Section 13 Soils Mapping, Erosion Control and Stormwater Management

13.0 SOILS MAPPING, EROSION CONTROL AND STORMWATER MANAGMENT

Highland is required to demonstrate that it has made adequate provision for fitting the proposal harmoniously into the existing natural environment in order to ensure there will be no undue adverse effect on natural resources in the area likely to be affected by the proposal. Three components of that demonstration are included in this Section of the Application. In addition, an Environmental Assessment is provided at Section 14 of this Application.

The Applicant, through its consultants, have performed soils mapping which demonstrates that the soils at the Project site are suitable for the proposed use, the results of which are located at Appendix 13-1. In addition, the Application provides the information necessary to demonstrate compliance with the erosion control requirements of Land Use Regulation Commission (LURC) Rule Chapter 10.25, M see Section 13.2 below and the civil plans shown in Exhibit 1. The stormwater calculations were performed using methodology developed in consultation with Maine Department of Environmental Protection (MDEP), and demonstrate the Project's compliance with MDEP Stormwater Rules. These calculations are provided in Appendix 13-2.

13.1 Soils Mapping

Albert Frick Associates, Inc. completed appropriate intensity soil surveys for the Highland Wind Project (Project) generating facility, Operations & Maintenance (O&M) building, and generator lead. See Appendix 13-1. The resulting report concludes that with proper planning and construction techniques, the soils are appropriate for the proposed construction activities. During surveying and planning of the Project, the applicant's consultants worked closely with the State Soil Scientist to determine appropriate survey extents. As a result of these discussions, the soils report includes additional information concerning poorly drained and somewhat-poorly drained soils.

13.2 Erosion Control

This erosion and sedimentation control plan has been developed to (1) satisfy the requirements of the LURC Chapter 10 Rules and Standards and (2) identify road construction and stormwater management techniques that will minimize unreasonable soil erosion and prevent potential reductions in the water storage capacity of existing soils. The plan identifies Best Management Practices (BMPs) that can be implemented during construction of the Project to minimize and control soil erosion. The plans, details, and specifications included in the plan identify appropriate BMPs for various soil and environmental conditions, explain the basis for their use, and provide details for their installation. Erosion control details are provided in Exhibit 1 (Refer to Sheets 600-609). Note that no component of this Project is located above 2,700 feet in elevation; therefore the erosion control plans do not address work under these conditions.

13.2.1 Overview of Erosion and Sedimentation Concerns

Activities that may potentially cause erosion during Project construction primarily consist of clearing and grading of the access roads and crane paths and grading and site preparation for the wind turbine clearings (i.e., foundations, crane pads, and rotor assembly areas). See Section 12.11 for more detailed clearing information. The critical areas for this site during construction are the steep slopes and any disturbance near wetlands and streams.

13.2.2 Erosion and Sedimentation Control Measures

The proposed erosion and sedimentation control plan includes installation of silt fencing, wood waste berms, erosion control mix, riprap slope protection, and rock sandwich road construction. These BMPs will be designed in accordance with the following Maine standard references for erosion and sedimentation control:

• Maine Erosion and Sedimentation Control Best Management Practices (MDEP, 2003);

- Erosion and Sediment Control Handbook for Maine Timber Harvesting Operations Best Management Practices (1991); and
- Land Use Handbook Section 6 Erosion Control on Logging Jobs and Revision (Supplement) (effective January 5, 1981).

Erosion and sedimentation control design plans, details, and specifications will be reviewed by a State of Maine licensed Professional Engineer and Certified Professional in Erosion and Sedimentation Control who specializes in design and implementation of erosion control methods.

If winter or early spring construction occurs, the recommended winter construction BMPs will be followed. These include application of hay mulch at twice the standard rate and installation of a double row of sediment barriers for areas within 75 feet of a wetland. Winter construction specifications are also provided in Exhibit 1 (Refer to Sheet C-4).

Wood Waste Berms/Silt Fence

Wood waste berms, silt fence, or a combination of the two, will be installed down gradient of construction and clearing activities. In critical areas, particularly near wetlands, a double layer of silt fencing or wood waste berms may be installed. Multiple rows of wood waste berms/silt fencing also may be necessary in areas with long cuts. The final layout will be prepared in accordance with typical design methods in the above referenced BMPs documents. Silt fence should not be used in areas of concentrated stormwater runoff.

Erosion Control Mix

Erosion control mix (ECM) will be used to provide cover and stabilize slopes in denuded areas until vegetation is established. On steep slopes, erosion control mesh or fabric netting anchored with staples may be used with the ECM. Wood mulch generated by tree/stump grinding and other cleared woody vegetation will be used to provide cover material over bare slopes as an erosion control material. ECM should not be used in areas of concentrated stormwater runoff.

<u>Riprap</u>

Steeply sloped ditches along Project roadways will be stabilized using approximately sized riprap or processed blast rock armoring. Cross-culverts also may be necessary as part of this Project. Plunge pools, check dams, and level spreaders will be used to dissipate concentrated flows that might cause erosion and thereby protect culvert outlets.

Rock Sandwich Road Construction

Where appropriate, the erosive potential of water that otherwise would be concentrated in ditches will be minimized by the use of "rock sandwich" road construction. This method will be used in areas with high ground water or poor soils or other areas with sensitive hydrology. The "rock sandwich" will allow water to pass through the roadway subbase rather than being intercepted by the roadway. This will eliminate concentrated flows in ditches located on the uphill side of the road and allow water from uphill areas to continue flowing under the road through a layer of coarse rock.

Ditch Turnouts and Level Lip Spreaders

Ditches will be necessary primarily in cut sections of the roadway. Where ditches are needed, appropriately sized and placed cross-culverts and ditch turnouts will be used to dissipate collected stormwater runoff back to sheet flow. As recommended by MDEP and LURC Chapter 10 criteria, ditches will be designed so that ditch turnouts will end with a level lip spreader.

13.2.3 Site Plan

James W. Sewall Company prepared the road and turbine site design plans for this application that identify vegetation types and locations, slopes, and other nature features near the disturbed areas. The plans and accompanying details show and describe temporary and permanent erosion control measures.

13.2.4 Sequence of Construction

In general, erosion control measures will be installed down-gradient of each work area before earthwork begins. Construction activities will be sequenced to minimize the Project area that is disturbed and unstabilized at any point in time. Disturbed and stockpiled soil will be temporarily stabilized at the end of each workday. Temporary erosion control measures will be the first items installed and the last items to be removed. Removal of temporary erosion control measures will occur only after healthy vegetation is established.

After preliminary layout and staking/flagging of the new road segments and areas to be cleared, erosion control measures will be installed. As the roads are constructed and areas are cleared, additional measures will be implemented. Once roads reach final grade, permanent measures, such as ditch turnouts and level spreaders, will be constructed.

Cleared areas will receive temporary mulching as required. Topsoil stockpiles will be protected by double measures such as temporary seeding and silt fences. After turbines are installed, a significant portion of each turbine clearing will be re-graded and ECM and stockpiled topsoil will be applied.

Because stabilization of areas following completion of final grading is very important to prevent erosion, areas will be stabilized within seven days of work completion. Final stabilization will primarily consist of coarse gravel or blast rock (Project roadways), ECM (turbine clearings and portions of crane paths), erosion control mix/matting (less steep earth cut and fill slopes), and riprap or blast rock (steep cut/fill slopes, ditches and culvert outlets).

13.2.5 Maintenance and Inspection of Erosion Control Measures

Maintenance of erosion control measures is essential to their successful operation. The Applicant will be responsible for ensuring that maintenance of erosion control measures will be completed in a timely manner. During construction, the prime contractor, who has yet to be determined, will have this responsibility. Erosion control measures will be inspected at least weekly and after any rainstorm greater than 0.5 inch. These regular inspections will be conducted by the Project General Contractor, who will be certified in erosion control practices by the MDEP. Periodic inspections also will be conducted by a third-party inspector who will be under direct supervision of a licensed Professional Engineer. Inspections will be documented in writing and be made available to LURC upon request. On-site workers will be instructed to report problems when they occur so remedial action can be taken as soon as possible.

13.2.6 Maintenance Plan

The following outlines the maintenance that will be applied to the various permanent erosion control measures and other features that could experience erosion.

Ditches

Rip-rap lined ditches

- Inspect semi-annually.
- Remove sediment buildup, leaves, litter or other debris from the bottom and side slopes.
- Reposition stones to restore channel to original dimensions.

Vegetated Ditches

- Inspect the ditch lining monthly for slumping of the lining, downcutting of the ditches base, or undercutting of the banks.
- Repair any damage immediately.
- Mow or brush-cut annually only as necessary to prevent the establishment of woody vegetation.

Culverts

- Inspect for sediment buildup.
- Flush pipes and remove sediment at which time the depth of sediment at any location in the pipe exceeds three inches.

Rip-Rap Aprons, Level Spreaders, and Ditch Turnouts

- Inspect semi-annually or after severe storms for dislodged stones or slumping of the stone lining.
- Inspect and verify that top of stone is level (+/-1").
- Repair level lip to distribute flows uniformly across the buffer
- Reposition stones to restore the pools original dimensions and a uniform surface.
- Clean any accumulated sediments and debris from the plunge pool.
- Cut and remove any woody vegetation growing within the pool.

Vegetation

- Inspect vegetated areas each spring.
- Rework and re-stabilize sparsely re-vegetated areas that show evidence of soil erosion.

Stones Check Dams

Prior to establishment of permanent vegetation

- Inspect check dams after each storm event until permanent vegetation is established.
- Remove sediment buildup behind check dams.

After establishment of permanent vegetation

- Inspect for sediment build-up in void space between stones and dislodged stones.
- Remove sediment build-up.
- Stabilize disturbed areas.
- Replace check dam if sediment is filling void space.
- Replace dislodged stones.

Road Grading

• Grade the road as necessary to maintain the proposed roadway crown or super elevation and to prevent the creation of berms or ruts that may channelize flow.

Side slopes of gravel surfaces

- Inspect slopes for rill erosion due to concentrated flows.
- Stabilize eroded slopes with ECM or other approved BMP method.

13.3 Stormwater Management

The construction of gravel roads, tower foundations, turbine pads, and an operations and maintenance area may create stormwater runoff in excess of what the Project area presently generates. It is important to mitigate this increase in stormwater runoff to prevent erosion or damage to downgradient ecosystems. In general, the stormwater control plan is designed to minimize the concentration of stormwater flows off the Project site. The primary components of the plan include minimizing the permanently impacted areas of the Project site and incorporating appropriate BMPs in the Project design. Plans showing stormwater buffers, phosphorous restriction areas, ditch turnouts, and sedimentation and erosion control measures are provided in Exhibit 1.

The primary effort in stormwater management will be to minimize the permanent impacts associated with the Project through the systematic re-vegetation of disturbed areas. The reestablishment of vegetation will occur principally within the areas of temporary impacts. Temporary impacts will be associated with the 34-foot wide crane path roads, and the approximately 332-foot diameter clearings required for assembly of the turbine rotors. Areas of temporary clearing and the reestablishment of vegetation in these areas are further discussed in Section 12.11.

The impacts to site hydrology from the proposed Project also will be minimized by the use of appropriate stormwater management BMPs such as culverts with outlet protection and level spreaders. These are discussed above in Section 13.2.

Buffers around the Project construction areas are vital to minimize construction-related impacts to existing wetlands, streams, and soils in the Project area. When developing the turbine site and road plans, the Project provided several types of buffers including general stormwater buffers. The length and width of the proposed buffers will be based on site-specific conditions, including land slope and soil type, as defined in Appendix F of the BMP Manual Chapter 500. Three types of stormwater buffers are proposed for use on this Project. The first type of buffer would be used in areas adjacent to the downhill side of the road, in which the runoff from the road will sheet directly into a buffer. The second type is a ditch turn-out buffer in which ditch runoff is diverted to a 20-foot-wide level spreader and then distributed into a buffer. The third type of buffer allows runoff to be diverted to a stone bermed level lip spreader and distributed into a buffer. The level lip spreaders have been sized according to the most recent version of the Maine BMP Manual.

13.3.1 Best Management Practice General and Phosphorous Standard

Due to its size and location, the Project is subject to the BMP General and Phosphorus Standard. The purpose of the BMP standards is to include treatment measures that will mitigate for the increase of channel erosive flows and treat the pollutants effectively, and to mitigate for the potential temperature impacts due to the runoff from the proposed site. The Project also must meet the Flooding Standard for the 2, 10 and 25-year-storm event to prevent flooding down gradient of the site.

The applicant proposes to meet the required **BMP General Standard** by doing the following.

The applicant proposes to use a combination of underdrain soil filters and buffers to treat the runoff from the Project site. Per Maine MDEP regulations, at least 75 percent of the linear portion of the Project (the access roads, crane paths, and turbine pads) and at least 50 percent of the developed area of the linear portion of the Project (access road and crane paths, associated grading, and landscaped area) must be treated. The nonlinear impervious area of the Project (O&M building and parking lot) must have 95 percent treatment and nonlinear developed area (O&M building and parking lot, grading and landscaping) must meet at least 80 percent treatment. The support documents that summarize the method of treatment, with their sizes, the contributing area of impervious surface and developed area, and the percentage of the Project's treatment met with each treatment system are provided in Appendix 13-2.

The applicant proposes to meet the **BMP Phosphorus Standard** as follows.

The applicant proposes to use a combination of buffers to treat the phosphorus from the Project site. Following MDEP regulations, the phosphorus export for the post-development conditions must be less than the phosphorus budget determined by the State for the Project site. The support documents that summarize the method of treatment, with their sizes, the contributing area of impervious surface, and the phosphorus export for both pre- and post-development conditions are provided in Appendix 13-2.

The applicant proposes to meet the **Flooding Standard** as follows.

As part of the flooding standard, runoff from the site must meet or be less than the pre-development flows or have an insignificant increase in flow off the site. Near the O&M building, the flooding standard will be addressed by storing runoff volume using soil filters. These structures are designed to collect, store, and control the stormwater runoff. To meet the quality standards, the soil filters were modeled to detain only the volume of water for which they were sized. The structures have been designed to accommodate the 2-, 10-, and 25-year storm events. The rest of the Project will use buffers with level lip spreaders to slow and return the runoff to sheet flow. The overall storm water management system has an insignificant increase in runoff and is designed to prohibit any adverse impact on areas downstream from the site.

Pre- and Post-Development Watershed plans illustrating watershed areas, hydraulic lengths lines, and physical features are provided in Exhibit 1 (Refer to Sheets C-701 through C-704). Support documents that summarize the method of treatment, with their sizes, the contributing area of impervious surface, and the calculations for both pre- and post-development conditions are provided in Appendix 13-2.

13.4 Phosphorus Analysis

The Project lies within the Gilman Pond, Carrabassett River, and Kennebec River Watersheds. Runoff from the Project has the potential to increase phosphorus within the Gilman Pond watershed. Buffers will be used throughout the Project to reduce the phosphorus loading to meet the MDEP standards in these areas. See the support documents in Appendix 13-2 for more detailed information.

The phosphorus analysis is based on several assumptions listed in this narrative and specific analytical methods described in "Phosphorus Control in Lake Watersheds: A Technical Guide to Evaluating New Development" published in January 2008 by the MDEP.

Gilman Pond's current calculated pound per acre phosphorus allocation is 0.038 pounds/acre. The Project area includes 21,470 acres that are within the direct watershed of Gilman Pond. The Small Watershed Threshold is 779 acres.

Linear portions of the Project are gravel or blast rock roadways. From the MDEP guidance documents, these portions have been assigned a phosphorus runoff coefficient of 1.75 pounds/acre/year. The permanent parking areas to remain at each turbine and the area around the base of the turbines have been assigned a coefficient of 1.25 pounds/acre/year. Using these methods, runoff will be treated to meet these standards.

Calculations demonstrating this analysis and indicating what buffers will treat each section of road are included Appendix 13-2.

Phosphorus treatment will be accomplished by extensive forested and roadside buffering. The Project roadways are being built on mountainous slopes, which in many cases exceed 15 percent in grade. MDEP has suggested additional BMP's that allow for a significant amount of additional roadway to be treated. Many roads will be super elevated to drain surface water from the road to the downhill ditch or fill slope. An 18-foot wide re-vegetated mulched area located on the downhill side of the roadway will function as a pre-filter for the road runoff, and will contribute to pretreatment of the water. This allows the road surface runoff to be treated either by sheet-flow roadside buffers, ditch turnouts, or buffers with stone bermed level lip spreaders. In buffer areas adjacent to roads where existing ground slopes are steeper than 15 percent, wood-waste berms will be utilized and located at the toe of the slope. The berm will reduce the likelihood that the flow from the road will concentrate. Rather, it will seep through the berm and be reintroduced to the mountainside as sheet flow. Where existing grades are steeper than 30 percent, no roadside, ditch turnout or stone bermed level lip spreader buffering is proposed because it is thought to be ineffective.

Phosphorus export from the Project has been calculated in the Gilman Pond watershed and will be reduced by providing buffers and treatment where practical. Phosphorus Encumbrance Zones (Zones) have been created based on the expected export associated with each watershed. These Zones are referred to as the total development areas in the phosphorus calculations. Due to the size of the Zones, the phosphorus export will be slightly less than that allowed in the phosphorus budget. Within these Zones, which are generally defined as a setback from the centerline of Project roads, no additional development resulting in permanent impervious areas will be allowed.

13.5 Re-vegetation Plan

Following construction, the lay down area and approximately 2.4 acres of the total 2.6 acre clearing for each circular turbine pad will be allowed to re-vegetate. To reduce the potential for erosion, topsoil material, previously stripped from the development areas and stockpiled, will be spread on these

relatively flat areas. Erosion control mix, primarily comprised of stump grindings and shredded organic material generated during clearing, will be mixed and spread with the topsoil material and allowed to naturally re-vegetate.

Following completion of road construction and turbine erection activities, these areas will be allowed to revegetate and will be inspected periodically to check for erosion. If erosion is noted, these areas will be further stabilized. Areas will continue to be inspected until a vegetative cover is established.

Topsoil stockpiles throughout the site will be protected from erosion and sedimentation through implementation of Best Management Practices. This will include encircling down-gradient sides of the stockpiles with silt fencing or erosion control mix berms. Slopes will be left in a roughened condition to help minimize runoff erosion.

Appendix 13-1

HIGHLAND WIND PROJECT

Highland Plantation and Pleasant Ridge Plantation, Maine

SOIL NARRATIVE REPORT

December 14, 2010

PREPARED FOR:

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Topsham, ME 04086

by Albert Frick Albert Frick Associates, Inc. 95A County Road Gorham, ME 04038

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1.0 Introduction

Albert Frick Associates hereby provides the Soil Survey for Highland Wind, LLC's proposed *Project* in *Highland Plantation* and *Pleasant Ridge Plantation, Maine*. This Soil Survey includes:

- a Class L level of soil survey as required by *Maine Department of Environmental Protection* and the *Maine Land Use Regulations* for *linear* projects (e.g. wind projects) in the area of the proposed turbine sites and proposed road alignment,
- a High Intensity Class B Soil Survey at the proposed operations and maintenance building location, and
- a modified Hybrid Class L Soil Survey along the proposed transmission corridor.

1.1 Overview of Project and Location

The Highland Wind Project energy generating facility located in Highland Plantation, Somerset County, Maine. In addition to the wind turbines, the Project includes a 34.5kilovolt (kV) electrical collector system, an electrical collector substation, a 115-kV generator lead, an Operations and Maintenance (O&M) building, up to five permanent 80-meter meteorological towers, and a series of roads to construct and then access the turbines and related infrastructure. All projects components are proposed to be located in Highland Plantation; however the generator lead, which delivers power from the electrical collector substation to the New England grid, also passes through Pleasant Ridge Plantation on its way to the CMP-controlled substation in Moscow, Maine.

The Project will consist of the following components:

• A total of 39 turbines, along with associated electrical interconnection infrastructure and five permanent meteorological towers, installed in two distinct strings along ridges of the Witham Mountain, Bald Mountain, Burnt Hill and Briggs Hill in Highland Plantation, will be located at elevations between 1,553 and 2,237 feet above mean sea level, along ridges with elevations at approximately 700 feet.

The western string of the Project includes the 18 turbines located on the ridgeline that connects Witham Mountain, and Bald Mountain. The eastern string includes 21 turbines extending from the northeastern end of Burnt Hill south to Briggs Hill.

2.0 Purpose

This investigation is a Class L (linear) soils survey for the proposed project, as required by Maine law. A Class L Soil Survey for linear wind power projects is concentrated in the areas of proposed access roads, turbine pads, and laydown areas. The purpose of this Class L soils investigation is to provide soil information for the proposed Highland Wind project along the proposed corridor of the access road alignment and within the proposed turbine pad sites, and laydown areas. More specifically, the purpose of this Class L soil survey is to identify and quantify soils limitations at the site for the proposed wind power development, particularly with respect to any design accommodations necessary to address soil drainage, physical properties and/or depths to bedrock class.

The purpose of the High Intensity Class B Soil Survey in the Operations and Maintenance Building site is to identify any soils limitations to that more intensive use.

The purpose of the modified Class D Soil Survey for the proposed transmission corridor is to identify hydrologically sensitive soils which may require erosion and sedimentation control measures, or other special considerations that may require caution during construction.

The Maine Department of Environmental Protection, the Maine Land Use Regulation Commission, and David Rocque, State Soil Scientist, are interested in project designs which retain hydraulic connections and maintain the natural perched ground water and surface run-off pattern as much as is feasible. This is a particularly relevant to this project, where there are traversing road alignments along the side sloping mountainous terrain, which is subject to long drainage sheds with high volumes of perched ground water flows and surface water runoff. Currently, the *state of the art* of access road designs is to

maintain a continued hydraulic interconnection between the upslope and downslope sides of new road beds, by allowing water to pass through in more of a *sheet* flow capacity and to minimize large channelized flow. A *rock sandwich* (aka *French mattress* per Penn State technical bulletin) is one such technique, which will be employed at the Highland wind project.

Albert Frick Associates' soil scientists examined the proposed access road corridors, turbine sites and transmission lines, identifying and survey-locating areas of soils which are:

- 1. poorly to somewhat poorly drained;
- exhibit oxyaquic-like conditions (soils which are subjected to oxygen rich, seasonally perched ground water after rainfall events, e.g. early spring, late fall and during periods of heavy precipitation. These soils may exhibit more than one color or streaking, caused by differential organic matter accumulation in soil profile horizons);
- 3. intermittent drainages not included in wetland delineation streams;
- 4. subterranean mountain streams; OR
- natural drainage swales that have potential to concentrate surface water runoff during periods of spring snowmelt, late fall rainfall, and/or during periods of extended heavy precipitation.

Where associates field identified soil areas that should be subject to drainage considerations in the development plans, they so noted on the soils plan.

In order to simplify the soils review, we overlaid a composite road alignment plan depicting cut and fill, grading, erosion and sediment control, cross-drainage techniques, and culverting, etc. onto the soils map.

3.0 Methodology

We performed soils identification, mapping and soil surveys in accordance with the standards adopted by the *Maine Association of Professional Soil Scientists (revised February 2004)* for *Class L* soil surveys for the proposed access road and proposed turbine sites and *Class B* for the proposed Operations & Maintenance building site. We performed a modified *Class D* soil survey for the proposed transmission line corridor to identify somewhat poorly to poorly drained soils, which might be sensitive to erosion and sediment control if the proposed construction were done at times when the soils were wet.

We examined the proposed road alignment, turbine sites, O & M building site, and Transmission Line Corridor in the field on June 22, 23, 24, 30, July 1, September 14, 15, 21, 23 and October 6, 7, 12 and 13, 2009 and December 11, 2010. *Albert Frick*, Certified Soil Scientist, accompanied by a Field Technician with a Global Positioning Systems (GPS) unit [Trimble GeoXT submeter accuracy] performed the field work. The latitude and longitude coordinates were recorded in UTMNAD 83.

Soils are described using standard soil terminology developed by the USDA Natural Resources Conservation Service, which is also where soil interpretation records originate for each soil series described in Maine. Where important distinctions between hydric and non-hydric soils are made in the mapping, the Maine Association of Professional Soil Scientists Key to Soil Drainage Classes was also utilized, as well as a separate list of regional indicators for identification of hydric soils (Field Indicators for Identifying Hydric Soils in New England, version 3 2004).

This proposed wind project is sited in a remote mountainous area. Consequently, it is not feasible to utilize mechanized equipment (i.e. backhoe excavation, drilling rig, etc.) due to inaccessibility and environmental concerns in this remote location. In such situations,

the soil mapping standards allow for use of a tile spade shovel, hand soil auger, and tile probe to excavate test pits to a depth of 40 inches or until refusal due to encountering bedrock, large boulder, or basal lodgment till.

Field work consisted of documenting soil morphology and characteristics with hand dug test pits, borings and probes to bedrock and/or refusal. We identified test pits on-site with numbered flagging tape. AFA personnel located each test pit by submeter GPS. Soil types were identified and depicted on the proposed project Site Plan $1^{"} = 100^{"}$.

We took additional confirmatory soil borings/observations by soil auger to assist in the placement of soil map unit boundaries onto the soil survey base map. AFA personnel located observed bedrock outcroppings by GPS survey to further identify shallow to bedrock soil map units, and project the relative depth to bedrock in the soil mapping units.

Soil map units were designed and structured to report the pertinent soil characteristics along with potential soil limitations for the proposed use and management of a Wind Power project site, so that the design team could take such limitations into account. Here, poor soil drainage is the primary concern in identifying soil limiting factors. Therefore, we used *ad hoc* symbols in places on the map to provide more detailed information about bedrock outcropping locations, groundwater seeps, surface water runoff, soil areas comprised of *oxyaquic*-like soils, intermittent and perennial streams or watercourses, and other natural features encountered on the property. We provided this additional detailed information where we anticipated that civil engineers should further evaluate the need for special cross drainage and/or erosion and sediment control measures.

A preliminary soils map was developed by obtaining the electronic layer of the *U.S. Natural Resource Conservation Service* medium intensity map, and importing the soil boundary information into the project CAD file. This was utilized for a preliminary soil map and the entire project area was reviewed along the proposed access road corridor, turbine sites, and transmission lines. Soil test pit excavations and descriptions were performed to upgrade, refine, and modify the map within the project borders.

The Design and Permitting teams used the developing soils work, along with the topographic survey and wetland delineation to locate and revise the road alignment and turbine placement, as well as to refine the design with regards to natural hydraulic crossdrainage concerns. These specific areas were identified and additional measures were proposed by project engineers to address hydraulic concerns

The soils data provide information useful for engineering by anticipating existing and proposed conditions with regards to *depth to bedrock*, that will affect blasting, benching techniques, and source of road building materials and/or cost; *soil drainage characteristics* that will affect road hydraulic cross-drainage, culverting frequency and sizing, storm water design, erosion and sediment control, and *soil textures/slopes* that will affect erosion potential.

4.0 Site Location/Setting

The proposed Highland Wind Project is located off *Long Falls Dam Road* and *Sandy Stream Valley Road* in *Highland Plantation, Maine*. The transmission corridor to Wyman Dam passes through *Pleasant Ridge Plantation*. The project area consists of moderately sloping to steeply sloping topography, and is currently comprised mainly of forested land, except for portions of the existing transmission line.

5.0 General Site and Subsurface Conditions

The site primarily includes forested sideslopes and mountain top ridges. Soil landforms generally consist of *loam* and *sandy loam* soils derived from glacial till. The tops of the mountain and ridge lines are generally bedrock controlled, and consequently exhibit shallow to bedrock soil conditions. The sideslopes tend to be comprised of deeper soils (ie. +40" in depth), which are *loam* to *sandy loam* textured soils generally derived from

glacial till sediments. These soils commonly exhibit a firm substratum which produces a perched ground water table.

6.0 Soil Map Unit Descriptions

The kinds of map units used in a survey depend primarily on the purposes of the survey and the pattern of the soils and miscellaneous areas in the landscape. The pattern in nature is fixed, and it is not exactly the same in each delineation of a given map unit. In soil surveys, these patterns must be recognized, and map units designed to meet the major objectives of the Survey. It must be remembered that soil interpretations are made for areas of land and the most useful map units are those that group similarities.

The soil map unit descriptions included in Appendix C provide details regarding the soil series encountered, and the composition of soils within the given map unit (both for the range of soil characteristics and the potential similar and dissimilar soil within the soil map unit). Soil map units with multiple names are generally listed in order of their prevalence within the map unit. Slope gradient ranges are also provided, and refer to slope phases indicated in the soil survey map and in the soil legend. The soil narrative report is provided to describe the soil composition and physical characteristics, the general soil limitations, and related recommendations for the proposed use and management. The soils map depicts the spatial location of the soil or soils within the project site.

7.0 Conclusions and Recommendations

Based on our observations of the project site, and our knowledge of the proposed use of the property, the soils within the development area are suitable for the proposed use, with the following notable exceptions:

Recommend providing road cross drainage of the natural perched and surface water flow in the specified areas of the soil map located within the cross-hatched blue area as shown on the plans. (Civil engineers should consider rock sandwich [aka French mattress], frequent cross culverting and road turn-outs to maintain and maximize sheet flow).

The nearly level, moderately sloping glacial till soils that are moderately well drained or well drained are generally suitable for the proposed use, although some modifications to drainage or slope may be needed to improve conditions (as outlined by the Civil Engineers).

The somewhat poorly drained soils, where seasonal high groundwater tables are within 12" of the mineral soil surface for a significant portion of the year, may require additional measures such as the addition of coarse granular fill, rock sandwich, or the installation of upslope curtain drain to intercept sheet flow drainage, to overcome limitations.

The poorly or very poorly drained hydric soils have further limitations due to prolonged wetland and frost susceptibility, and may have additional permitting implications, if identified as wetland areas. Jurisdictional wetland areas were intentionally avoided, or wetland filling impacts minimized, as part of the selection of the road alignment.

There currently are two existing graveled roads that reach the summits of *Briggs Hill* and *Stewart Mountain* (peaks within Project area), and a third existing graveled road that is within 700' of the *Witham Mountain* (peak within project area) summit. These existing roads are drivable by 2-wheel drive vehicles, and are clear examples that road access to the summits can be successfully accomplished. However, all the new proposed roads as well as upgraded road within the project have been subjected to substantially more review of soils, wetlands, topographic mapping, as well as extensive civil engineering proven practices of soil and erosion control standards for mountain access road construction.

A segment of the access roads to both *Burnt Hill* and *Witham Mountain*, as shown with the symbol for area recommended for cross-drainage, should be subject to standards and

acceptable practices of cross-drainage techniques that are designed by the Civil Engineers to respect the mountain hydrology.

APPENDIX A

Limitations

This soil narrative report and accompanying soil survey map have been prepared for the exclusive use of *Stantec Consulting*, for its specific application to the proposed *Highland Wind Power Project* in *Highland Plantation* and *Pleasant Ridge Plantation*, *Maine*. Albert Frick Associates, Inc. conducted the work in accordance with generally accepted soil science practices outlined in the *Maine Association of Professional Soil Scientists Guidelines*, and the *Maine Board of Certification of Geologists and Soil Scientists Guidelines*. Further, presentation of mapping information meets the requirements of <u>Guidelines for Maine Certified Soil Scientists for Soil Identification and Mapping (2004)</u>, and in accordance with standards adopted by the Maine Department of Environmental Protection (MDEP) for project review. No other warranty, expressed or implied, is made.

It should be recognized that map unit design is influenced by the intended use of the soil survey information, and may not be adequate or sufficient to evaluate for uses other than that for which the specific soil survey was developed. Soils which are non-limiting for one use may be considered a limitation for different use than that identified.

The analysis contained herein is based on data obtained during subsurface exploration of the site, and the interpretation of published information by the USDA Natural Resources Conservation Services. Due to the glaciation of Maine, and the complexity of the landscape, variations in subsurface conditions may exist between exploration sites which may not become evident until significant project excavation begins. Should significant variations in subsurface conditions become evident after the submission of this report, it may be necessary to re-evaluate the nature of the variation, in light of the recommendations enclosed herein.

Due to the combination of remoteness, current inaccessibility of heavy excavation equipment (e.g. backhoe, excavator, drill auger), *Albert Frick Associates'* Soil Scientist utilized hand shovels, tile probes and soil augers. *Refusal* or depth limitation to hand operated equipment may be due to bedrock and/or large stone or boulders.

APPENDIX B

Maine Association of Professional Soil Scientists Standards

Class L (Linear) Soil Survey Map

Purpose - This soil survey standard is designed to provide the minimum soil information necessary to allow for the design and construction of long but narrow projects such as access roads, utility lines or trails with little or no adjacent development. In remote, difficult to access sites such as mountains or roadless areas, soil observations may be made entirely by use of a hand shovel, screw or Dutch auger. For areas which are more accessible, deeper soil observations should be made in order to properly classify the soils.

1. Class L soil survey map units shall be made on the basis of parent material, slope, soil texture, soil depth to dense till or bedrock (which ever is shallowest) and soil wetness (drainage class and/or oxyaquic-like conditions) at the Class A High Intensity Map Unit size. The preferred method of naming the soil map units is by assigning a soil series name or names for complexes. If soils are classified to the series level in remote areas not readily accessible to equipment and/or without road cuts, it shall be noted in the narrative that soils were classified by shallow observations only.

2. Scale is 1 inch equals 100 feet or larger (e.g. 1"=50").

3. Ground Control - base line and test pits for which detailed data are recorded are located to sub-meter accuracy under the direction of a qualified professional.

4. Base map with two foot contour lines.

SEE END OF SOILS SECTION REPORT FOR LOCATION OF INDIVIDUAL SOIL MAP SHEETS (1 – 40)

APPENDIX C

Soil Map Unit Descriptions

ABRAM (Frigid Lithic Haplorthod)

<u>setting</u>

Parent Material:	Thin very shallow mantle of glacial till over bedrock		
Landform:	On mountains and high elevations		
Position in Landscape:	Uppermost portions of landscape		
Slope Gradient Ranges:	(C) 8-20% (D) 20%+		

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class:	Well drained to excessively well drained.	
Typical Profile Description:	Surface layer: Subsurface layer: Bedrock:	Pinkish gray sandy loam, 0-2" Very dusky red to brown sandy loam, 2-10" Less than 10" (typical)
Hydrologic Group:	D	
Permeability:	Moderately rapid in organic layers, moderate or moderately rapid on the mineral horizon	
Depth to Bedrock:	Very shallow, 0-10"	
Hazard to Flooding:	None	
Erosion Factors:	k: .1732	

INCLUSIONS (Within Mapping Unit)

Similar: Ricker (cryic) Knob Lock (frigid), Hogback, Rawsonville, Rock Outcrop, Lyman, Tunbridge

Dissimilar: Naskeag, Mahoosuc, Dixfield

USE AND MANAGEMENT

Development of Wind Power Projects: Soils within this map unit are generally suited to the proposed use, in that they generally have no limitations due to wetness, and shallow depths to bedrock can provide stable and solid anchoring points for wind tower bases, or can be a source of road construction material if bedrock is processed.

ABRAM-HOGBACK COMPLEX

<u>setting</u>

Coarse loamy soils derived from mica schist and phyllite with

Parent Material:

	some granite and gneiss.		
Landform:	Ridgetop portions of glaciated uplands.		
Position in Landscape:	Uppermost sideslopes and ridgetops.		
Slope Gradient Ranges:	(C) 8-20% (D) 20	%+	
COMPC	dition and soil	<u>CHARACTERISTICS</u>	
Drainage Class:	Excessively drained (Abram) to well drained (Hogback) with a seasonal high groundwater table observed only for short durations after significant storm events or snowmelt, usually on top of bedrock.		
Typical Profile Description: (for Abram)	Surface layer: Subsurface layer: Bedrock @ 5"	Pinkish gray sandy loam, 0-2" Very dusky red to brown sandy loam, 2-5"	
(for Hogback)	Surface layer: Subsurface layer: Bedrock @ 15"	Dark reddish brown fine sandy loam, 0-7" Dark reddish brown fine sandy loam, 7-15"	
	These two soils occur in a non-regular, non-repeating pattern that could not be separated out in mapping. It is estimated that Abram forms the majority of this map unit, while Hogback occupies the balance of the area.		
Hydrologic Group:	Hogback: Group B Abram: Group D		
Surface Run Off: Permeability:	Rapid Moderately rapid		
Depth to Bedrock:	Abram: 0-10" to bedrock Hogback: 10-20" to bedrock		
Hazard to Flooding: Erosion Factor:	None K: .1764		
<u>INCLUSIONS</u> (Within Mapping Unit)			

Similar:Knob Lock (frigid), Ricker (cryic), Rawsonville, Dixfield, Skerry, MarlowDissimilar:Mahoosuc, Rock Outcrop

USE AND MANAGEMENT

Development of Wind Power Projects: Abram and Hogback soils are generally suited for development of wind power projects, in that wetness is generally not a factor in these map units, and both provide for solid and stable anchoring points for wind tower bases.

ABRAM-RICKER-ROCK OUTCROP COMPLEX (Dysic Lithic Borofolists)

<u>setting</u>

Parent Material:	Thin organic deposits underlain by a thin mineral horizon over bedrock			
Landform:	On mountains and	On mountains and hills		
Position in Landscape:	Uppermost portio	ns of landscape		
Slope Gradient Ranges:	(C) 8-20% (D)	20%+		
COM	POSITION AND	SOIL CHARACTERISTICS		
Drainage Class:	Well drained to ex	ccessively well drained		
Typical Profile Description: (for Abram) (for Ricker) Hydrologic Group:	with areas of exp separated out in most area of this r Outcrop less area. D: Abram/Rock C			
	A: Ricker Note: NRCS lists Ricker as "A", however, a conference with David Rocque, State Soil Scientist, suggests expected run-off similar to Abram (D).			
Surface Water Runoff: Permeability:	Rapid Moderately rapid	in organic layers, moderate or moderately rapid		
	on the mineral ho	rizon		
Depth to Bedrock: Hazard to Flooding:	Very shallow to m None	oderately deep, 0-10"		
Erosion Factors:	K: .1749			

<u>INCLUSIONS</u>

(Within Mapping Unit)

Similar:	Hogback, Rawsonville, Lyman, Tunbridge
Dissimilar:	Naskeag, Mahoosuc, Marlow

USE AND MANAGEMENT

Development of Wind Power Projects: Soils within this map unit are generally suited to the proposed use, in that they generally have no limitations due to wetness, and shallow depths to bedrock can provide stable and solid anchoring points for wind tower bases, or can be a source of road construction material if bedrock is processed.

BRAYTON (Aeric Haplaquepts)

<u>setting</u>

Parent Material:	Compact loamy glacial till.		
Landform:	Depressions and toe	Depressions and toeslopes of glaciated uplands.	
Position in Landscape:	Lowest positions on	landform.	
Slope Gradient Ranges:	(A) 0-3% (B) 3-8%	6	
<u>CO</u>	MPOSITION AND SOIL CHARACTERISTICS		
Drainage Class:	the soil surface fror	Poorly drained, with a perched water table 0 to 1.0 feet beneath the soil surface from November through May or during periods of excessive precipitation.	
Typical Profile Description:	Surface layer:Very dark grayish brown sandy loam, 0-5"Subsurface layer:Grayish brown sandy loam, 5-15"Subsoil layer:Olive gray fine sandy loam, 15-24"Substratum:Olive sandy loam, 24-65"		
Hydrologic Group:	Group C		
Surface Run Off:	Moderate to moder	Moderate to moderately rapid.	
Permeability:	Moderate in solum, moderately slow or slow in dense substratum.		
Depth to Bedrock:	Deep, greater than 40 inches.		
Hazard to Flooding:	None		
Erosion Factors:	K: .2432		
<u>INCLUSIONS</u> (Within Mapping Unit)			
Similar: Pillsbury, Colonel, Monarda, Westbury, Telos			

Dissimilar: Naskeag, Peacham, Waskish

USE AND MANAGEMENT

Development for wind power projects: The limiting factor for development of wind power projects is wetness, since seasonal high groundwater tables within these map units are generally within 7" of the ground surface for long durations of the year. Groundwater perches on the firm substratum in Brayton, and this can carry significant amounts of runoff from long, upsloping watersheds. Importation of granular fill may be necessary to overcome limitations due to drainage for turbine pad construction, and maintaining cross drainage on new road sections will avoid concentration of stormwater. Brayton flows may have further implications as jurisdictional wetlands, when all three parameters of hydrophytic (wetland) vegetation, wet hydrology, and hydric (wetland) soils are present.

CHARLES (Limerick) (Aeric Fluvaquents)

<u>setting</u>

Parent Material:	Recently deposited alluvium sediment on flood plain.		
Landform:	Floodplains adjacent to rivers and streams.		
Position in Landscape:	Commonly found in broad depressions on floodplains.		
Slope Gradient Ranges:	(A) 0-3% (B) 3-8%		
<u>CO1</u>	MPOSITION AND S	OIL CHARACTERISTICS	
Drainage Class:	Poorly drained, with an apparent water table from 0 to 1.5 feet beneath the soil surface from November through June.		
Typical Profile Description:	Surface layer: Subsurface layer: Subsoil layer: Substratum:	Dark grayish brown silt Ioam, 0-13" Olive gray silt Ioam, 13-35" Gray silt Ioam, 35-40" Dark gray silt Ioam, 40-65"	
Hydrologic Group:	Group C		
Surface runoff:	Overflow generally occurs during spring runoff		
Permeability:	Moderate to very rapid.		
Depth to Bedrock:	Very deep, greater than 60".		
Hazard to Flooding:	Common for brief periods from March through October.		
Erosion Factor:	K: .3249		
	<u>INCLUSIC</u> (Within Mappi		
	D .		

Similar: Cornish, Pillsbury, Brayton

Dissimilar: Limerick (Variant) - very poorly drained, Medomak (Saco), Waskish

USE AND MANAGEMENT

Development of Wind Power Projects: The limiting factor of this soil for development of wind power projects is wetness, since this floodplain soil is frequently flooded and seasonal high groundwater tables are within 18" of the soil surface for considerable periods of the year. Charles soil may be consistent with floodplains as identified on the Federal Emergency Management Agency's FIRM maps, and otherwise may be jurisdictional wetland area in areas where all three parameters of wet hydrology, hydric soils, and hydrophytic vegetation are present.

COLONEL (Aquic Haplorthods)

<u>setting</u>

Parent Material:	Compact loamy glacial till.		
Landform:	Glaciated uplands.		
Position in Landscape:	Intermediate positions on landform.		
Slope Gradient Ranges:	(A) 0-3% (B) 3-8% (C) 8-20%		

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class:	Somewhat poorly drained, with a perched water table 1.0 to 1.5 feet beneath the soil surface from November through May or during periods of excessive precipitation.	
Typical Profile Description:	Surface layer: Subsurface layer: Subsoil layer:	Grayish brown fine sandy loam, 0-2" Dark reddish brown fine sandy loam, 2-12" Light olive brown gravelly fine sandy loam, 12-18"
	Substratum:	Olive gravelly fine sandy loam, 18-65"
Hydrologic Group:	Group C	
Surface Run Off:	Moderate	
Permeability:	Moderate in solum and moderately slow or slow in the compact substratum.	
Depth to Bedrock:	Deep, greater than 40 inches.	
Hazard to Flooding:	None	
Erosion Factor:	K: .1724	

INCLUSIONS (Within Mapping Unit)

Similar:	Dixfield, Skerry, Westbury, Telos
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Dissimilar: Brayton, Pillsbury, Hogback, Rawsonville, Naskeag

USE AND MANAGEMENT

Development of Wind Power Projects: The limiting factor of this soil for development of wind power projects is wetness, since Colonel soils exhibit a perched water table within 15" of the ground surface during periods of heavy precipitation and spring run-off. Proposed activities near the bottom of long sideslopes may be subject to considerable runoff. Maintaining cross drainage beneath proposed roads will help to assure stable road bases, and to avoid concentration of stormwater flows.

COLONEL (Very Stony) (Aquic Haplorthods)

SETTING

Parent Material:	Compact loamy g	Compact loamy glacial till.		
Landform:	Glaciated uplands	Glaciated uplands.		
Position in Landscape:	Intermediate posit	Intermediate positions on landform.		
Slope Gradient Ranges:	(B) 3-8% (C) 8-2	(B) 3-8% (C) 8-20%		
<u>C</u> (OMPOSITION AND S	SOIL CHARACTERISTICS		
Drainage Class:	feet beneath the	drained, with a perched water table 1.0 to 1.5 soil surface from November through May or excessive precipitation.		
Typical Profile Description:	Surface layer: Subsurface layer: Subsoil layer:	Grayish brown fine sandy loam, 0-2" Dark reddish brown & brown fine sandy loam, 2-12" Light olive brown gravelly fine sandy loam,		
	Substratum:	12-18" Olive gravelly fine sandy loam, 18-65"		
Hydrologic Group:	Group C			
Surface Run Off:	Moderate			
Permeability:	Moderate in solun substratum.	Moderate in solum and moderately slow or slow in the compact substratum.		
Depth to Bedrock:	Deep, greater thar	Deep, greater than 40".		
Hazard to Flooding:	None	None		

INCLUSIONS (Within Mapping Unit)

Similar: Dixfield, Skerry, Westbury

Dissimilar: Brayton, Pillsbury

USE AND MANAGEMENT

Development of Wind Power Projects: The limiting factor of this soil for development of wind power projects is wetness, since Colonel soils exhibit a perched water table within 15" of the ground surface during periods of heavy precipitation and spring run-off. Proposed activities near the bottom of long sideslopes may be subject to considerable runoff. Maintaining cross drainage beneath proposed roads will help to assure stable road bases, and to avoid concentration of stormwater flows.

CORNISH (Fluvaquentic Dystrochrepts)

<u>setting</u>

Parent Material:	Alluvial sediments.		
Landform:	Floodplains.		
Position in Landscape:	Nearly level areas, c	commonly in broad depressions.	
Slope Gradient Ranges:	(A) 0-3% (B) 3-8%	, o	
<u>CON</u>	<u>APOSITION AND S</u>	<u>OIL CHARACTERISTICS</u>	
Drainage Class:	Somewhat poorly drained, with an apparent water table 1.0 to 2.0 feet beneath the soil surface from November through May and during periods of excessive precipitation or spring run-off.		
Typical Profile	Surface layer:	Very dark grayish-brown, very fine sandy loam, 0-12"	
Description:	Subsurface layer:	Light olive-brown, very fine sandy loam, 12- 24"	
	Subsoil layer: Substratum:	Olive, very fine sandy loam, 24-35" Olive-gray, very fine sandy loam, 35-60"	
Hydrologic Group:	Group C		
Surface Run Off:	Slow		
Permeability:	Moderate in coarse silty layers, and moderate to very rapid in the silt loam to fine gravel strata, where present.		
Depth to Bedrock:	Very deep, greater than 60".		
Hazard to Flooding:	Twice annually to once every ten years.		
Erosion Factor:	K: .3249		
	<u>INCLUSIONS</u> (Within Mapping Unit)		

Similar: Lovewell (moderately well drained floodplain soils)

Dissimilar: Charles, Medomak

USE AND MANAGEMENT

Development of Wind Power Projects: This soil map unit is subjected to periodic flooding and the flood hazard should be evaluated. The limiting factor of this soil for development of wind power projects is depths to seasonal high groundwater table, which are 1-2' beneath the ground surface, and frequency of flooding, which may occur 1-2 times every 10 years. Water table limitations may be overcome by the addition of coarse granular fill and associated stabilization. Other methods to maintain unimpeded cross drainage beneath proposed road beds may also be indicated.

DIXFIELD (Typic Haplorthods)

<u>setting</u>

Parent Material:		Compact loamy glacial till.		
Landform:		Glaciated uplands and drumlins.		
Position in Landscape:		Upper portions of landform.		
Slope Gradient Ranges:		(B) 3-8% (C) 8-20%		
	<u>COM</u>	POSITION AN	D SOIL CHARACTERISTICS	
Drainage Class:		Moderately well drained, with a perched water table 1.5 to 2.5 feet beneath the existing soil surface from November through April and during periods of excessive precipitation.		
Typical Profile		Surface layer:	Grayish brown and dark brown fine sandy	
Description:			loam, 0-6"	
		Subsurface layer:	 Strong brown and dark yellowish brown fine sandy loam, 6-19" 	
		Subsoil layer:	Light olive brown gravelly fine sandy loam, 19-24"	
		Substratum:	Light olive brown gravelly sandy loam, 24- 65"	
Hydrologic Group:		Group C		
Permeability:		Moderate in the solum, moderately slow or slow in the compact substratum.		
Depth to Bedrock:		Very deep, greater than 60".		
Hazard to Flooding:		None		
Erosion Factors:		K: .1724		
		<u>INCLU</u> (Within	<u>'SIONS</u> Mapping Unit)	
Similar:	Hermon, Skerry, Becket, Croghan, Sunappe, Marlow, Berkshire, Monadnock			

Dissimilar: Colonel, Hogback (10-20" to bedrock), Rawsonville (20-40" to bedrock), Sunappe

USE AND MANAGEMENT

Development with Wind Power Projects: Dixfield soils are generally suited for development of wind power projects, in that these soils are moderately well drained with dense basal till substratum. Depths to seasonal high groundwater table can be overcome by redirection of surface water runoff, and/or importation of coarse granular fill, or by providing adequate cross-drainage techniques.

HERMON (Typic Haplorthods)

<u>setting</u>

Parent Material:	Hermon - sandy al subsurface.	blation glacial till without a restrictive		
Landform:	Glaciated upland p	Glaciated upland plains, hills and ridges.		
Position in Landscape:	Both soils occupy	Both soils occupy uppermost portions of landforms.		
Slope Gradient Ranges:	(C) 8-20% (D) 20	(C) 8-20% (D) 20%+		
<u>(</u>	COMPOSITION AND	SOIL CHARACTERISTICS		
Drainage Class:		Hermon soils are somewhat excessively drained, while Skerry soils are moderately well drained		
Drainage Class:		Somewhat excessively drained, with a water table greater than 6.0 feet beneath the existing soil surface.		
Typical Profile Description:	Surface layer: Subsurface layer: Subsoil layer:	Pinkish gray sandy loam, 0-3" Dark reddish brown, 3-9" Strong brown & dark yellowish brown, 9- 32"		
	Substratum:	Light olive brown gravelly coarse sand, 32- 65"		
Hydrologic Group:	Hermon: Group A			
Surface Run Off:	Slow to medium			
Permeability:	Rapid in the solum	Rapid in the solum, rapid or very rapid in the coarser substratu		
Depth to Bedrock:	Very deep, greater	Very deep, greater than 60".		
Hazard to Flooding:	None			
Erosion Factors:	K: .1024			

<u>INCLUSIONS</u> (Within Mapping Unit)

Similar:	Skerry, Dixfield, Marlow, Waumbek, Becket, Hermon (D slopes in C unit),
Colton,	Monadnock, Adams
Dissimilar:	Stetson, Waumbek (moderately well drained), Skerry, Colonel, Hogback (10-20" to bedrock), Rawsonville (20-40" to bedrock)

USE AND MANAGEMENT

Development of Wind Power Projects: Hermon soils are generally suited for the development of wind power projects. The Hermon map unit may also be a source of gravelly materials for use as road subgrades, etc.

HOGBACK (Lithic Haplohumods)

SETTING

Parent Material:	Loamy soils of glacial till over bedrock.			
Landform:	Ridgetop portions of glaciated uplands.			
Position in Landscape:	Uppermost sideslopes and ridgetops.			
Slope Gradient Ranges:	(C) 8 – 20% (D) 20%+			
COMPOSITION AND SOIL CHARACTERISTICS				
Drainage Class:	Well drained (Hogback) with a seasonal high groundwater table observed only for short durations after significant storm events or snowmelt, on bedrock surface.			
Typical Profile Description:	Surface layer:Dark reddish brown fine sandy loam, 0-7"Subsurface layer:Dark reddish brown fine sandy loam, 7-15"Bedrock @ 10" to 20"			
Hydrologic Group:	Group B			
Surface Run Off:	Rapid			
Permeability:	Moderately rapid			
Depth to Bedrock:	10-20" to bedrock			
Hazard to Flooding:	None			
Erosion Factor:	K: .1764			
	INCLUSIONS			

INCLUSIONS (Within Mapping Unit)

Similar: Abram, Rawsonville, Ricker [Knob Lock], Rock Outcrop

Dissimilar: Dixfield, Skerry, Mahoosuc, Naskeag, Berkshire

USE AND MANAGEMENT

Development of Wind Power Projects: Hogback soils are generally suited for development of wind power projects, in that wetness is generally not a factor in this mapping unit, and provides for solid and stable anchoring points for wind tower bases.

HOGBACK-ABRAM COMPLEX

SETTING

Parent Material:	Coarse loamy soils derived from mica schist and phyllite with some granite and gneiss.			
Landform:	Ridgetop portions of glaciated uplands.			
Position in Landscape:	Uppermost sideslopes and ridgetops.			
Slope Gradient Ranges:	(C) 8-20% (D) 20%+			
COMI	POSITION AND SO	UL CHARACTERISTICS		
Drainage Class:	Well drained (Hogback) to excessively drained (Abram) with a seasonal high groundwater table observed only for short durations after significant storm events or snowmelt.			
Typical Profile Description: (for Hogback)	Surface layer: Subsurface layer: Schist bedrock @ 15"	Dark reddish brown fine sandy loam, 0-7" Dark reddish brown fine sandy loam, 7-15"		
(for Abram)	Bedrock @ 5" Note: These two s pattern that could estimated that Hoge	Pinkish gray sandy loam, 0-2" Very dusky red to brown sandy loam, 2-5" soils occur in a non-regular, non-repeating not be separated out in mapping. It is back forms the majority of this map unit, as the balance of the area.		
Hydrologic Group:	Hogback: Group B Abram: Group D			
Surface Run Off: Permeability: Depth to Bedrock: Hazard to Flooding: Erosion Factor:	Rapid Moderately rapid Hogback: 10-20" to Abram: 0-10" to bed None K: .1764			
INCLUSIONS				

INCLUSIONS (Within Mapping Unit)

Similar:Saddleback, Ricker [Knob Lock], Dixfield, Skerry, RawsonvilleDissimilar:Rock Outcrop

USE AND MANAGEMENT

Development of Wind Power Projects: Hogback and Abram soils are generally suited for development of wind power projects, in that wetness is generally not a factor in these map units, and both provide for solid and stable anchoring points for wind tower bases.

HOGBACK-ABRAM-RAWSONVILLE COMPLEX

SETTING

Parent Material:	Loamy glacial till formed from mica schist and phyllite with some granite and gneiss.			
Landform:	Glaciated upland ridges.			
Position in Landscape:	Uppermost till ridges and upper sideslopes.			
Slope Gradient Ranges:	(C) 8-20% (D) 20%+			
COMI	COMPOSITION AND SOIL CHARACTERISTICS			
Drainage Class:	Well drained, generally with no observed water table, or a short duration water table observed after significant storm events or snowmelt.			
Typical Description: (Hogback)	Surface layer: Subsurface layer: Schist bedrock @ 15	Dark reddish brown fine sandy loam, 0-7" Dark reddish brown fine sandy loam, 7-15" ;"		
(for Abram)	Surface layer: Subsurface layer: Bedrock @ 5"	Pinkish gray sandy loam, 0-2" Very dusky red to brown sandy loam, 2-5"		
(for Rawsonville)		Dark reddish brown fine sandy loam, 0-10" Dark reddish brown fine sandy loam, 10-19" Dark brown fioen sandy loam, 19-28" 3" soils occur within this complex in a non- ng pattern that could not be separated out in		
Hydrologic Group:	Group C			
Surface Run Off:	Rapid			
Permeability:	Moderate of moderately rapid			
Depth to Bedrock: Hazard to Flooding: Erosion Factor:	Moderately deep, 20-40" to bedrock None K: .1764			

INCLUSIONS (Within Mapping Unit)

Similar: Saddleback, Ricker, Marlow Rock Outcorp, Naskeag, Brayton, Pillsbury, Rock Outcrop, Mahoosuc, Dixfield Dissimilar:

USE AND MANAGEMENT

For Development of Wind Power Projects: Hogback-Abram-Rawsonville soils are generally suited For construction of wind power projects, since drainage is not a significant limitation within these map units, and can provide solid and stable anchoring points for wind towers.

HOGBACK-ABRAM-ROCK OVTCROP COMPLEX

SETTING

Parent Material:	Coarse loamy soils derived from mica schist and phyllite with some granite and gneiss.		
Landform:	Ridgetop portions of glaciated uplands.		
Position in Landscape:	Uppermost sideslop	es and ridgetops.	
Slope Gradient Ranges:	(C) 8-20% (D) 20	%+	
<u>COMI</u> Drainage Class:	POSITION AND SOIL CHARACTERISTICS Well drained (Hogback) to excessively drained (Abram) with a seasonal high groundwater table observed only for short durations after significant storm events or snowmelt.		
Typical Profile Description: (for Hogback)	Surface layer:Dark reddish brown fine sandy loam, 0-7"Subsurface layer:Dark reddish brown fine sandy loam, 7-15"Schist bedrock @ 15"		
(for Abram)	Surface layer: Subsurface layer: Bedrock @ 5" Note:	Pinkish gray sandy loam, 0-2" Very dusky red to brown sandy loam, 2-5" These two soils occur in a non-regular, non- repeating pattern, along with areas of exposed bedrock. Hogback is the dominant soil type in the complex, followed by Abram and Rock Outcrop, respectively.	
Hydrologic Group:	Hogback: Group B Abram: Group D		
Surface Run Off: Permeability: Depth to Bedrock:	Rapid Moderately rapid Hogback: 10-20" to bedrock Abram: 0-10" to bedrock		
Hazard to Flooding: Erosion Factor:	None K: .1764 <u>INCLUSIONS</u> (Within Mapping Unit)		

(Within Mapping Unit)

Similar:	Rawsonville, Saddleback, Ricker
Dissimilar:	Naskeag, Brayton, Pillsbury, Dixfield

USE AND MANAGEMENT

Development of Wind Power Projects: Hogback and Abram soils are generally suited for Development of wind power projects, in that wetness is generally not a factor in these map units, and both provide for solid and stable anchoring points for wind tower bases.

HOGBACK-RAWSONVILLE COMPLEX

SETTING

Parent Material:	Loamy glacial till formed from mica schist and phyllite with some granite and gneiss.		
Landform:	Glaciated upland ridges.		
Position in Landscape:	Uppermost till ridges and upper sideslopes.		
Slope Gradient Ranges:	(C) 8-20% (D) 20%+		
<u>COM</u> Drainage Class:	POSITION AND SOIL CHARACTERISTICS Well drained, generally with no observed water table, or a short duration water table observed after significant storm events or snowmelt.		
Typical Profile Description: (for Hogback)	Surface layer:Dark reddish brown fine sandy loam, 0-7"Subsurface layer:Dark reddish brown fine sandy loam, 7-15"Schist bedrock @ 15"		
(for Rawsonville)	Surface layer:Dark reddish brown fine sandy loam, 0-10"Subsurface layer:Dark reddish brown fine sandy loam, 10-19"Subsoil layer:Dark brown fine sandy loam, 19-28"Schist bedrock @ 28"Note:Note:These soils occur in a non-regular, non-repeating patternthat could not be separated out in mapping.		
Hydrologic Group:	Group C		
Surface Run Off:	Rapid		
Permeability:	Moderate of moderately rapid		
Depth to Bedrock:	Moderately deep, 20-40" to bedrock		
Hazard to Flooding:	None		
Erosion Factor:	K: .2864		
	INCI USIONS		

INCLUSIONS (Within Mapping Unit)

Similar: Ricker, Abram, Saddleback

Dissimilar: Rock Outcrop, Naskeag, Brayton, Pillsbury, Dixfield

USE AND MANAGEMENT

Development of Wind Power Projects: Hogback-Rawsonville soils are generally suited for Construction of wind power projects, since drainage is not a significant limitation within these map units, and can provide solid and stable anchoring points for wind towers.

HOGBACK-RAWSONVILLE-ABRAM COMPLEX

<u>SETTING</u>

Parent Material:	Loamy glacial till formed from mica schist and phyllite with some granite and gneiss.	
Landform:	Glaciated upland ridges.	
Position in Landscape:	Uppermost till ridges and upper sideslopes.	
Slope Gradient Ranges:	(C) 8-20% (D) 20%+	
<u>COMI</u> Drainage Class:	POSITION AND SOIL CHARACTERISTICS Well drained, generally with no observed water table, or a short duration water table observed after significant storm events or snowmelt.	
Typical Profile Description: (for Hogback)	Surface layer: Subsurface layer: Schist bedrock @ 15	Dark reddish brown fine sandy loam, 0-7" Dark reddish brown fine sandy loam, 7-15" "
(for Rawsonville)	Surface layer: Subsurface layer: Subsoil layer: Schist bedrock @ 28	Dark reddish brown fine sandy loam, 0-10" Dark reddish brown fine sandy loam, 10-19" Dark brown fine sandy loam, 19-28" 3"
(for Abram)	Surface layer:Pinkish gray sandy loam, 0-2"Subsurface layer:Very dusky red to brown sandy loam, 2-5"Bedrock @ 5"SolutionNote:These three soils occur within this complex in a non- regular, non-repeating pattern that could not be separated out in mapping.	
Hydrologic Group:	Group C	
Surface Run Off:	Rapid	
Permeability: Depth to Bedrock: Hazard to Flooding: Erosion Factor:	Moderate of moderately rapid Moderately deep, 20-40" to bedrock None K: .2864	
	INCI USI	

<u>INCLUSIONS</u> (Within Mapping Unit)

Similar:	Abram, Saddleback, Ricker
Dissimilar:	Naskeag, Brayton, Pillsbury, Rock Outcrop

USE AND MANAGEMENT

Development of Wind Power Projects: The soils within this soil mapping unit are generally suited for construction of wind power projects, since drainage is not a significant limitation within these map units, and can provide solid and stable anchoring points for wind towers.

MADE LAND

<u>setting</u>

Parent Material:	Variable
Landform:	Variable
Position in Landscape:	Variable
Slope Gradient Ranges:	(A) 0-3% (B) 3-8%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class:	None assigned	
Typical Profile Description:	Surface layer: Subsurface layer: Subsoil layer: Substratum:) Typically this map unit) consists of areas) excavated and reworked) by man, then smoothed.
Hydrologic Group:	None assigned	
Surface Run Off:	Variable	
Permeability:	Variable	
Depth to Bedrock:	Variable	
Hazard to Flooding:	None	

INCLUSIONS (Within Mapping Unit)

Similar: Filled Land

Dissimilar: Small 'made' depressions that contain standing water or have other drainage implications. These may be caused by compaction by vehicular traffic, which is not synonymous with seasonal water tables.

USE AND MANAGEMENT

Development of Wind Power Project: This map unit consists of areas reworked by man, so that the soils are no longer taxonomically classifiable. Limiting factor for development is soil drainage, though somewhat difficult to determine in these map units. Proper foundation drainage or other site alterations recommended for construction. This map unit usually consists of existing graveled roadways.

MAHOOSUC (Typic Borofolists)

<u>setting</u>

Parent Material:	Deep and very deep soils formed in thin organic materials overlying fragmental colluviums.		
Landform:	Ridge and mountain tops.		
Position in Landscape:	Steep slopes on uppermost portions of glaciate uplands, generally found at the base of a steep bedrock slope.		
Slope Gradient Ranges:	(C) 8 – 20% (D) 20%+		
<u>COMPOS</u>	COMPOSITION AND SOIL CHARACTERISTICS		
Drainage Class:	Somewhat excessively drained, generally with no observable seasonal high groundwater table.		
Typical Profile	Surface layer: Substratum:	Dusty red to black fabric and hemi materials, 0-8" Fragmental cobbles, stones, gravel and boulders, 8-20'.	
	Subsoil:	Fragmental soils consisting of cobbles, stones, and boulders, 20-60".	
Hydrologic Group:	Group A		
Permeability:	Very rapid		
Depth to Bedrock:	Very deep, greater than 60 inches		
Hazard to Flooding:	None		
	INCL	<u>USIONS</u>	

(Within Mapping Unit)

Similar: Rawsonville, Dixfield, Skerry, Monadnock, Berkshire

Dissimilar: Abram, Hogback, Saddleback, Pillsbury, Dixfield, Skerry

USE AND MANAGEMENT

Development of Wind Power Projects: The limiting factor for development of wind power projects is the fragmental nature of this soil, where the abundance of boulders and other large colluviums can be an impediment to excavation and/or vehicular traffic. Large boulders in this soil mapping unit have the potential to be processed into rip rap stone for a source of road construction base material. Wetter substrata may be evident underlying the boulders and stones in places, and flowing underground streams can occur in localized areas subject to surface and perched groundwater accumulation.

NASKEAG (Aeric Haplaquods)

<u>setting</u>

Parent Material:	Loamy and sandy glacial till over bedrock.	
Landform:	Depressions of glaciated bedrock ridges.	
Position in Landscape:	Lowest positions in depressions or concavities in landform.	
Slope Gradient Ranges:	(A) 0-3% (B) 3-8% (C) 8-20%	

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class:	Somewhat poorly to poorly drained, with a perched water table 0-1.5 feet beneath the soil surface.		
Typical Profile Description:	Surface layer: Subsurface layer: Subsoil layer: Substratum:	Very dusky red muck, 0-5" Light brownish gray and brown sandy loam or loamy sand, 5-16" Dusky red loamy sand, 10-26" Light yellowish brown gravelly loamy sand, 26-38"	
Hydrologic Group:	Group C		
Surface Run Off:	Moderate or moderately rapid (across bedrock surface)		
Permeability:	Rapid		
Depth to Bedrock:	Moderately deep, 20-40" to bedrock surface.		
Hazard to Flooding:	None, but may be ponded for short duration in spring and during periods of excessive rainfall.		
Erosion Factors:	K: .10		

INCLUSIONS (Within Mapping Unit)

Similar: Colonel, Brayton, Pillsbury, Hogback, Rawsonville

Dissimilar: Rock Outcrop, Naskeag (Variant-V.P.D.), Waskish

USE AND MANAGEMENT

Development of Wind Power Projects: The limiting factors for development of wind power projects is wetness, due to a seasonal high groundwater table near the soil surface for a significant portion of the year, and bedrock which varies generally from 20-40". Naskeag (poorly drained) may also have further limitation as a wetland area, if combined parameter of wet hydrology, hydric soils, and hydrophytic vegetation are all present. The underlying bedrock, generally within 40 inches of the surface, does generally provide for a firm structural foundation for construction if the wetness, due to perched ground water table, is properly addressed with drainage and/or suitable fill material.

NASKEAG (SWP) (Aeric Haplaquods)

<u>setting</u>

Parent Material:	Loamy and sandy glacial till over bedrock.		
Landform:	Depressions of glaciated bedrock ridges.		
Position in Landscape:	Lowest positions in depressions or concavities in landform.		
Slope Gradient Ranges:	(A) 0-3% (B) 3-8% (C) 8-20%		

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class:	Somewhat poorly drained, with a perched water table 7" to 15" beneath the soil surface.	
Typical Profile Description:	Surface layer: Subsurface layer:	Very dusky red muck, 0-5" Light brownish gray and brown sandy loam or loamy sand, 5-16"
	Subsoil layer: Substratum:	Dusky red loamy sand, 10-26" Light yellowish brown gravelly loamy sand, 26-38"
Hydrologic Group:	Group C	
Surface Run Off:	Moderate or moderately rapid (across bedrock surface)	
Permeability:	Rapid	
Depth to Bedrock:	Moderately deep, 20-40" to bedrock surface.	
Hazard to Flooding:	None, but may be ponded for short duration in spring and during periods of excessive rainfall.	
Erosion Factors:	K: .10	
INCLUSIONS		

(Within Mapping Unit)

Similar: Colonel, Pillsbury

Dissimilar: Rock Outcrop, Naskeag (Variant-V.P.D.), Waskish (Moosabec), Hogback, Rawsonville

USE AND MANAGEMENT

Development of Wind Power Projects: The limiting factors for development of wind power projects is wetness, due to a seasonal high groundwater table 7 to 12" from the soil surface for a significant portion of the year, and bedrock which varies generally from 20-40". The underlying bedrock, generally within 40 inches of the surface, does generally provide for a firm structural foundation for construction if the wetness, due to perched ground water tale, is properly addressed with drainage and/or suitable fill material.

