need for technical documentation to support these requirements. The need for public education about the role that soil properties and principles play in the lot size determinations was also evidenced by the common practice of planning boards arbitrarily changing the lot sizes from those presented in the original soil based lot size table. An Ad Hoc Soil Based Lot Size Committee was formed to assess the situation and prepare a document to summarize the technical background and present a model regulation that could be used by municipalities on a statewide basis to promote regulatory consistency. The committee's efforts resulted in the document entitled Environmental Planning for on-site Wastewater Treatment in New Hampshire: Technical Report of the Ad Hoc Committee for Soil-Based Lot Size, NH DES and Rockingham County Conservation District, June 1991 and subsequent work sessions to update that document to meet current technical and scientific standards. Further detail about these efforts are presented in the Historic Prospective section of this document.

Current Status

On January 17th, 2003, the full membership meeting of the Society of Soil Scientists of Northern New England (SSSNNE) voted to develop and publish a report on the most current, technical and scientific information available on soil based lot sizes. This resulting report provides the most recent update of the work of the Ad Hoc Committee for Soil-Based Lot Size, a model lot size by soil type regulation and two tables that provide lot sizes for soil maps prepared using either the Site-Specific Soil Mapping Standards for New Hampshire and Vermont (SSSNNE Special Publication No. 3) or the High Intensity Soil Maps for New Hampshire, Standards (SSSNNE Special Publication No. 1. It is intended that the planning board will adopt either the SSSMS Table or the HISS Table if they choose to adopt and implement the model lot size by soil type regulation.

On August 22, 2003, the full membership meeting of the Society of Soil Scientists of Northern New England reviewed and approved this document for publication and release by unanimous vote. This document, Soil Based Lot Sizing Environmental Planning for On-Site Wastewater Treatment in New Hampshire SSSNNE Special Publication No. 4. Version I, September, 2003 supercedes all previous soil based lot size documents and replaces all previously developed interpretive lot size tables. It is endorsed by the Society of Soil Scientists of Northern New England with pending endorcements from the New Hampshire Office of State Planning and Energy Programs, and the New Hampshire Department of Environmental Services..

The Society provides this publication as a service to the general public. It was formatted for use by Planning Boards, Conservation Commissions, Planners, Engineers, Surveyors, Soil Scientists, Wetland Scientists, and others as a tool for protection of ground water resources. Neither the Society nor any of its members received any financial benefit from the preparation of this publication. It was strictly a volunteer effort by members of the Society to provide the general public with the best available information on lot sizing by soil types.

The Society of Soil Scientists of Northern New England is a non-profit organization of soil scientists, from both the private sector and the public sector, that is dedicated to the advancement of soil science. The Society fosters the profession of soil classification, mapping and interpretation, and encourages the dissemination of information concerning soil science.

With the intent of contributing to the general human welfare, the Society seeks to educate the public on the wise use of soils and the associated natural resources. The Society has two other current publications besides this one: SSSNNE Special Publication No. 1 High Intensity Soil Maps for New Hampshire, Standards (last revision July 16, 2002), and SSSNNE Special Publication No. 3 Site-Specific Soil Mapping Standards for New Hampshire and Vermont .

The Society approved the creation of a Soil-based Lot Size Committee to develop this publication. Members of the Society that formed the Committee are as follows:

Allain, David, Private Soils Consultant
Balcius, Cynthia, Private Soils Consultant
Bond, Richard, Private Soils Consultant
Cuomo, Michael, Private Soils Consultant
Gove, James (Chair), Private Soils Consultant
Hundley, Steven, Soil Scientist, USDA, Natural Resources Conservation Service
Jacobs, Mark, Private Soils Consultant
Latawiec, Francesca, Private Soils Consultant
Lobdell, Raymond, Private Soils Consultant
Morse, Lawrence, Private Soils Consultant
Pilgrim, Sidney, Adjunct Professor, University of New Hampshire

Other non-society attendees of the Committee:

Cassulo, Joanne	NH Office of State Planning and Energy Programs
Steve Whitman	NH Office of State Planning and Energy Programs
Evans, William	NH Department of Environmental Services
Greenwood, Glenn	Rockingham Planning Commission

Other contributing authors (affiliations at time of contribution):

Shope, Steven	Private Geohydrologist
Williams, Paul	Private Geohydrologist

II. Historic Perspective

The original effort to provide detailed technical documentation to support standards for construction, siting and lot sizing for on-site septic systems resulted in a report entitled Environmental Planning for on-site Wastewater Treatment in New Hampshire: Technical Report of the Ad Hoc Committee for Soil-Based Lot Size, NH DES and Rockingham County Conservation District, June 1991. The stated purpose of this report and the model soil-based lot size regulation developed to implement it are as follows:

> *"To provide the technical basis and standards for lot sizing for on-site septic systems, while maintaining an acceptable level of groundwater and surface water quality."*

A literature review of the current scientific research available at the time was summarized in the aforementioned document. In general, the committee used a mass balance, nitrogen computer model to generate optimal density requirements for subdivisions. They found that nitrogen, in the form of nitrates, is the major contaminant factor in the sizing of lots for groundwater protection. The primary mechanism of nitrate nitrogen reduction in groundwater is dilution, achieved by recharge to groundwater from precipitation.

The amount of recharge is primarily dependent upon a combination of the amount of rainfall and the capability of the soil to infiltrate, transmit and store this water. Soil features such as texture, restrictive layers, structure, consistence and slope are key physical properties that affect groundwater recharge. For the purpose of the committee's work, nitrate loading was considered to be the most limiting factor, with other constituents in wastewater adequately treated through modern regulatory septic system design and setback requirements.

Based upon these premises, the Ad Hoc Committee utilized a computer model developed by the National Association of Home Builders (NAHB) that considers various aspects of the above factors to calculate recommended lot sizes to maintain the EPA drinking water standard for nitrate nitrogen of 10 mg/L in the groundwater. The factors that were used in the computer model are detailed in Chapter 6 of the Ad Hoc Committee's technical report published in 1991, and the original lot sizes generated are presented in tables in the model regulation in Volume II of that report. Both the report and the model regulation were widely distributed and used for planning and regulatory purposes by municipalities in New Hampshire. The lot size tables in the 1991 report have been updated and replaced with the tables published in this document.

A. Reasons for Update to the Original Soil-Based Lot Size Model

Since 1991, DES Subsurface Bureau has been working on a series of changes to their Administrative Rules for Subdivision and Individual Sewage Disposal System Design Rules, Env-Ws 1000. They formed a technical committee to assist with the rulemaking, with representatives from the DES Water Council, Granite State Designers and Installers (GSDI), private soil and wetland consultants, the Wetlands Bureau, OSP and the Natural Resources Conservation Service (NRCS).

One major issue identified by the rules committee was the current discrepancies between lot sizes required by DES' rules, those presented in Volume II of the Ad Hoc Committee's report and those adopted by municipalities relative to on-site wastewater treatment. It was a consensus of the group that all parties involved in the lot size by soil type issue should be supporting technically valid standards that are consistent across the state.

Based upon the current census data (year 2000), the figure of 3.6 people per household covers typically every single family residence in New Hampshire. This was the figure that was used in the calculation of the lot sizes in this document.

In 1991 the Ad Hoc Committee, for lack of a better method, used NRCS hydrologic groups as an indicator of soil recharge capability. This was a positive first step; however, hydrologic groups are an engineering interpretation used to place soils into four general categories according to their infiltration capacity and potential for contributing to surface runoff. While it is a valuable tool to assist in determining flooding potential within watersheds, it is not practical to apply these groupings on small parcels of land or in site specific applications. Additionally, because hydrologic group is an engineering interpretation, it is not possible to document observable and measurable soil characteristics in the field. Without the ability to provide measurable values, it becomes very difficult to apply lot size criteria consistently and it is difficult to enforce.

The Ad Hoc Committee on Soil-Based Lot Size reconvened in December of 1999 to update the original soil-based lot sizes using current census data and to reflect more detailed evaluation of physical soil properties, particularly transmissivity, and how they affect groundwater recharge from rainfall on an annual basis. Technical work was performed but no publication was issued. This initiative lost momentum for about a 2-year period before it resumed with renewed interest from the Society of Soil Scientists of Northern New England at their full membership meeting on January 17, 2003. The 2000 census data was reviewed, and found to be consistent with the calculations that were prepared in 1999.

B. Soil Physical Properties

The NRCS National Cooperative Soil Survey has established uniform, nationally accepted, scientific criteria for describing and interpreting a wide range of soil physical and chemical properties. Most of these properties are observable and measurable and can be documented and evaluated by qualified individuals directly in the field. For this reason, they are used to evaluate the suitability of different soil types for subsurface wastewater treatment in New Hampshire.

Both physical and chemical properties influence the soil's ability to function as a filtering medium for wastewater treatment. For the purpose of soil-based lot sizing, the NRCS sorted the soil types that occur in New Hampshire into six categories based upon their established physical properties. Each of these soil categories has a different capability to treat wastewater from septic systems. Using nitrate nitrogen as the contaminant of concern, the ability of any given soil to contribute recharge to groundwater is the primary characteristic of the soil that was considered in developing the categories. Five physical soil properties were considered in determining recharge capability. These properties can be distinctly recognized, measured, and documented in the field by soil series in accordance with

Site-Specific Soil Mapping Standards for New Hampshire and Vermont

The Society of Soil Scientists of Northern New England is a non-profit, professional organization of soil scientists, dedicated to the advancement of soil science. The Society seeks to educate itself and the public in the wise use of soil resources and natural resource information, thus contributing to the general human welfare and quality of life.

Society of Soil Scientists of Northern New England, P.O. Box 986, Durham, NH 03824.