NASKEAG-WASKISH COMPLEX

<u>setting</u>

Parent Material:		Loamy and sandy glacial till.		
Landform:		Depressions of glaciated bedrock ridges.		
Position in Lands	scape:	Lowest positions in	depressions or concavities in landform.	
Slope Gradient R	Ranges:	(A) 0-3% (B) 3-8%	6 (C) 8-20%	
	<u>COMPO</u>	<u>SITION AND SOIL</u>	<u>CHARACTERISTICS</u>	
Drainage Class:		Naskeag soil is somewhat poorly to poorly drained, with a perched water table 0-1.5 feet beneath the soil surface. Waskish soil is very poorly drained, with seasonal water table within 0.5' of the soil surface for most of the year.		
Typical Description: (for Nackaag)		Surface layer: Subsurface layer:	Very dusky red muck, 0-5" Light brownish gray and brown sandy loam	
(for Naskeag)		Subsoil layer: Substratum:	or loamy sand, 5-16" Dusky red loamy sand, 10-26" Light yellowish brown gravelly loamy sand, 26-38"	
(for Waskish)		Surface layer:	Very pale brown to brown fibric material, 0-14"	
			Dark brown sapric material, 14-16" Reddish brown fibric material, 16-84" erally is found in the deeper to bedrock areas of the depression with Naskeag near the	
Hydrologic Group:		for Naskeag: Group C for Waskish: Group D		
Surface Run Off:		Moderate or moderately rapid (across bedrock surface)		
Permeability:		Rapid		
Depth to Bedrock:		Naskeag: Moderately deep, 20-40" to bedrock surface. Waskish: Deep, greater than 40"		
Hazard to Flooding:		None, but may be ponded for short duration in spring and during periods of excessive rainfall.		
Erosion Factors:		K: .10 (for Naskeag)		
		-	<u>/SIONS</u> apping Unit)	
Similar: Dissimilar:	Lyman, Tunbridge, Colonel, Brayton, Swanton, PIIIsbury Rock Outcrop, Peacham, Naskeag (Variant-V.P.D.)			

Dissimilar: Rock Outcrop, Peacham, Naskeag (Variant-V.P.D.)

USE AND MANAGEMENT

Development of Wind Power Projects: The limiting factor of soils within this soil map unit for development of wind power projects is wetness, due to the presence of a seasonal high groundwater table very near the soil surface throughout much of the year. Waskish soils are generally considered to be wetland soils, while the poorly drained component of Naskeag may also be classified as wetland area. Appropriate engineering methods such as importation of coarse granular fill, or the use of 'rock sandwich' type road base construction can help overcome limitations due to drainage.

PILLSBVRY (Aeric Haplaquepts)

<u>setting</u>

Parent Material:	Compact loamy glacial till.
Landform:	Concave slopes with glaciated uplands.
Position in Landscape:	Depressional areas and shallow drainageways.
Slope Gradient Ranges:	(A) 0 – 3% (B) 3 - 8%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class:	Poorly to somewhat poorly drained, with a perched water table at or near the surface from 7-9 months a year.	
Typical Profile Description:	Surface layer: Subsurface layer: Subsoil layer: Substratum:	Black loam, 0-5" Dark grayish brown fine sandy loam , 5-12" Dark grayish brown fine sandy loam, 12-22" Olive brown fine sandy loam, 22-65"
Hydrologic Group:	Group C	
Surface Run Off:	Slow to medium	
Permeability:	Moderate in solum, slow in substratum	
Depth to Bedrock:	Very deep, greater than 60".	
Hazard to Flooding:	None	
Erosion Factors:	К: .2432	

INCLUSIONS (Within Mapping Unit)

Similar: Brayton, Colonel

Dissimilar: Naskeag, Waskish, Mahoosuc

USE AND MANAGEMENT

Development of Wind Power Projects: The limiting factor for development of wind power projects is wetness, due to the presence of seasonal high groundwater table at or near the mineral soil surface for a considerable period of the year. Redirecting runoff and subsurface drainage away from project areas, or importation of loose granular fill, can help overcome limitations for construction due to drainage. Pillsbury soils may also have further limitations and permitting implications, since these areas may also include wetlands on the combined basis of hydric soils, hydrology and hydrophytic vegetation. Adequate hydrologic cross drainage under roadways is appropriate for this soil map unit (i.e. rock sandwich, culvert cross drainage, adequate road subbase, etc.)

RAWSONVILLE (Typic Haplorthods)

SETTING

Parent Material:	Loamy glacial till over bedrock.		
Landform:	Glaciated upland ridges.		
Position in Landscape:	Uppermost till ridges an	nd upper sideslopes.	
Slope Gradient Ranges:	(B) 3 – 8% (C) 8 – 20%	% (D) 20%+	
COMPOS	SITION AND SOIL CHARACTERISTICS		
Drainage Class:	Well drained, generally with no observed water table, or a short duration water table observed after significant storm events or snowmelt.		
Typical Profile Description:	Subsurface layer: Da	ark reddish brown fine sandy loam, 0-10" ark reddish brown fine sandy loam, 10-19" ark brown fine sandy loam, 19-28" pical)	
Hydrologic Group:	Group C		
Surface Run Off:	Rapid		
Permeability:	Moderate or moderately	y rapid	
Depth to Bedrock:	Moderately deep, 20-40" to bedrock		
Hazard to Flooding:	None		
Erosion Factor:	K: .2864		

INCLUSIONS (Within Mapping Unit)

Similar: Hogback, Abram, Dixfield, Skerry, Marlow, includes shallow to bedrock, moderately well drained soils, with perched water table on top of bedrock

Dissimilar: Naskeag, Rock Outcrop, Mahoosuc

USE AND MANAGEMENT

Development of Wind Power Projects: Rawsonville soils are generally suited for construction of wind power projects, since drainage is not generally a significant limitation within these map units, and Rawsonville can provide solid and stable anchoring points for wind tower bases with underlying bedrock presence.

RAWSONVILLE-HOGBACK COMPLEX

SETTING

Parent Material:	Loamy glacial till fo	rmed on top of bedrock
Landform:	Glaciated upland ridges.	
Position in Landscape:	Uppermost till ridge	es and upper sideslopes.
Slope Gradient Ranges:	(C) 8-20% (D) 20	0%+
<u>COM</u>	POSITION AND SOIL CHARACTERISTICS Well drained, generally with no observed water table, or a short duration water table observed after significant storm events or snowmelt.	
Typical Profile Description: (for Rawsonville)	Surface layer: Subsurface layer: Subsoil layer: Bedrock @ 28"	Dark reddish brown fine sandy loam, 0-10" Dark reddish brown fine sandy loam, 10-19" Dark brown fioen sandy loam, 19-28"
(for Hogback)		Dark reddish brown fine sandy loam, 0-7" Dark reddish brown fine sandy loam, 7-15" occur in a non-regular, non-repeating pattern parated out in mapping.
Hydrologic Group:	Group C	
Surface Run Off:	Rapid	
Permeability:	Moderate of moderately rapid	
Depth to Bedrock:	Moderately deep, 20-40" to bedrock	
Hazard to Flooding:	None	
Erosion Factor:	K: .1764	

INCLUSIONS (Within Mapping Unit)

Similar:Dixfield, Skerry, Hermon, SaddlebackDissimilar:Rock Outcrop, Naskeag

USE AND MANAGEMENT

For Development of Wind Power Projects: Rawsonville-Hogback soils are generally suited for construction of wind power projects, since drainage is not a significant limitation within these map units, and Rawsonville-Hogback can provide solid and stable anchoring points for wind towers.

RICKER (cryic) [Knob Lock (frigid)] (Dysic Lithic Cryofolists)

<u>setting</u>

Parent Material:	Thin organic deposit bedrock	ts underlain by a thin mineral horizon over
Landform:	On mountains and h	nills
Position in Landscape:	Uppermost portions	s of landscape
Slope Gradient Ranges:	(C) 8-20% (D) 20	0%+
<u>COMPOS</u>	SITION AND SOIL	<u>CHARACTERISTICS</u>
Drainage Class:	Well drained to exce	essively well drained
Typical Profile Description: (Ricker)	Surface layer: Subsurface layer:	Dark reddish brown to black peat, 7-0" Dark bluish gray, very channery silt Ioam, 0 9"
	Substratum:	Bedrock
Hydrologic Group:	D* Note: Natural Resource Conservation Service lists as Hydrogeologic Group "A", however, discussion with David Rocque, State Soil Scientist, suggested soil is expected to perform similarly to Abram, which is rated as "D". Used D to be conservative until further notice.	
Surface Runoff:	Rapid	
Permeability:	Moderately rapid in rapid on the minera	organic layers, moderate or moderately I horizon
Depth to Bedrock:	Very shallow to moderatel;y deep, 0-10"	
Hazard to Flooding:	None	
Erosion Factors:	K: .1749	
	<u>INCLUSIC</u> (Within Mappi	

Similar: Knob Lock (frigid), Abram, Hogback, Rawsonville

Dissimilar: Rock Outcrop, Naskeag

USE AND MANAGEMENT

Development of Wind Power Projects: The soils within this map unit is generally suited to the development of wind power projects, in that wetness is generally not a factor, while shallow depths to bedrock can provide for stable and solid anchoring points for wind tower bases.

RICKER-ABRAM-ROCK OVTCROP COMPLEX

<u>setting</u>

Parent Material:		Thin organic deposits underlain by a thin mineral horizon over bedrock	
Landform:		On mountains and	hills
Position in Lands	scape:	Uppermost portion	s of landscape
Slope Gradient R	Ranges:	(C) 8-20% (D) 2	0%+
	<u>COMPO</u>	sition and soil	<u>CHARACTERISTICS</u>
Drainage Class:		Well drained to exc	essively well drained
Typical Profile Description: (Ricker)		Surface layer: Subsurface layer:	Dark reddish brown to black peat, 7-0" Dark bluish gray, very channery silt loam, 0 9"
		Substratum:	Bedrock – micaceous schist
(Abram)		Surface layer: Subsurface layer: Bedrock @ 5"	Pinkish gray sandy loam, 0-2" Very dusky red to brown sandy loam, 2-5"
		Note: Ricker and Abram soils in this map unit are interspersed with areas of exposed Rock Outcrop in a non-regular, non-repeating pattern that could not be separated out in mapping.	
Hydrologic Group:		A: Ricker D: Abram/Rock Outcrop	
Surface Water Runoff:		Rapid	
Permeability:		Moderately rapid in organic layers, moderate or moderately	
Depth to Bedrock: Hazard to Flooding: Erosion Factors:		rapid on the mineral horizon Very shallow to moderately deep, 0-40" None K: .1749	
<u>INCLUSIONS</u>			
(Within Mapping Unit)			
Similar: Dissimilar:		Knob Lock (frigid), Hogback, Rawsonville, Saddleback Rock Outcrop, Naskeag	
		USE AND MANA	AGEMENT

Development of Wind Power Projects: The soils within this map unit are generally suited for development of wind power projects, in that wetness is generally not a factor, while shallow depths to bedrock can provide for stable and solid anchoring points for wind tower bases.

RICKER-ROCK OUTCROP COMPLEX

<u>setting</u>

Parent Material:	Thin organic deposits underlain by a thin mineral horizon over bedrock
Landform:	On mountains and hills
Position in Landscape:	Uppermost portions of landscape
Slope Gradient Ranges:	(C) 8-20% (D) 20%+

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class:	Well drained to excessively well drained	
Typical Profile	Surface layer: Subsurface layer:	Dark reddish brown to black peat, 7-0" Dark bluish gray, very channery silt loam, 0- 9"
	Substratum:	Bedrock – micaceous schist
	exposed Rock Outc	n this map unit are interspersed with areas of rop in a non-regular, non-repeating pattern parated out in mapping.
Hydrologic Group:	Hydrogeologic Gro Rocque, State Soil So similarly to Abram, conservative until fu	Natural Resource Conservation Service lists as up "A", however, discussion with David cientist, suggested soils is expected to perform which is rated as "D". Used D to be urther notice. (not listed by NRCS), projected
Permeability:	Moderately rapid in rapid on the minera	n organic layers, moderate or moderately Il horizon
Depth to Bedrock:	Very shallow to mo	derately deep, 0-40"
Hazard to Flooding:	None <u>INCLUSIC</u> (Within Mappi	
Similar. Hogback Pau	konville	

Similar: Hogback, Rawsonville

Dissimilar: Rock Outcrop, Naskeag, Mahoosuc

USE AND MANAGEMENT

Development of Wind Power Projects: The soils within this map unit are generally suited for construction of wind power projects, in that they have no limitations due to drainage, and the shallow depths to bedrock provide for stable and solid anchoring points for wind tower bases.

ROCK OVTCROP

This mapping unit consists of areas of exposed bedrock.

USE AND MANAGEMENT

Development of Wind Power Projects: Rock Outcrop is generally suited for development of wind power projects, in that wetness is generally not a factor in this map unit, and it provides for solid and stable anchoring points for wind tower bases. This map unit is generally found on the top of a drainage shed along ridge tops and consequently is not subjected to large upslope drainage flows.

ROCK OUTCROP-ABRAM-HOGBACK COMPLEX

SETTING

Parent Material:	Coarse loamy soils derived from mica schist and phyllite with some granite and gneiss.		
Landform:	Ridgetop portions of glaciated uplands.		
Position in Landscape:	Uppermost sideslopes and ridgetops.		
Slope Gradient Ranges:	(C) 8-20% (D) 20%+		
COME	POSITION AND SOIL CHARACTERISTICS		
Drainage Class:	Excessively drained (Abram) to well-drained (Hogback) with a seasonal high groundwater table observed only for short durations after significant storm events or snowmelt, usually directly on top of bedrock.		

Typical Profile Description: (for Hogback)	Surface layer: Subsurface layer: Bedrock @ 15"	Dark reddish brown fine sandy loam, 0-7" Dark reddish brown fine sandy loam, 7-15"
(for Abram)	Surface layer: Subsurface layer: Bedrock @ 5"	Pinkish gray sandy loam, 0-2" Very dusky red to brown sandy loam, 2-5"
	Note:	These soils occur in a non-regular, non- repeating pattern that could not be separated out in mapping. It is estimated that Rock Outcrop surface forms the largest portion of this map unit, while Abram occupies the next largest area followed by Hogback.
Hydrologic Group:	Rock Outcrop:	Group D
	Abram: Hogback:	Group D Group B
Surface Run Off: Permeability: Depth to Bedrock:	Rapid Moderately rapid Rock Outcrop: 0" of Abram: 0-10" to be Hogback: 10-20" to	of soil cover edrock
Hazard to Flooding: Erosion Factor:	None K: .1764	

INCLUSIONS (Within Mapping Unit)

Similar:	Ricker (cryic), Knob Lock (frigid), Rawsonville, Dixfield, Skerry, Marlow
Dissimilar:	Mahoosuc, Rock Outcrop

USE AND MANAGEMENT

Development of Wind Power Projects: Rock Outcrop, Hogback and Abram soils are generally suited for development of wind power projects, in that wetness is generally not a factor in these map units, and both provide for solid and stable anchoring points for wind tower bases. This map unit is generally found on the top of a drainage shed along ridge tops and consequently is not subjected to large upslope drainage flows.

SKERRY (Aquic Haplorthods)

<u>setting</u>

Parent Material:	Loamy glacial till underlain by sandy textured denser till.
Landform:	Drumlins and glaciated uplands.
Position in Landscape:	Usually occupies upper components of landform.
Slope Gradient Ranges:	(B) 3-8% (C) 8-20%

COMPOSITION AND SOIL CHARACTERISTICS

Drainage Class:		ained, with a perched water table 1.5 to 3.5 surface from November through May.
Typical Profile Description:	Surface layer: Subsurface layer: Subsoil layer: Substratum:	Light gray fine sandy loam, 0-4" Dark reddish brown fine sandy loam, 4-20" Yellowish brown fine sandy loam, 20-25" Mixed brown and light olive brown fine sandy loam and sand, 25-65"
Hydrologic Group:	Group C	
Surface Run Off:	Moderate	
Permeability:	Moderate in solum substratum.	and slow or moderately slow in the compact
Depth to Bedrock:	Deep, greater than 4	40".
Hazard to Flooding:	None	

INCLUSIONS (Within Mapping Unit)

Similar: Dixfield, Herman

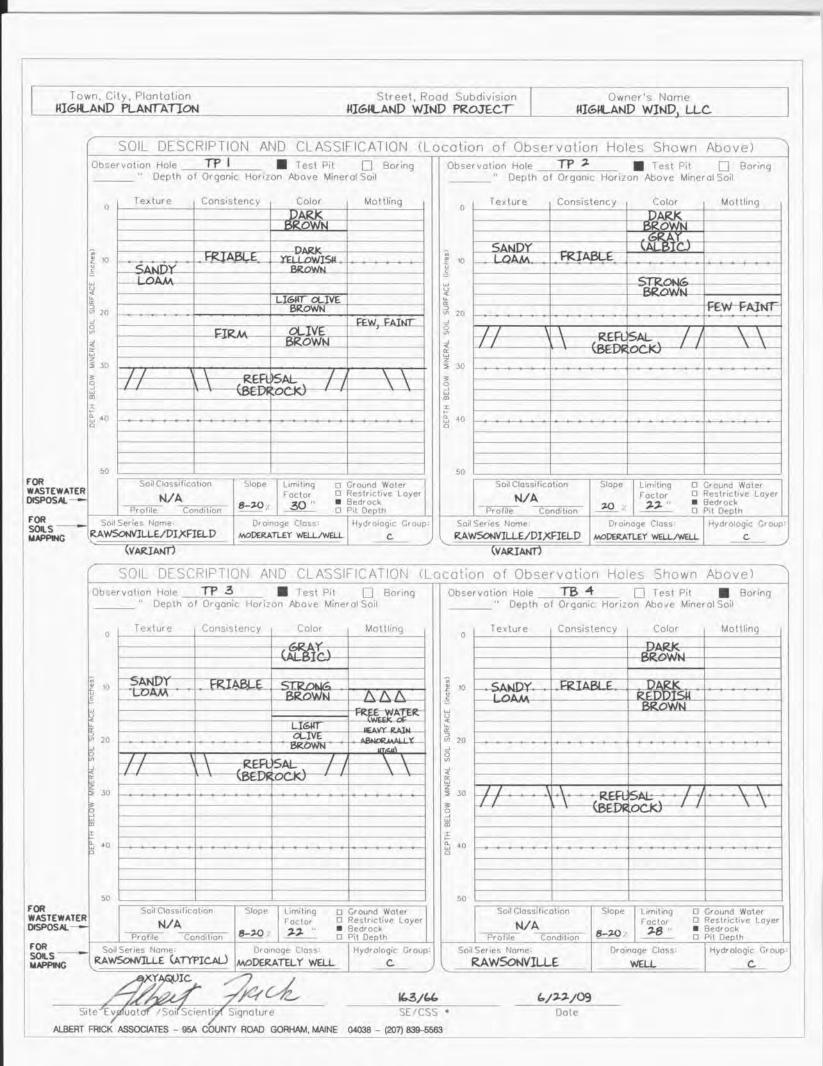
Dissimilar: Colonel, Westbury

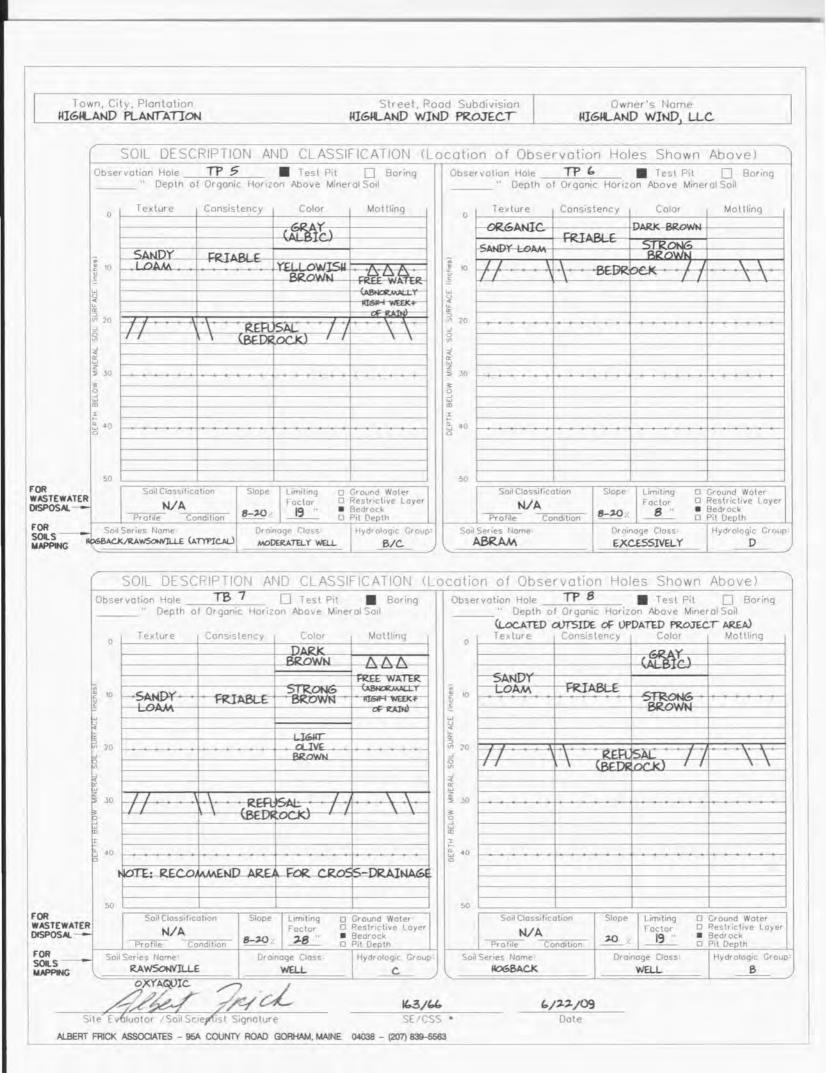
USE AND MANAGEMENT

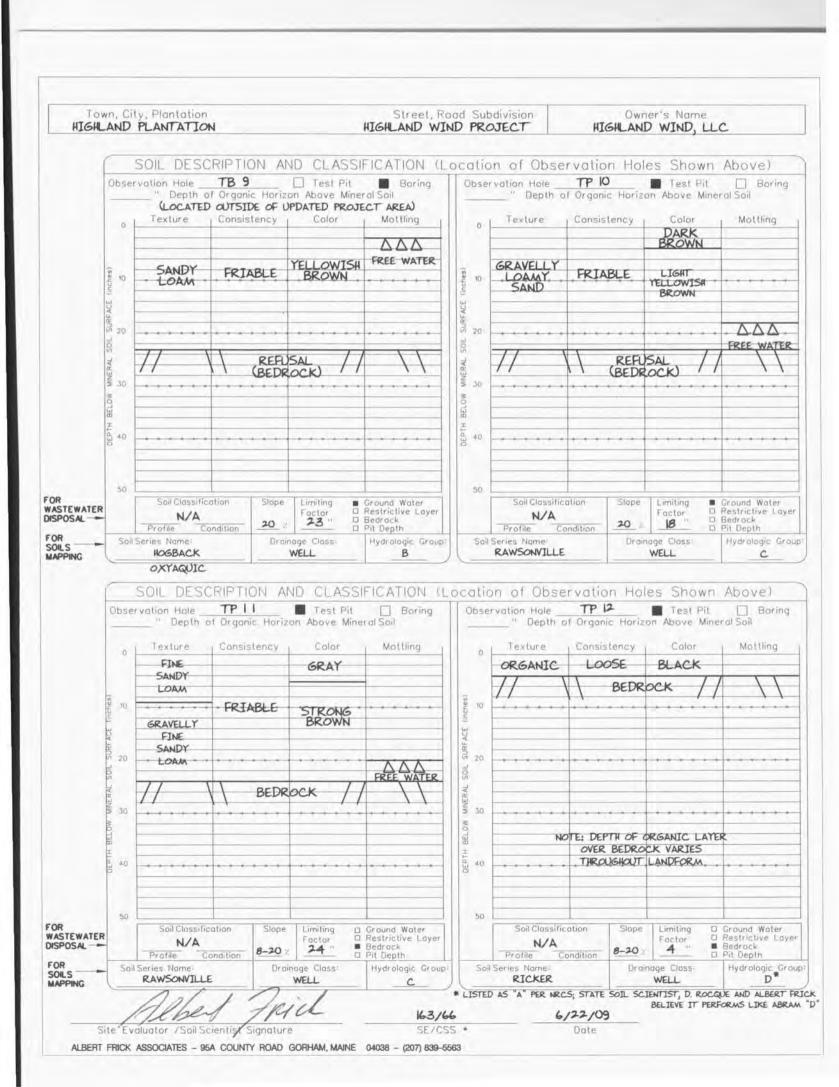
Development of Wind Power Projects: Skerry soils are generally suited for development of wind power projects, in that these soils are moderately well drained with basal till substratum. Depths to seasonal high groundwater table can be overcome by redirection of surface water runoff, and/or importation of coarse granular fill.

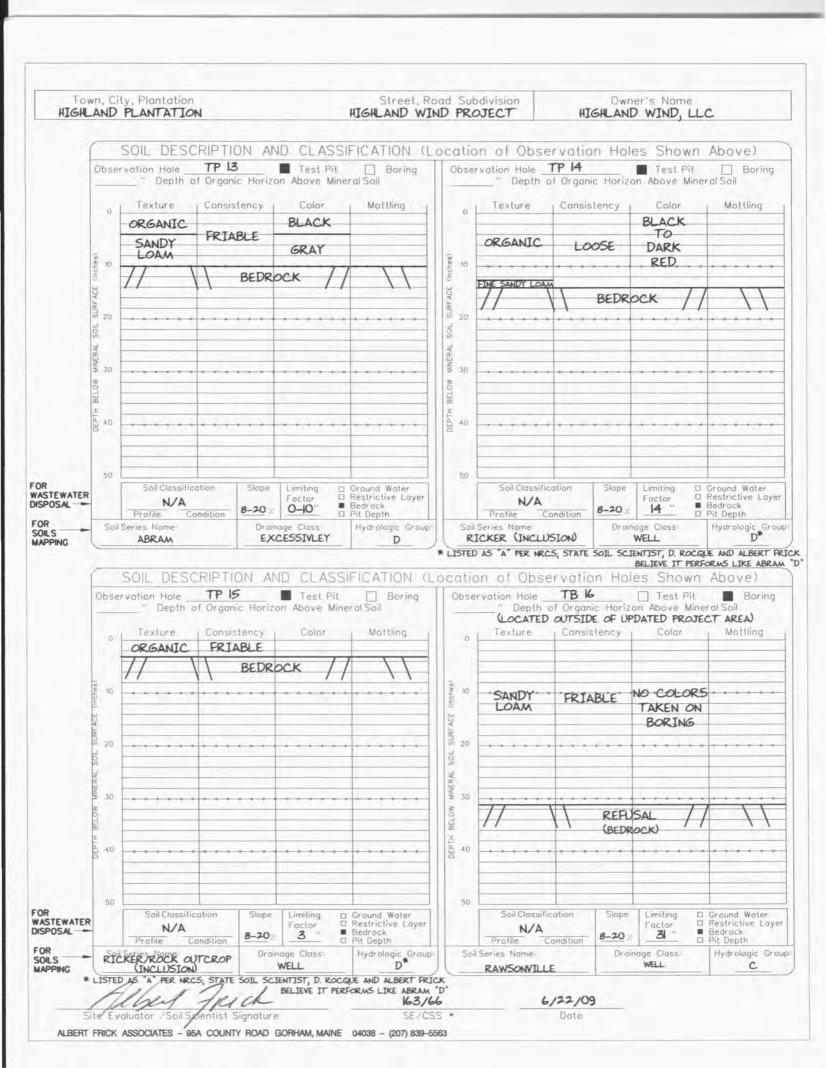
APPENDIX D

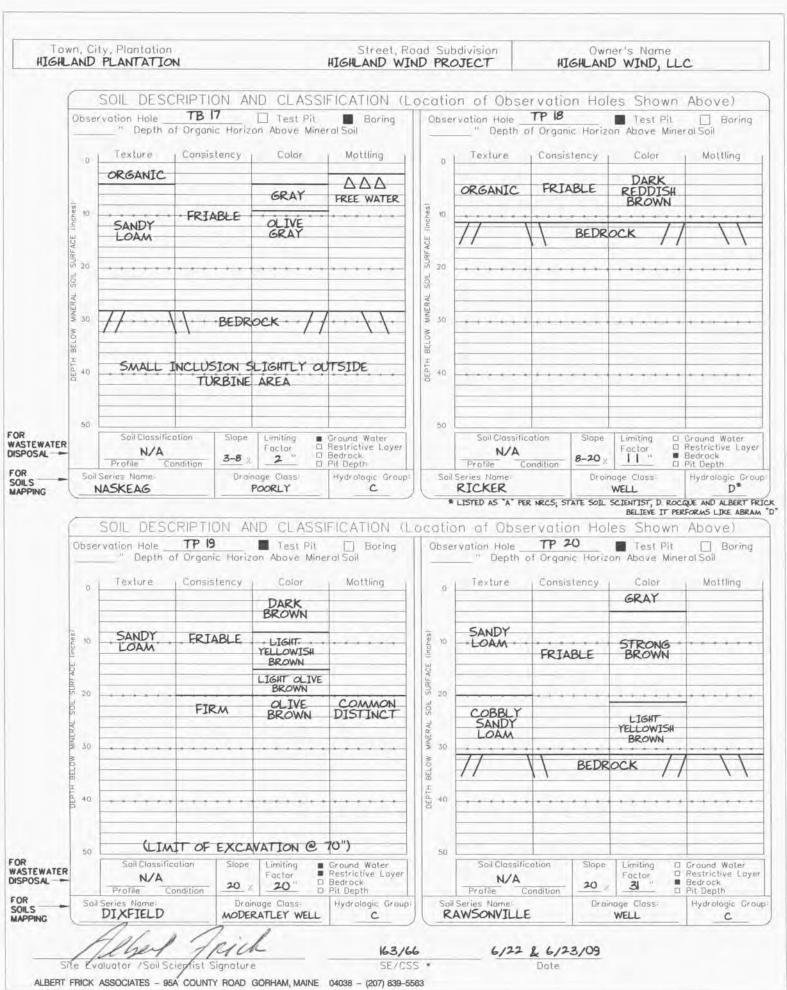
Soil Profile Descriptions

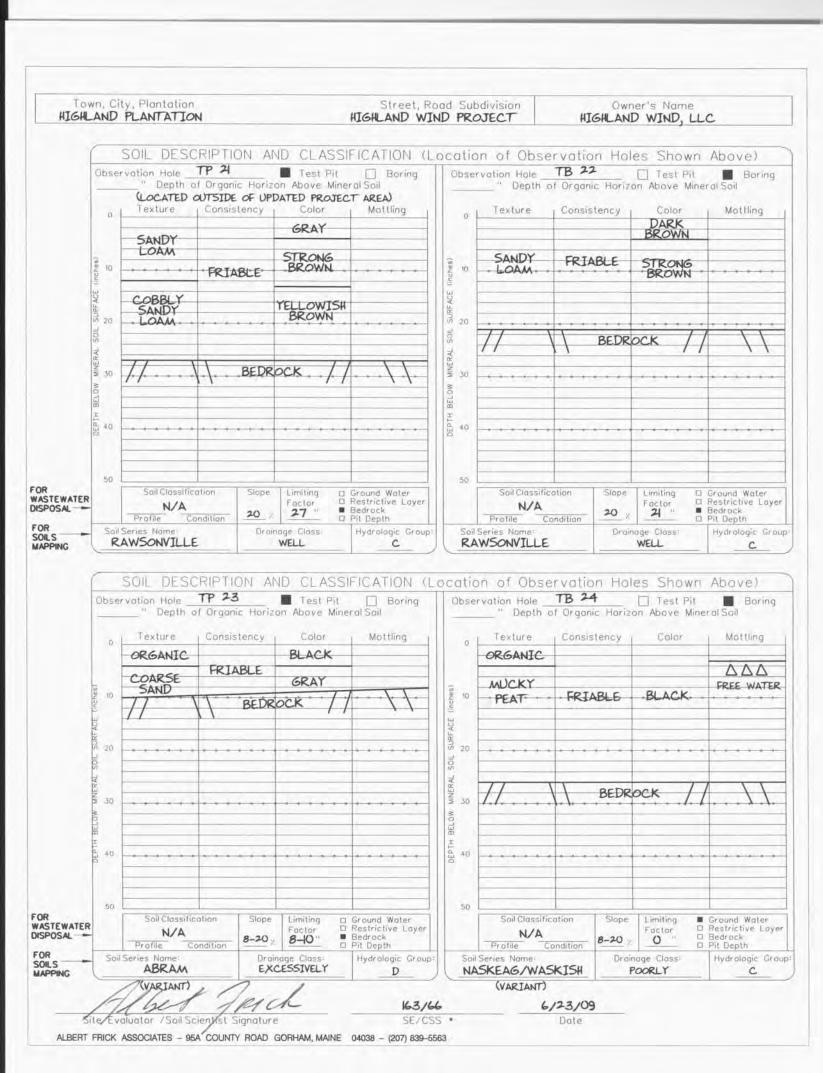


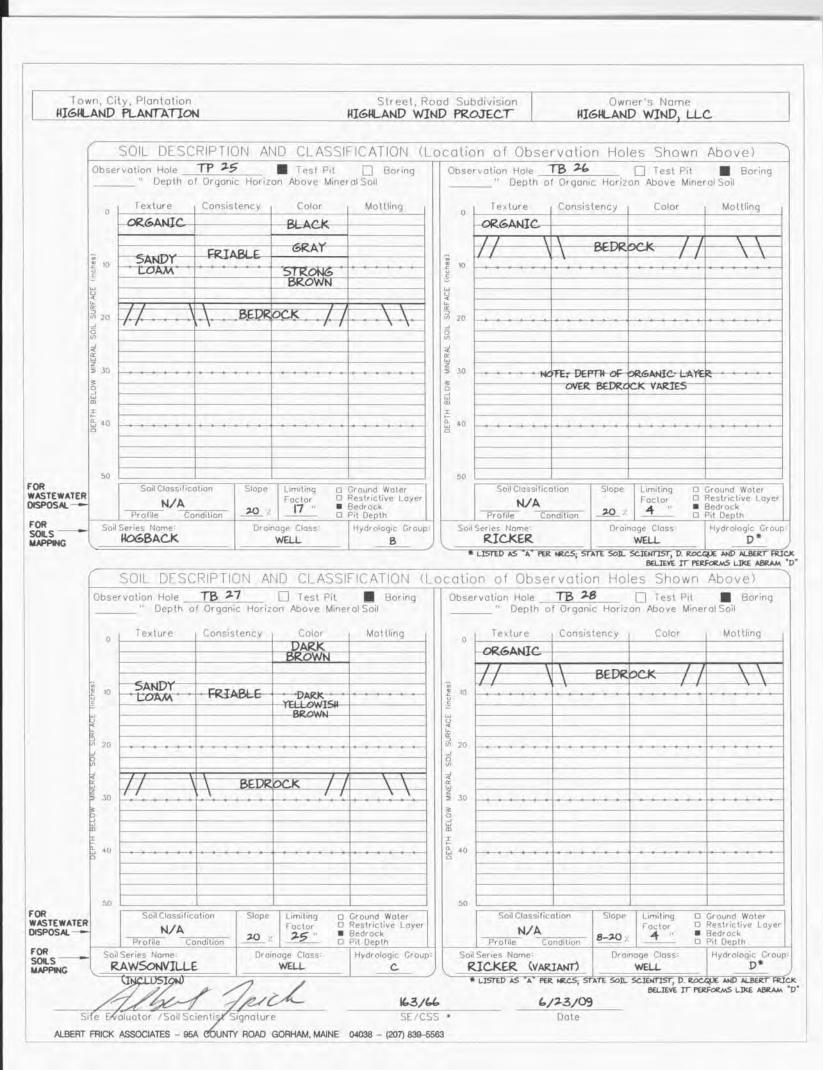


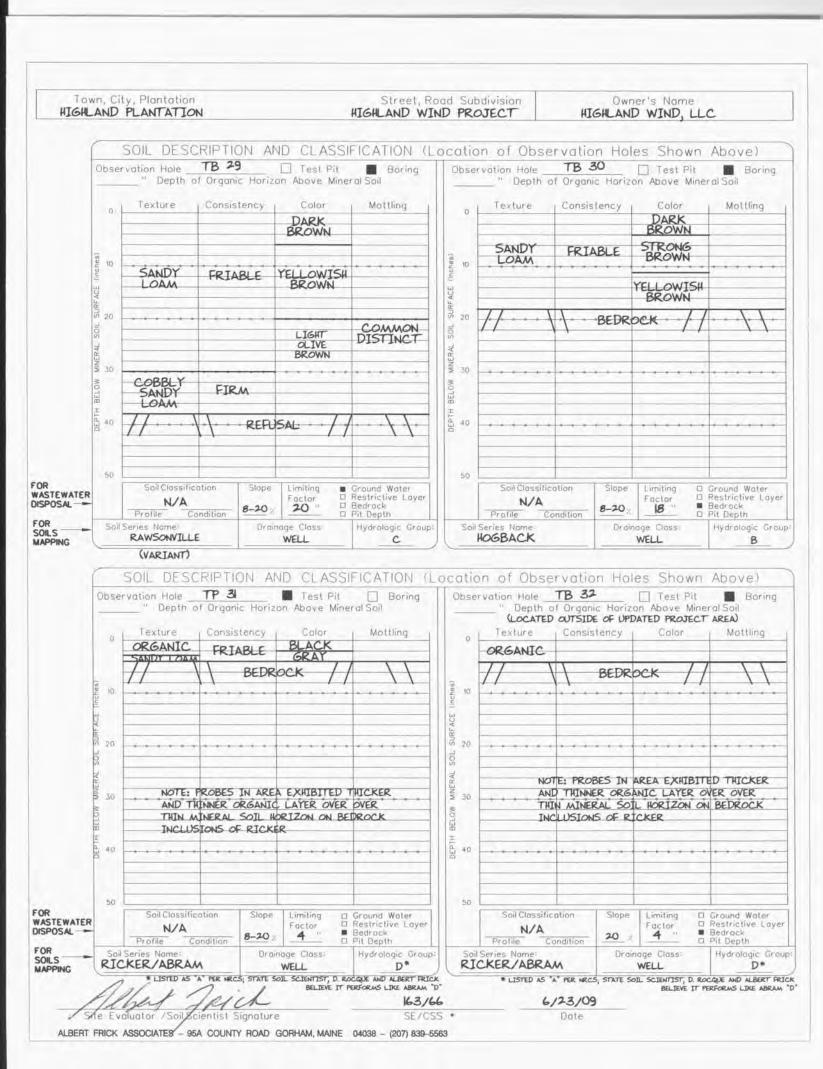


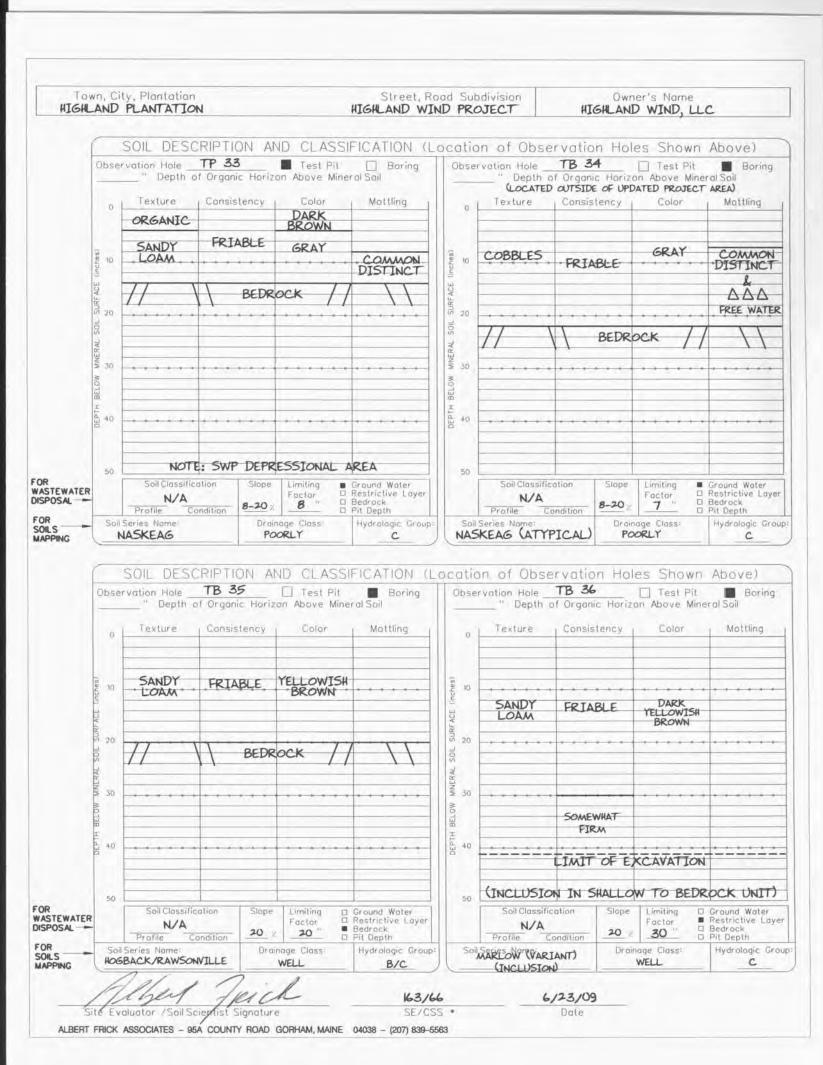


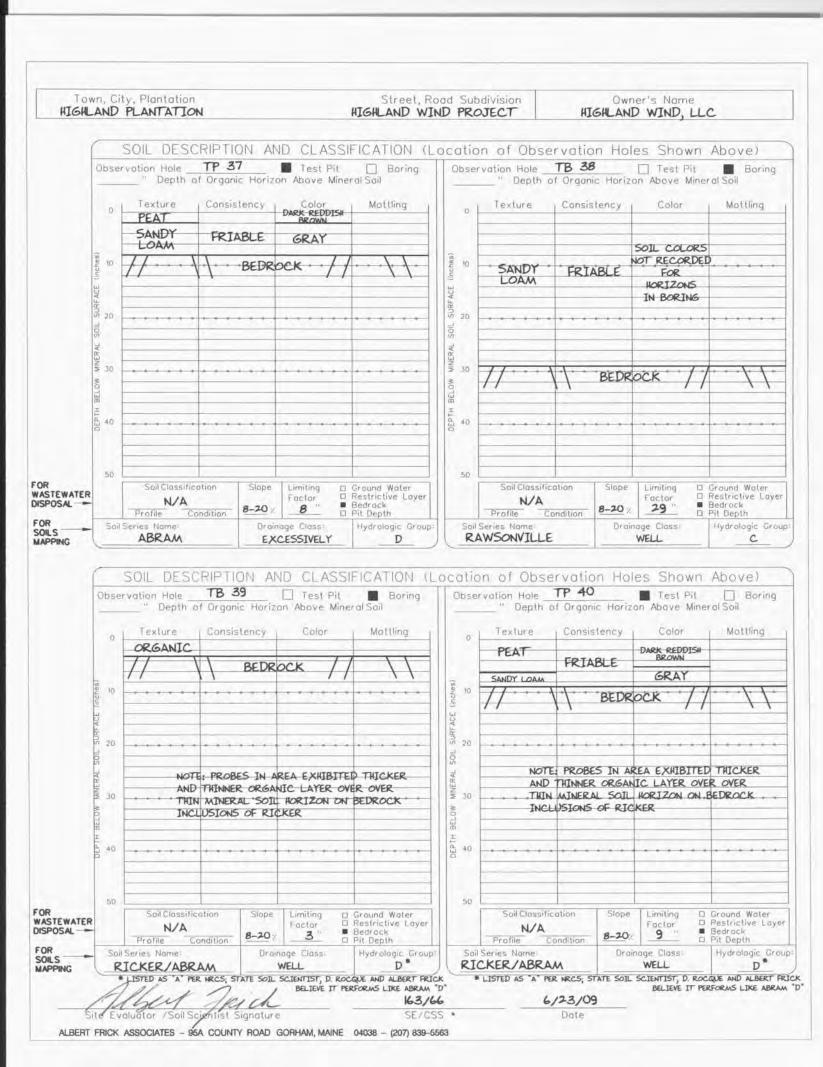


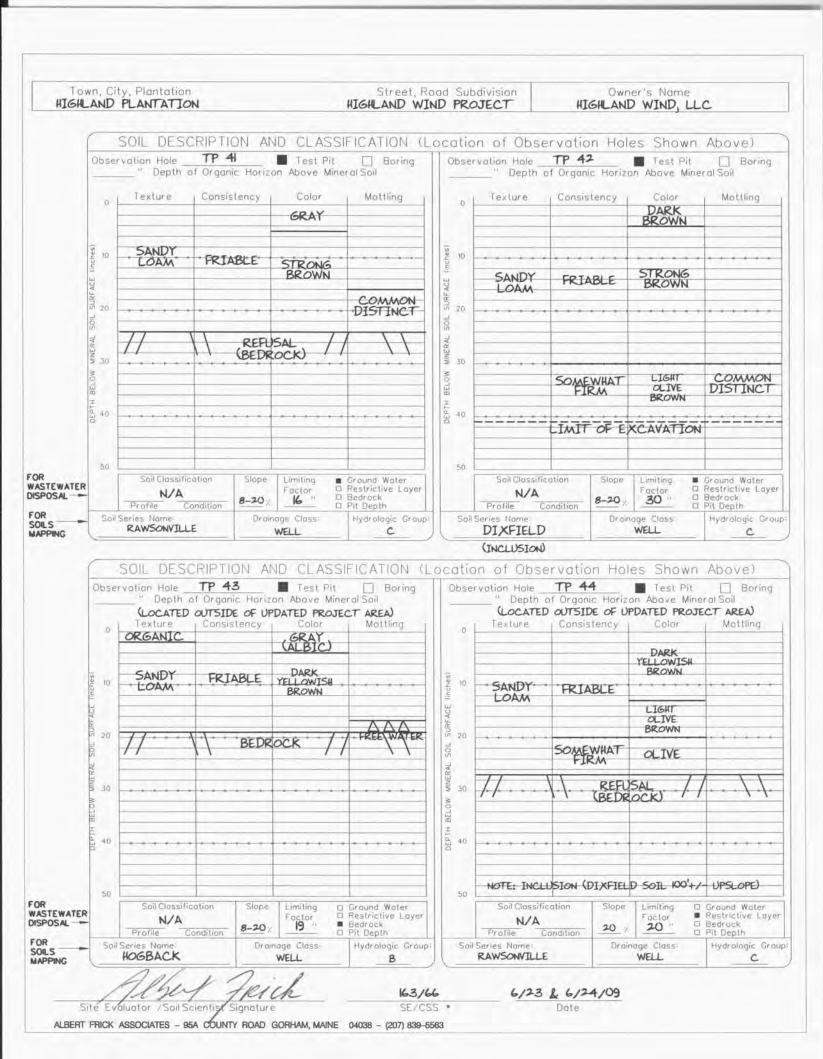


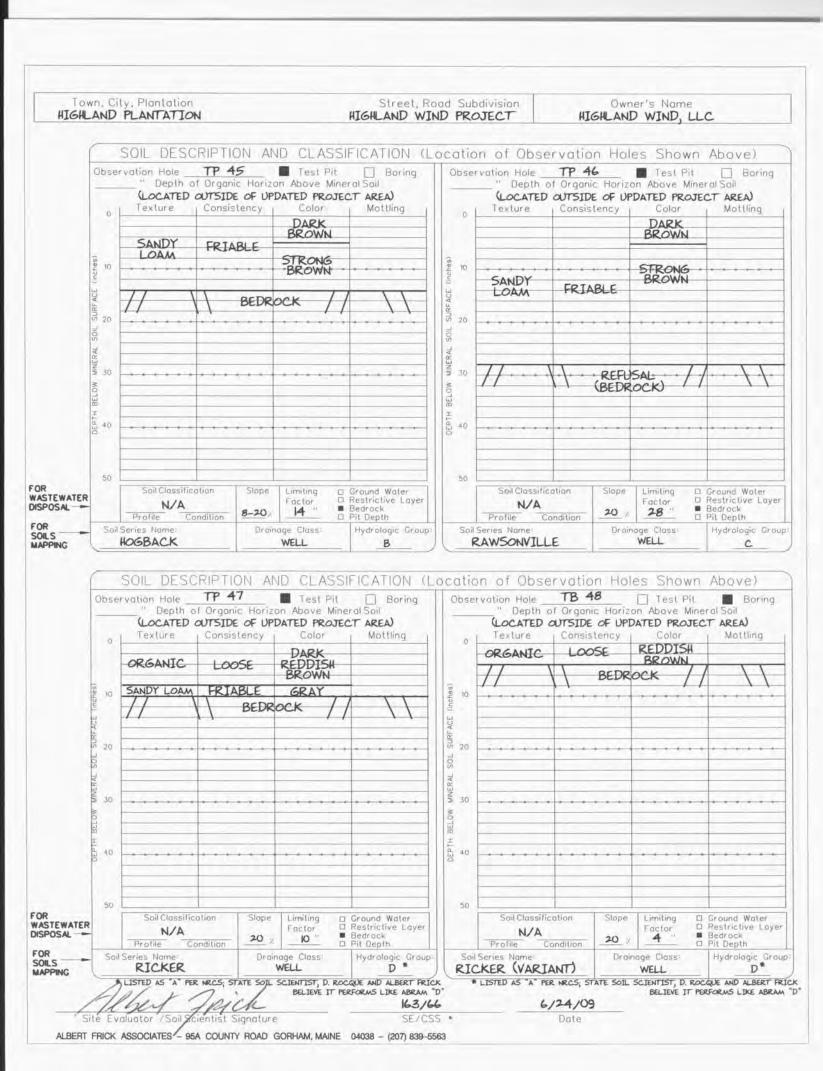


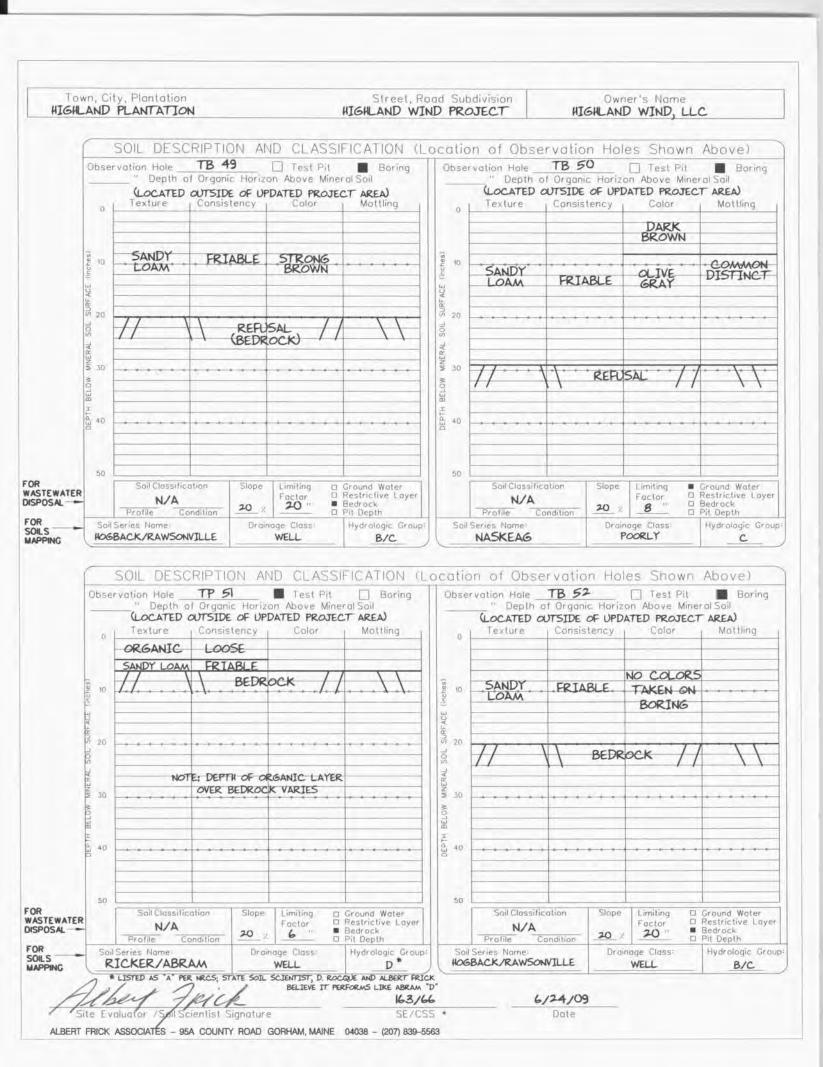


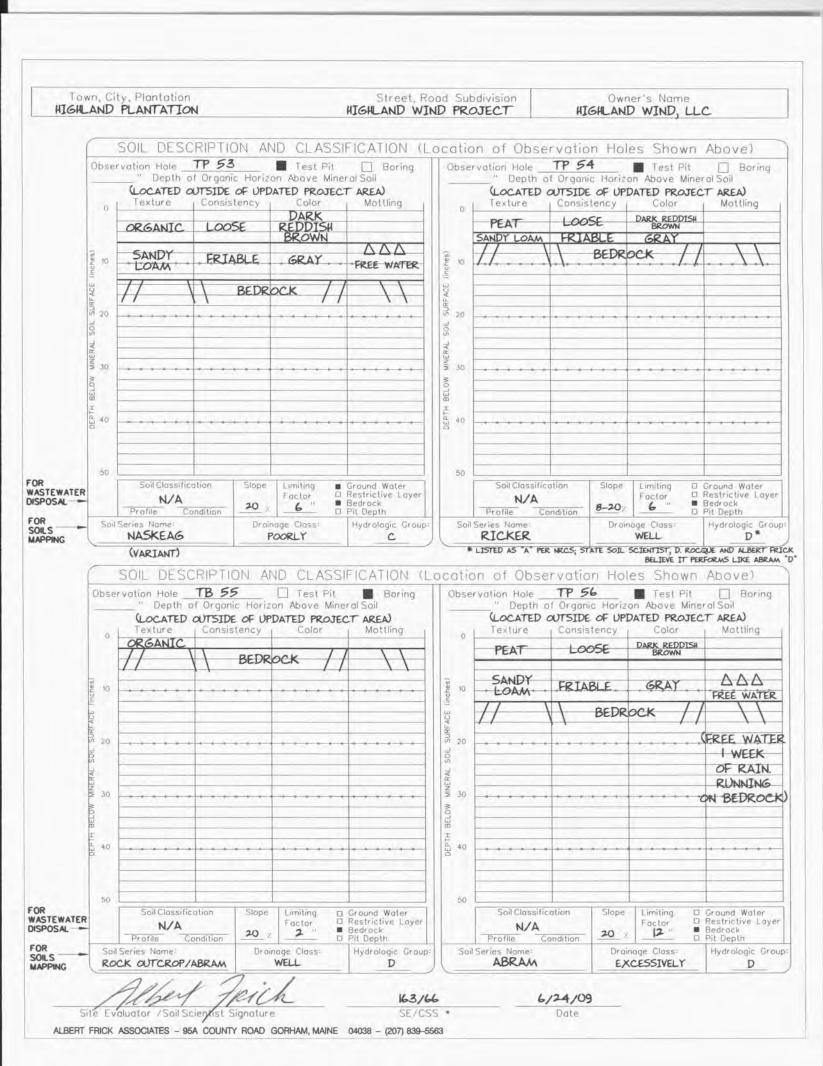




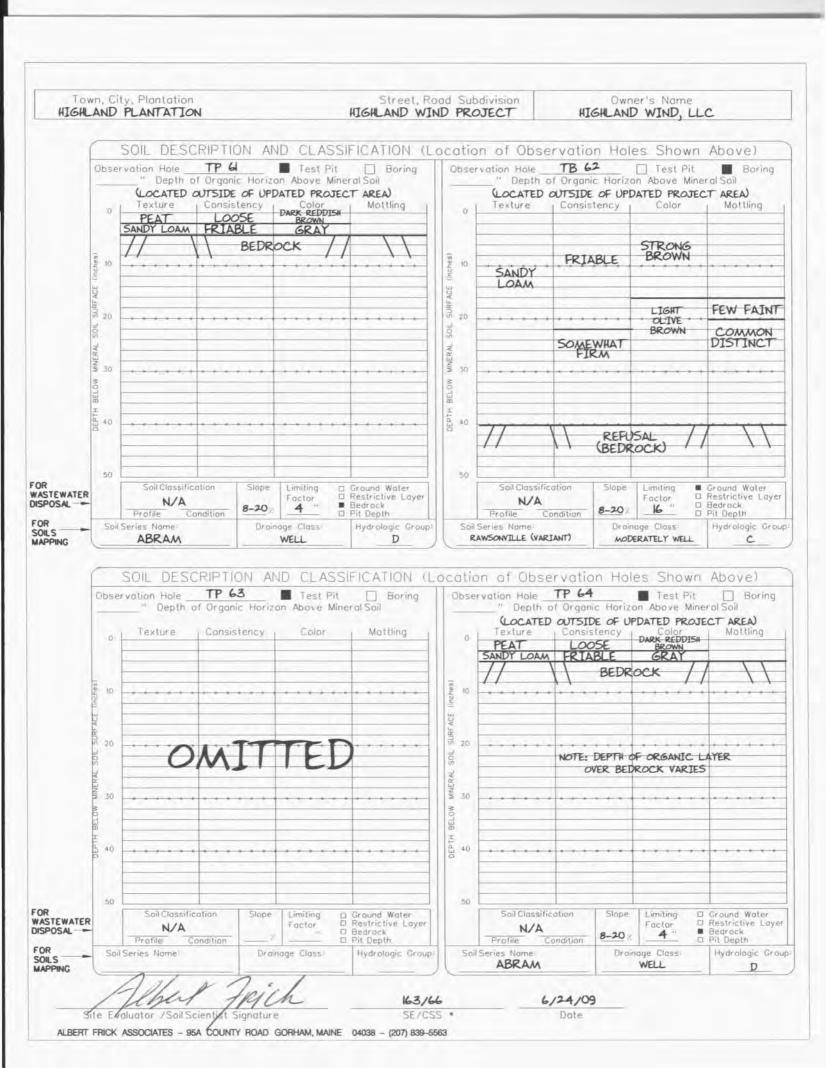


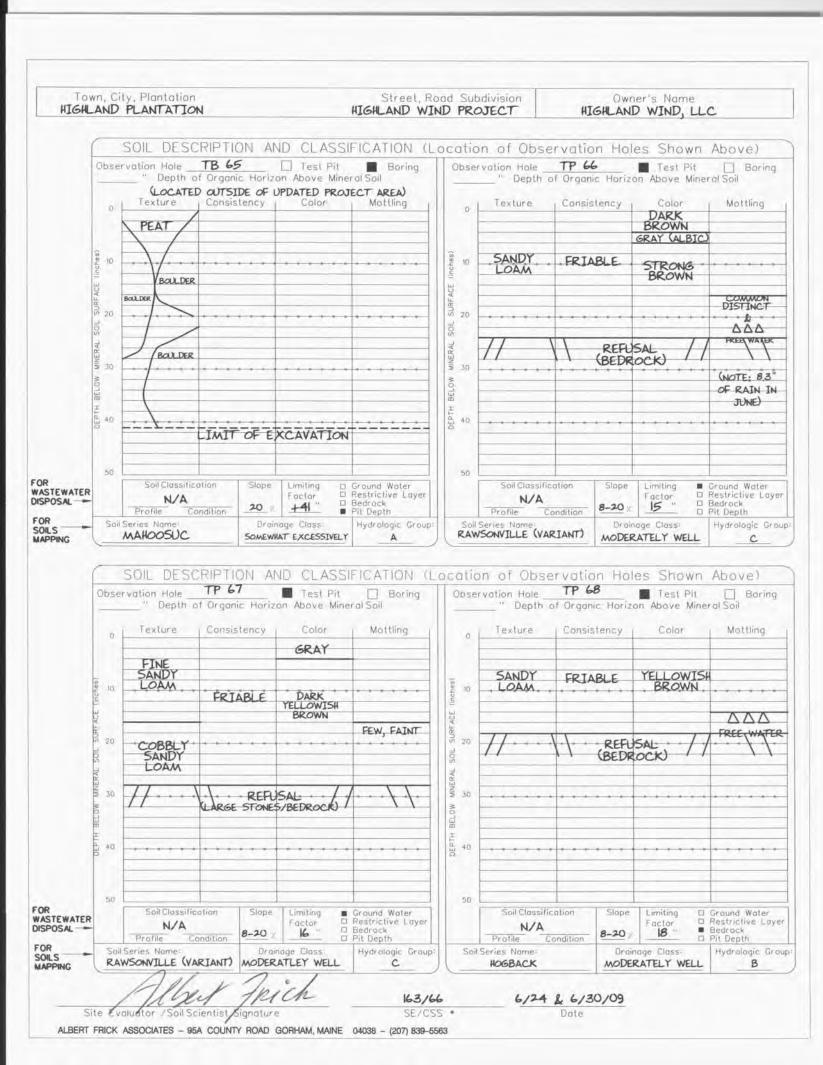


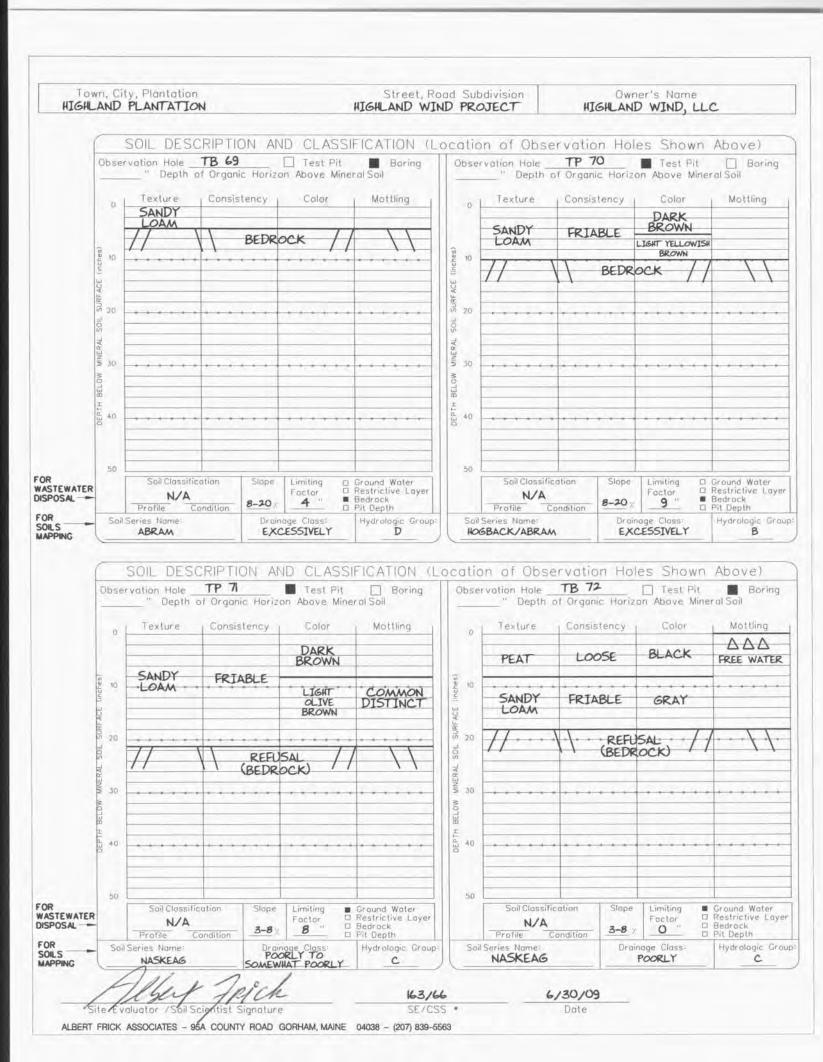




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SDIL						SOIL					
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BELO						BELOW		OVER	BEDROC	K VARIES	
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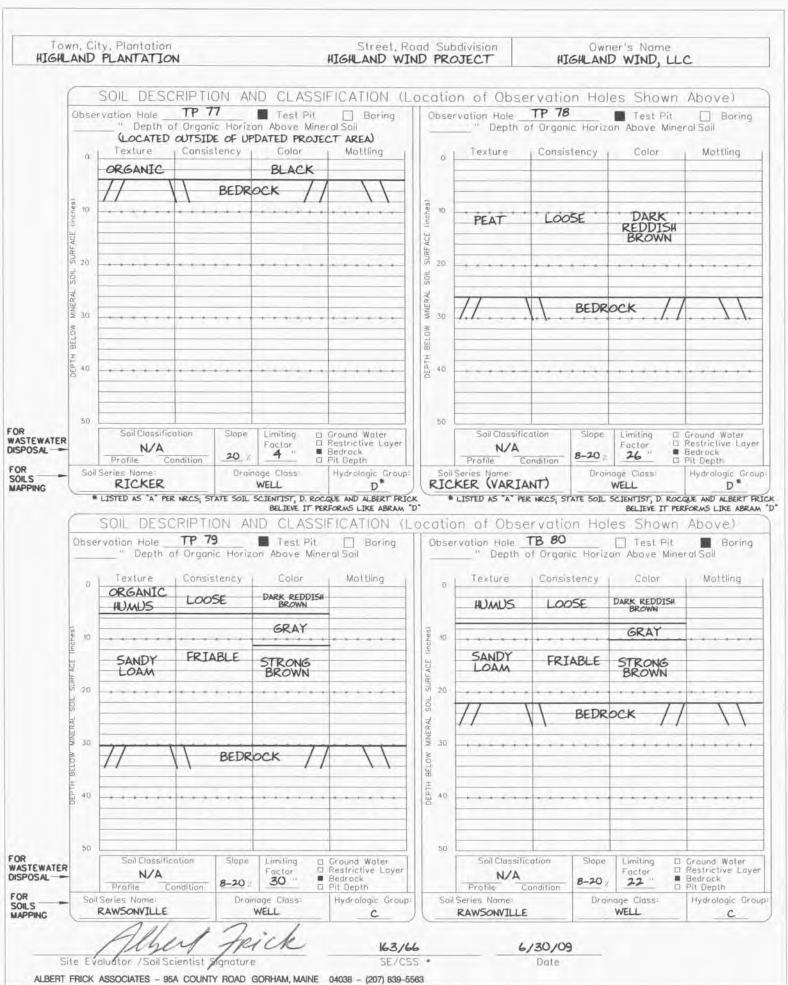


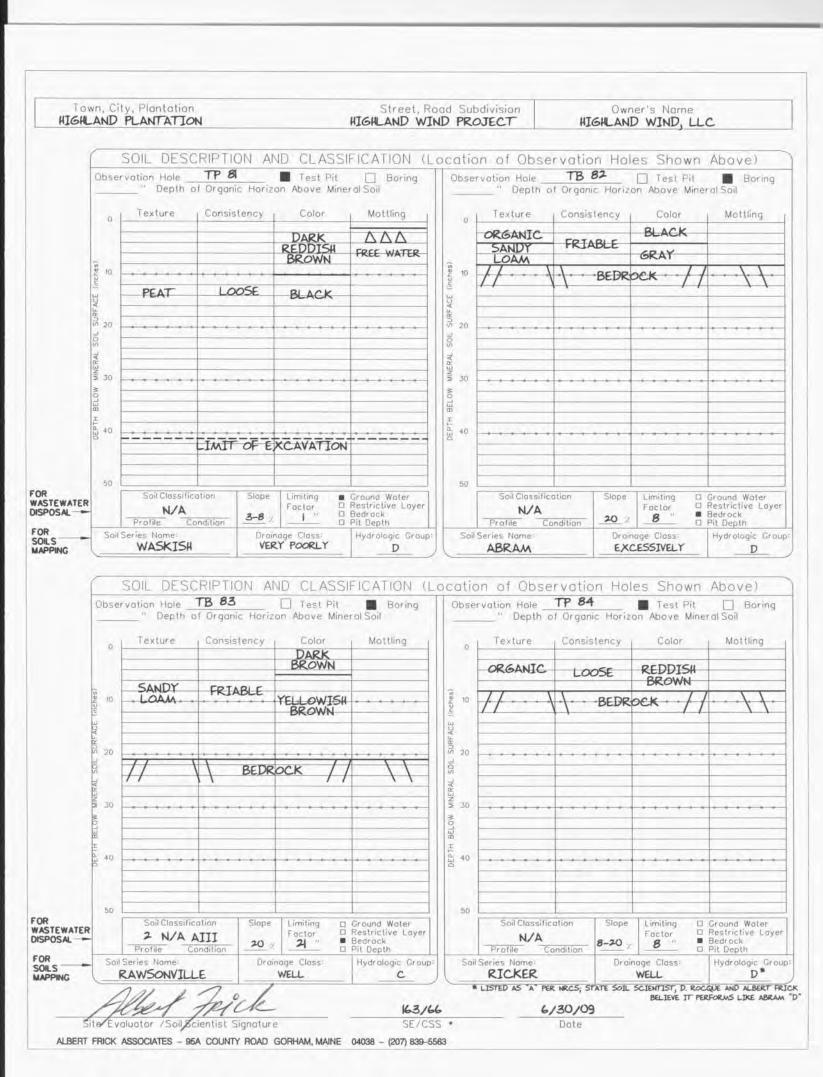


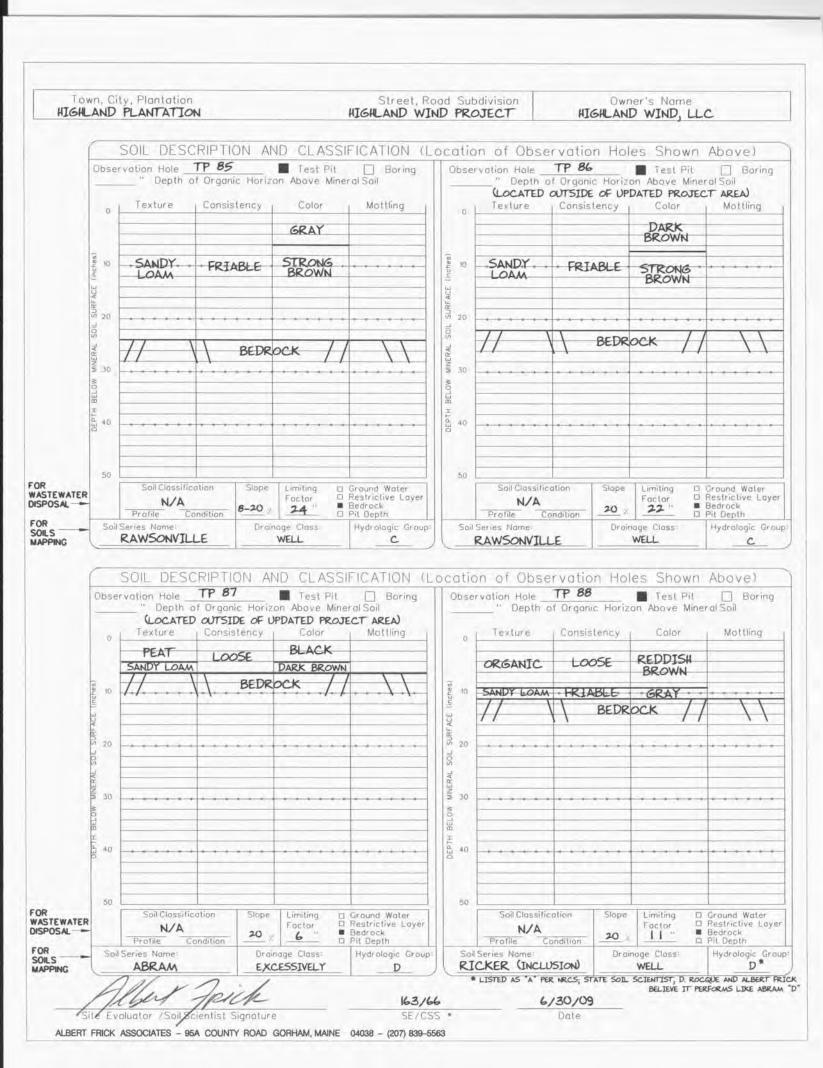


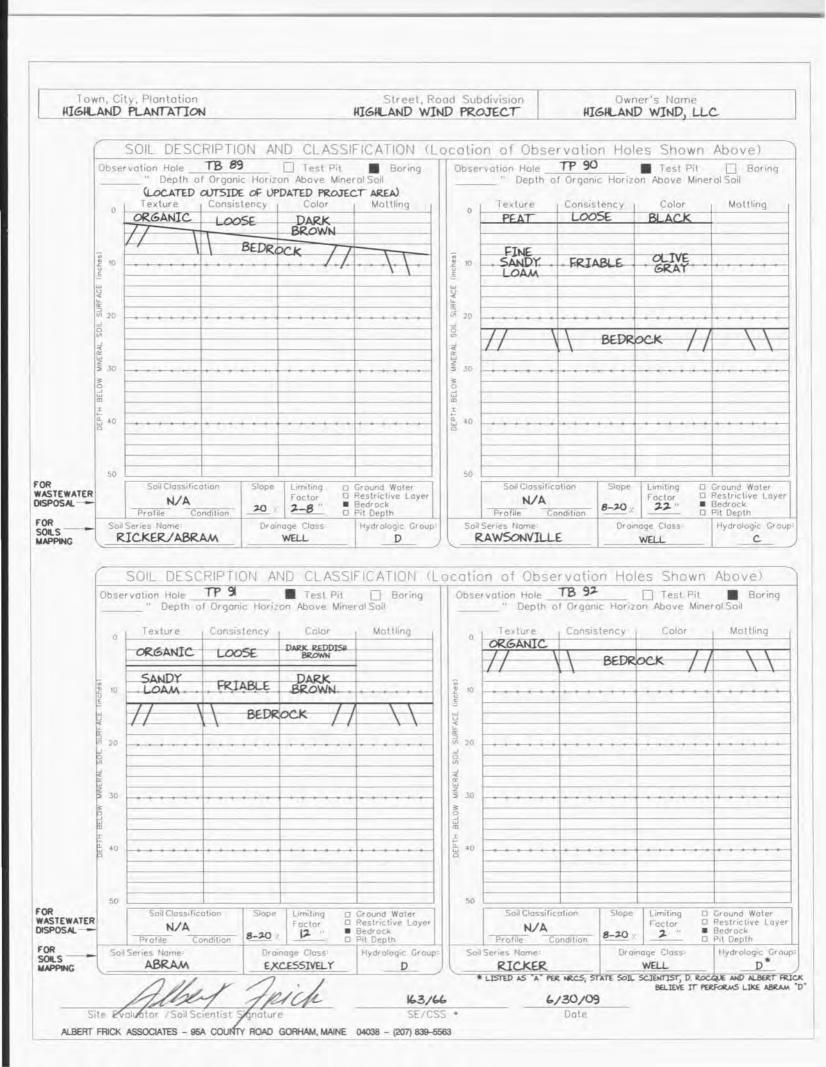
	ND	y, Plantation PLANTATIO	N		Street, Re HIGHLAND WI			HIG		ner's Name D WIND, LLO	2
10		vation Hale	TP 73		FICATION (L Baring ral Soil	1.1	votion Hole Depth	TB 74	Horiz	ES Shown Test Pit on Abave Miner	Borin al Soil
	0	Texture	Consistency	BLACK	Mottling	0	Texture	Consis	ency	Color	Mottling
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AL SOIL SURF	20	// \	REFL	35AL //		SOIL SURF	LOAM			BORING	
H BELOW WINE			• • • • •		• • • • • •	H BELOW MINERAL				•••••	
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(inches)	10	SANDY	FRIABLE	NO-COLORS TAKEN ON	5	E tinchest	SANDY	FRI	BLE		FREE WAT
		LOAM	* * * * * *	BORING		L SURFACE	//	//	REFL (BEDR OR	SAL /1	
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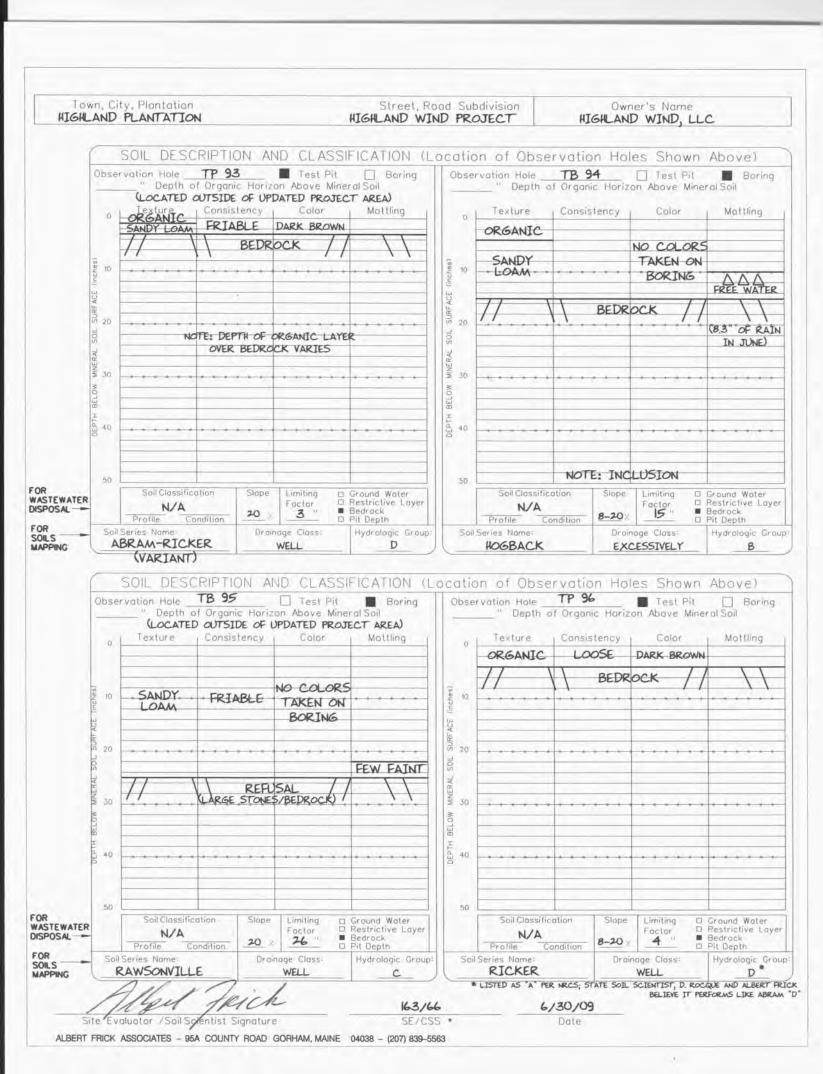
ALBERT FRICK ASSOCIATES - 95A COUNTY ROAD GORHAM, MAINE 04038 - (207) 839-5563

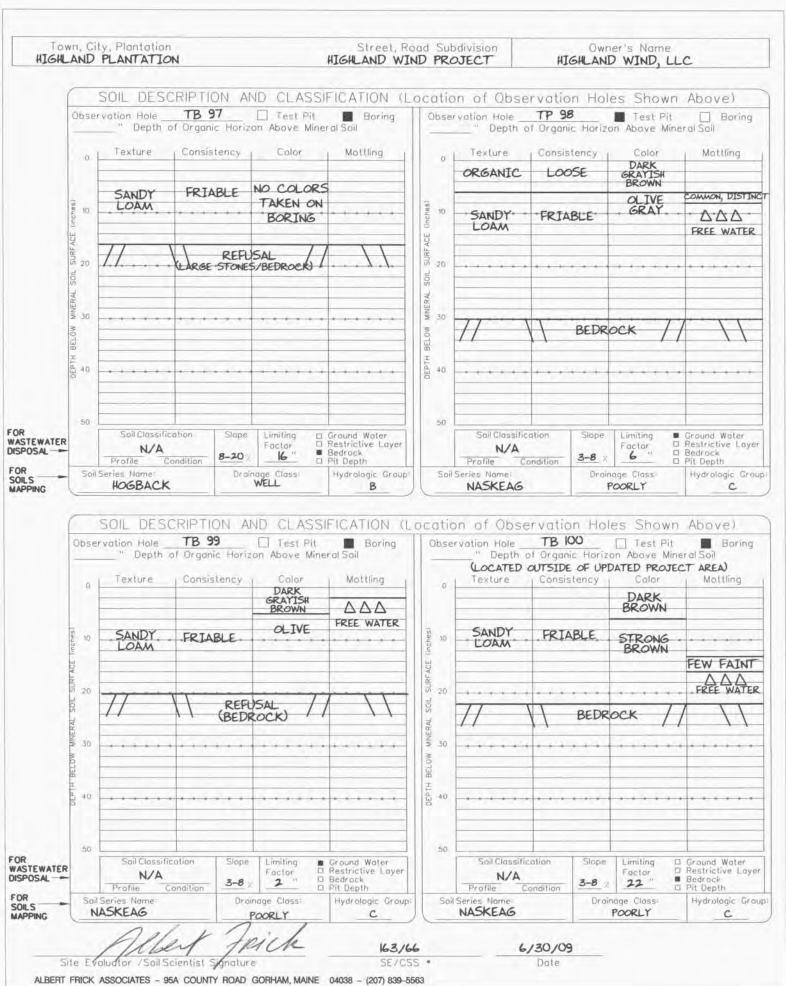




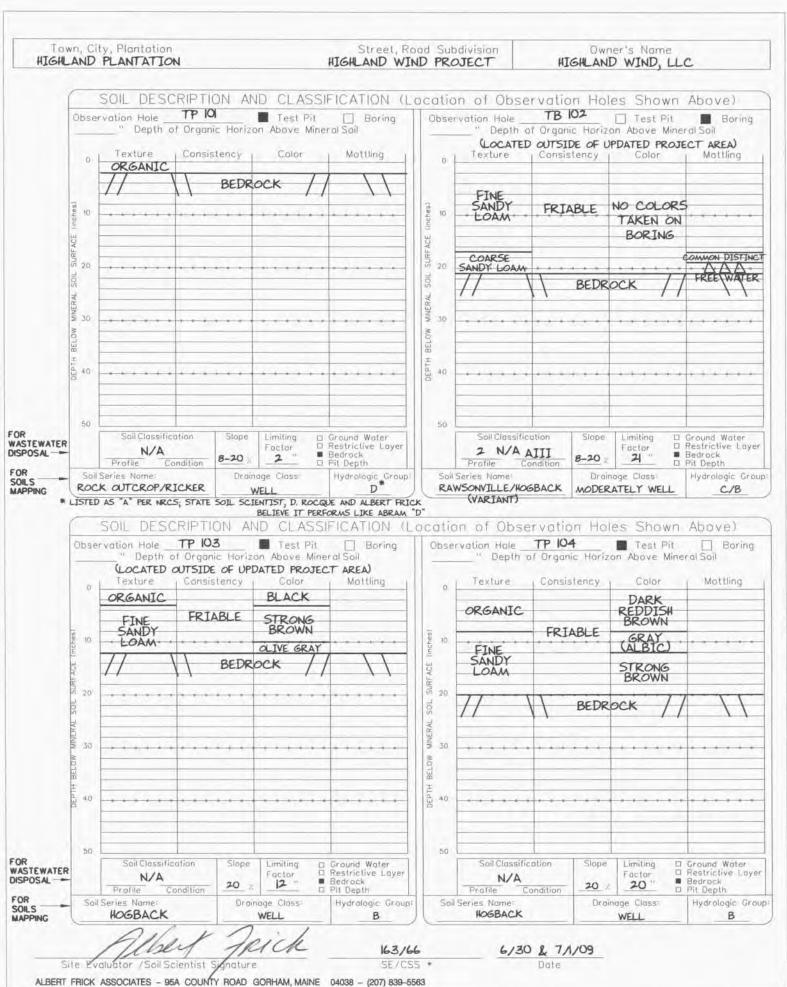


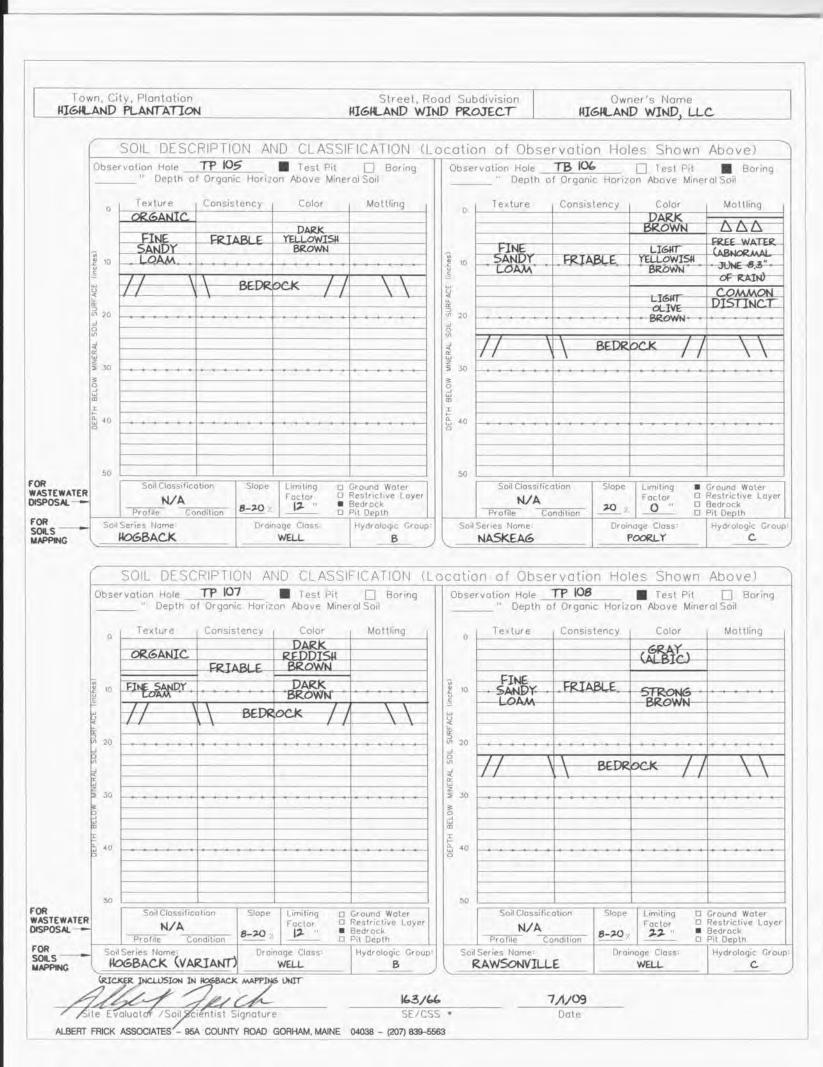


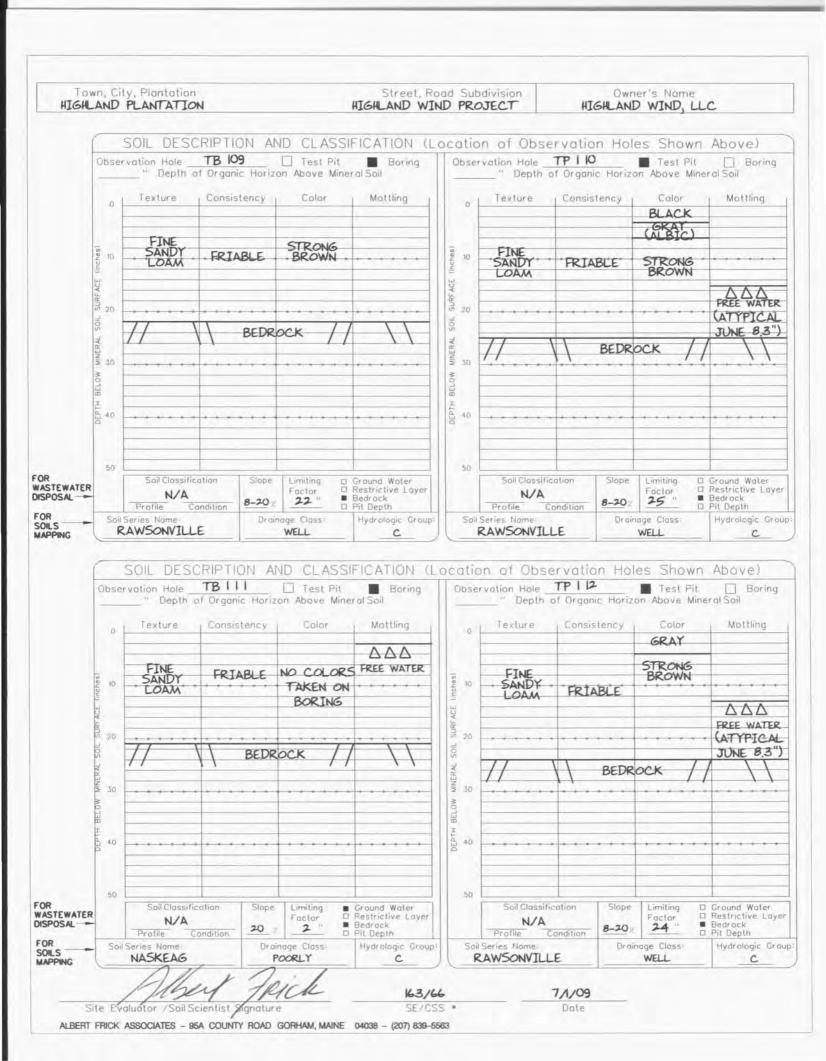


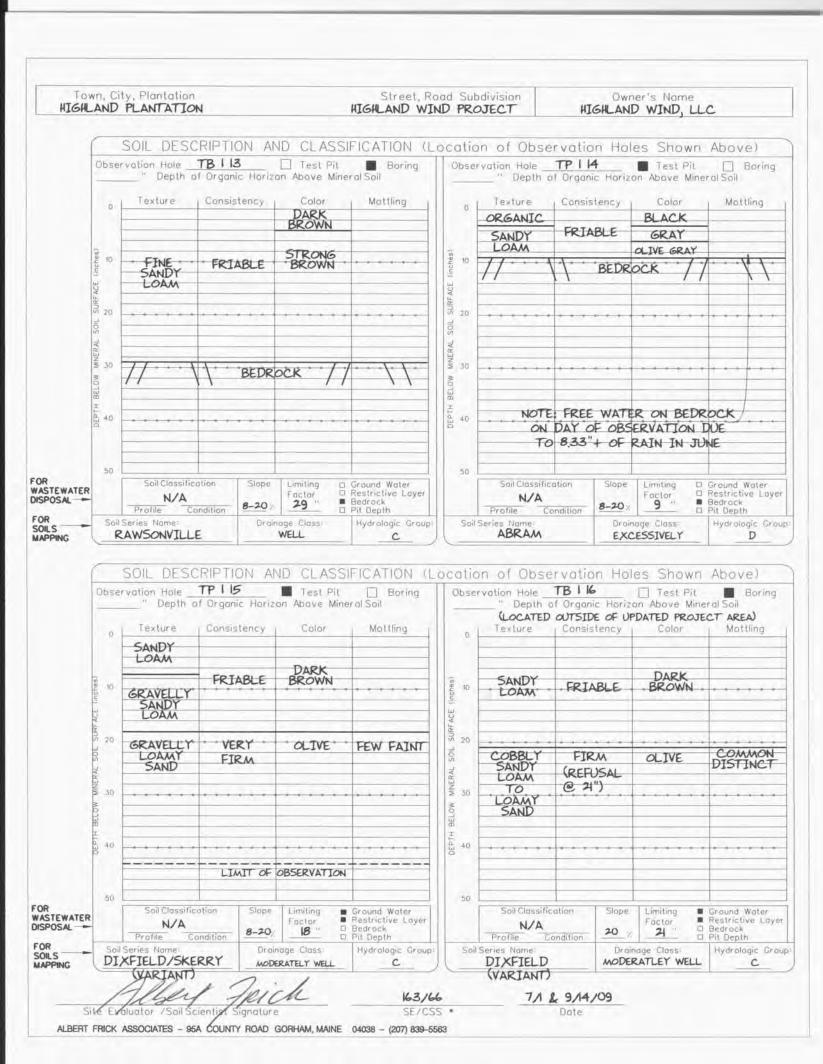


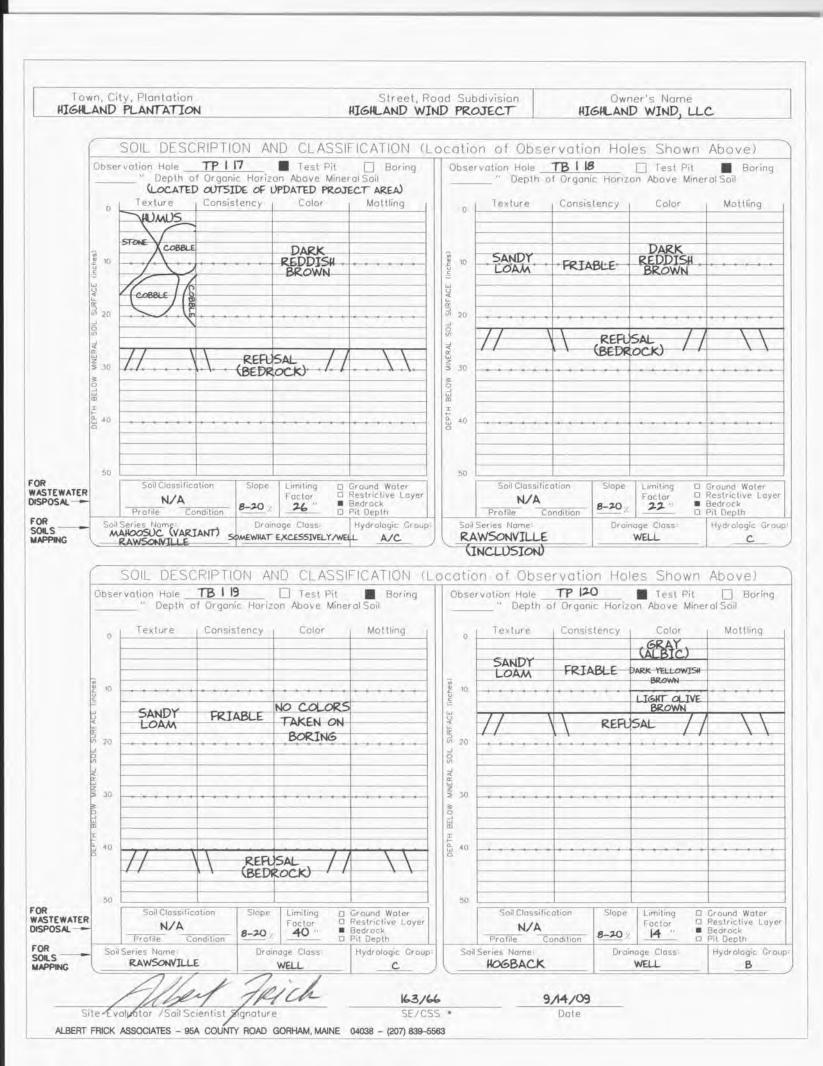
URITAM, MAINE 04038 - (207) 839-3303

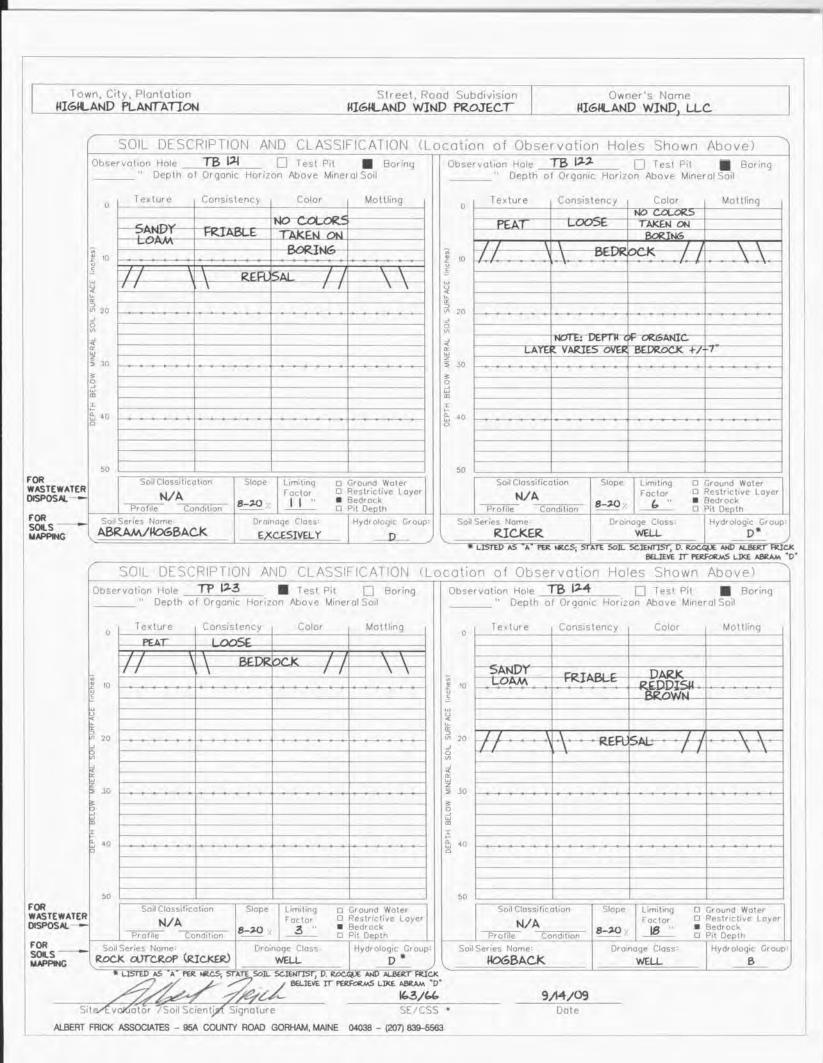


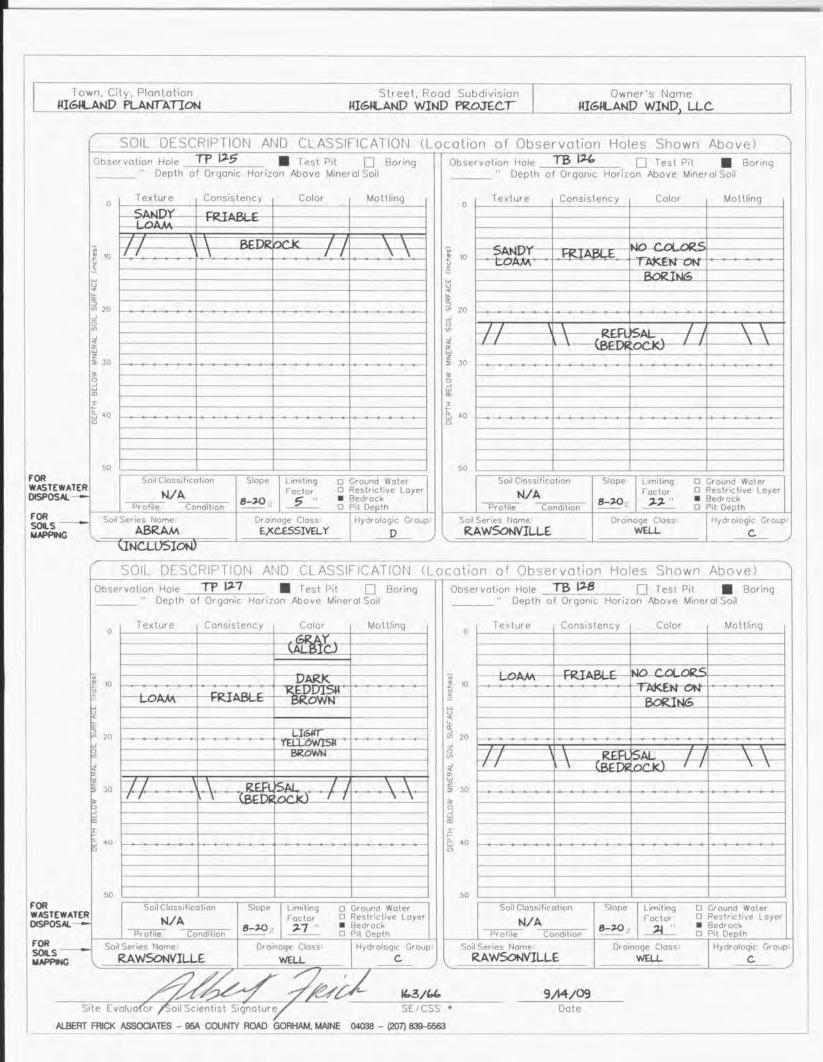


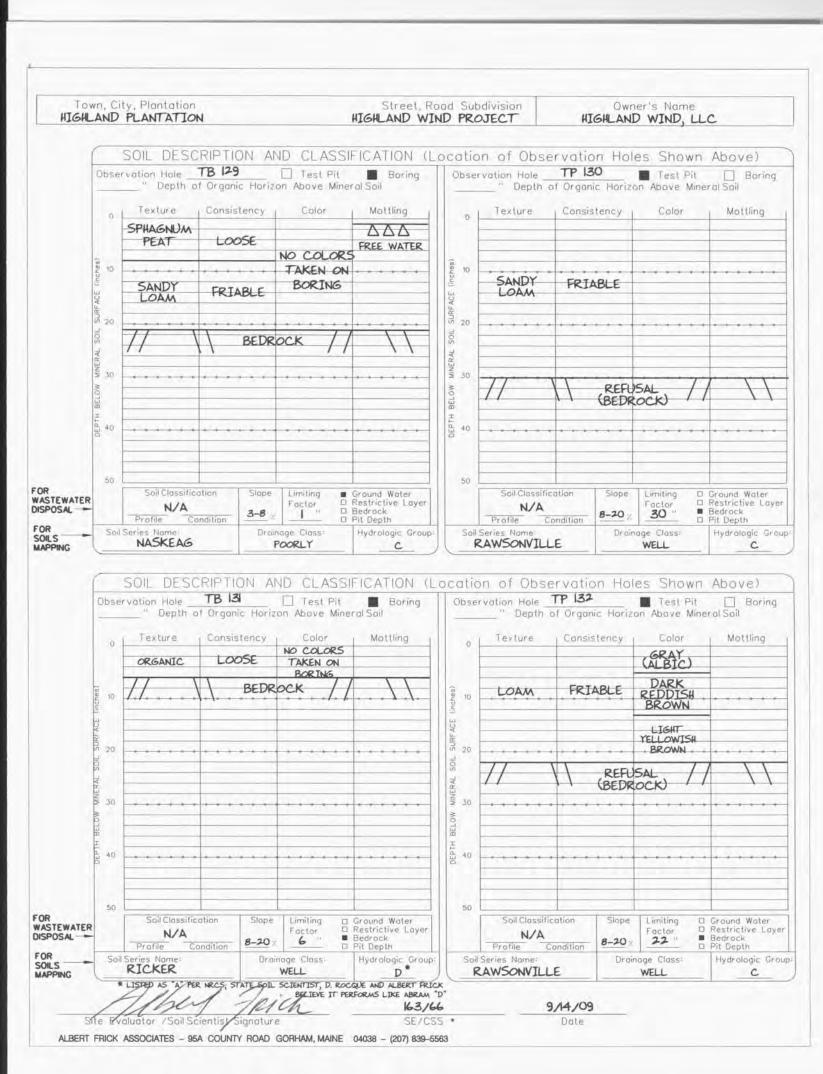


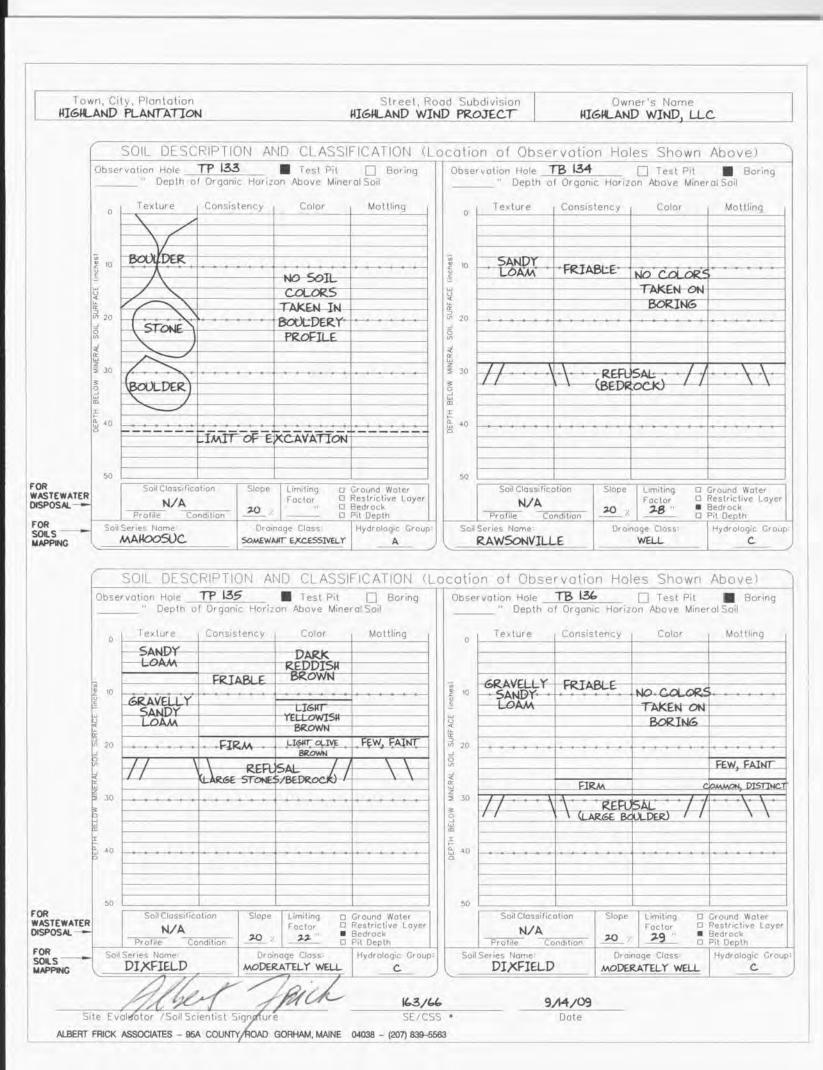












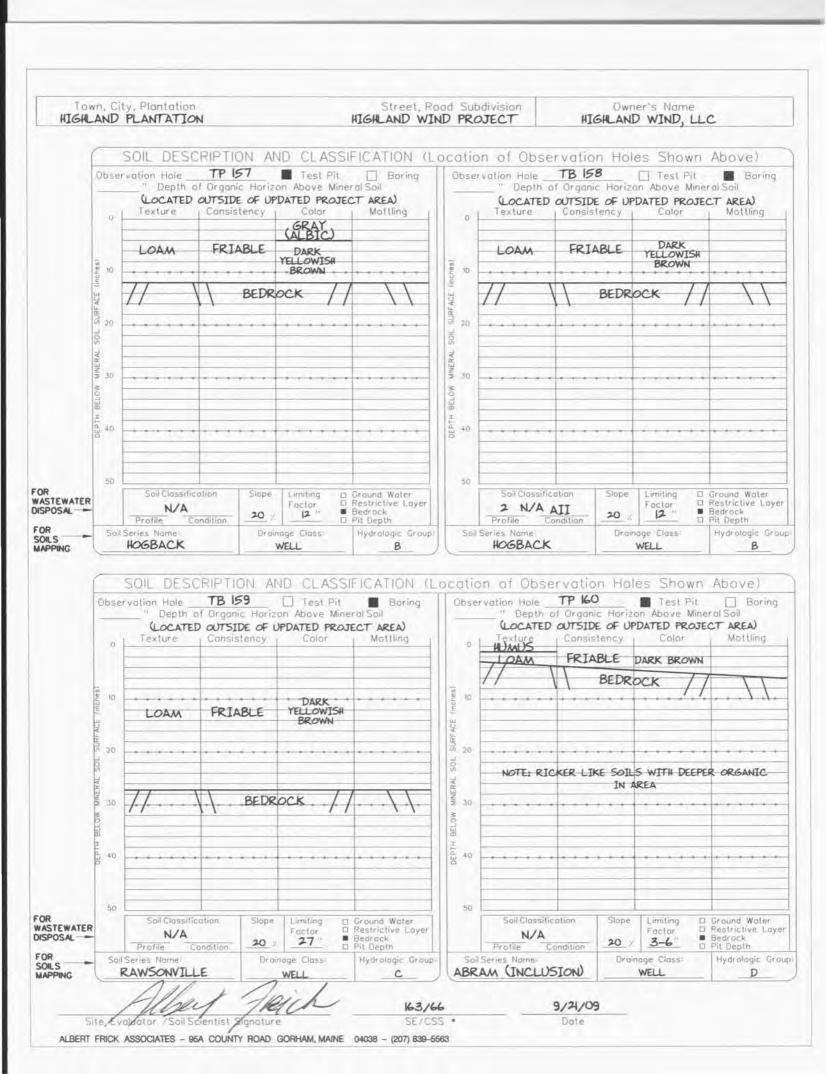
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C		SOIL DESC	RIPTION	AN	D CLASSI	FICATION (L	ocatio	n of Obse	rvatio	n Hol	es Show	n A	bove)
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		Texture	Consisten		Color	Mottling		Texture	Consis		Color		Mottling
	0				DARK		0					-	
15	-	SANDY	FRIABL	E	REDDISH BROWN		(5	SANDY	FRI	ABLE	DARK		
line	10		* * * * *		LIGHT OLIVE BROWN		0 (inche	*****		+ + + +	• • • • •	* *	+ + + +
SDIL SURFACE	-	GRAVELLY SANDY LOAM	. FIRM		. OLIVE	FEW FAINT	Soli SURFACE (inches)	COBBLY GRAVELLY. LOAMY SAND	FIR	M	LIGHT OLIVE BROWN	F	FEW FAJ
MINERAL	30						WINERAL 30						
BELOW							BELOW 1						COMMO
DEPTH B	10						8 H1d30					-	DISTINC
	-	GRAVELLY					5						
2	50	Soil Classifice		OF E	Factor D	Ground Water Restrictive Laver	50	Soil Clossific	otion	Slope	Limiting Factor	D Re	ound Water
	- 11	N/A Profile Co Series Name	indition -	-20 %	15 0	Bedrock Pit Depth		Profile Go	ondition	8-20	15 "	D Be D Pit	drock Depth
1		DIXFIELD		MODE	ATELY WELL	Hydrologic Group	SKER	Series Nome: 2Y (INCLUSION/VA		SOMEN	WHAT POORL	TO	C
-	oser	SOIL DESC vation Hole″ Depth o	TP 139 f Organic	MODES AN Horizo	RATELY WELL	FICATION (L	ocatio	on of Observation Hole	rvatio TP J	on Hal	TELY WELL WHAT POORL es Show Test Pi on Abave M	r r t	Lbove)
-		SOIL DESC vation Hole	TP 139	MODES AN Horizo	ID CLASSI Test Pit on Above Mine	FICATION (L Boring	ocatio	in of Obse vation Hole Depth o Texture	rvatio TP J	somew somew on Hol 40	TELY WELL WHAT POORL es Show Test Pi on Above M Color	r r t	bove)
-	n	SOIL DESC vation Hole Depth o Texture COBBLY	TP 139 f Organic	MODES N AN Horizo	ID CLASSI Test Pit on Above Mine Color	FICATION (L	Ocatio	on of Observation Hole	TP I TP I of Organ	on Hal	TELY WELL WHAT POORL es Show Test Pi on Abave M	r r t	Loove)
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