Version 2.0
January, 1999

Society of Soil Scientists of Northern New England

SSSNNE Special Publication No. 3

Abstract

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(2) Contain no more than 25% by volume of cobbles larger than 6 inches in diameter or stones larger than 12 inches in diameter;

(3) Have a percolation rate of not greater than 15 minutes per inch after placement and compaction; and

(4) Be homogeneous, and if bedding planes or other discontinuities are present, the applicant shall submit detailed soil analysis from a person or laboratory qualified to perform the analysis with the application to establish that the fill meets the above criteria.

(e) If a technology that has received approval under Env-Wq 1024 with a smaller separation distance to impermeable soil or bedrock will be used on a property, the separation distance(s) specified in the technology approval shall govern the down-slope receiving area requirement.

Source. (See Revision Note at chapter heading for Env-Wq 1000) #9086, eff 2-9-08; ss by #9904-A, eff 4-16-11

Env-Wq 1014.02 Basis for Poorly and Very Poorly Drained Soils.

(a) The purpose of the criteria for poorly drained soils is to identify soil conditions where ground water is present within the upper part of the soil surface during the growing season.

(b) The purpose of the criteria for very poorly drained soils is to identify soil conditions where water is present at or above the soil surface during the growing season such that a significant organic surface layer accumulates.

Source. (See Revision Note at chapter heading for Env-Wq 1000) #9086, eff 2-9-08

Env-Wq 1014.03 Delineation of Wetlands; Hydric Soils Determinations.

(a) Wetlands shall be delineated in accordance with RSA 482-A and Env-Wt 100 et seq.

(b) For sites in an undisturbed natural state, the presence or absence of hydric soils shall be determined by evaluating shovel or auger holes to a depth of 2 feet. A sufficient number of holes shall be dug to establish the hydric soil boundary to within 5 feet.

(c) The suitability of a site as a receiving layer shall be determined in accordance with (d), below, if any of the following apply:

(1) No fill has been placed on the site, but the natural vegetation and soil have been disturbed to the extent that it is not possible to determine the presence or absence of hydric soils based on a visual examination of the soil horizons revealed by shovel or auger holes; or

(2) Fill has been placed on the site prior to 1967 for tidal areas, or prior to 1969 for freshwater areas, or pursuant to authorization of the New Hampshire water resources board prior to 1979, or pursuant to a valid permit from the New Hampshire wetlands board issued prior to August 9, 1996, or issued by the department pursuant to RSA 482-A, and either:

a. Visual examination of a test pit establishes that the original soil was hydric, or

b. It cannot be determined by a visual examination of a test pit whether the original soil was a hydric soil or not.

(d) If any of the conditions set forth in (c) above apply, the presence of a suitable receiving layer shall be determined based on the hydrology of the site as shown by data obtained from piezometric monitoring wells in accordance with the following:

(1) One monitoring well shall be placed in the proposed leaching area and one monitoring well shall be placed at a point between 65 and 75 feet downgradient of the proposed leaching area;

(2) Additional monitoring wells shall be installed as needed to establish the 20,000 square foot area required for subdivision applications;

(3) Water level readings shall be taken every 2 weeks;

(4) Water level readings may be taken more often at the option of the property owner;

(5) All readings taken shall be submitted quarterly, in writing, to the department;

(6) Water levels shall be monitored for a period of 2 years;

(7) Based on the recorded data, the applicant shall estimate the seasonal high water table, taking into account weather conditions such as the amount of precipitation over the period, major storm events, frosts and thaws;

(8) The applicant shall submit the estimate together with supporting data to the department;

(9) The receiving layer shall be deemed suitable if the estimated seasonal high water table is no closer than 15 inches to the existing ground surface.

Source. (See Revision Note at chapter heading for Env-Wq 1000) #9086, eff 2-9-08; amd by #9904-A, eff 4-16-11

Env-Wq 1014.04 Distance Above Impermeable Substratum.

(a) Except as allowed by (b) through (d), below, or by Env-Wq 1014.06, the bottom of an EDA shall be at least 4 feet above bedrock or any other impermeable substratum.

(b) The bottom of the EDA for new systems shall be at or above the specified separation distance to bedrock or any other impermeable substratum for any EDA using EDA components that have been approved with reference to a manual pursuant to former Env-Ws 1024 or approved pursuant to Env-Wq 1024, where the approved manual or approval, respectively, specifies that the component can be used with other than a 4-foot separation.

(c) For a system to replace a failed system serving a single family residence or duplex where there will be no expansion, the following shall apply:

(1) The bottom of the EDA shall be as close to 4 feet above bedrock or other impermeable substratum as possible, and in no case less than 2 feet above bedrock or other impermeable substratum, if a conventional pipe-and-stone system is used to replace the failed system; and

(2) The bottom of the EDA shall be as close to the specified distance above bedrock or other impermeable substratum as possible, and in no case less than 2 feet above bedrock or other impermeable substratum, for any EDA using EDA components that have been approved with reference to a manual pursuant to former Env-Ws 1024 or approved pursuant to Env-Wq 1024, where the approved manual or approval, respectively, specifies that the components can be used with other than a 4-foot separation in new applications.

(d) A system to replace a failed system serving a condominium shall be installed in accordance with (c), above, if: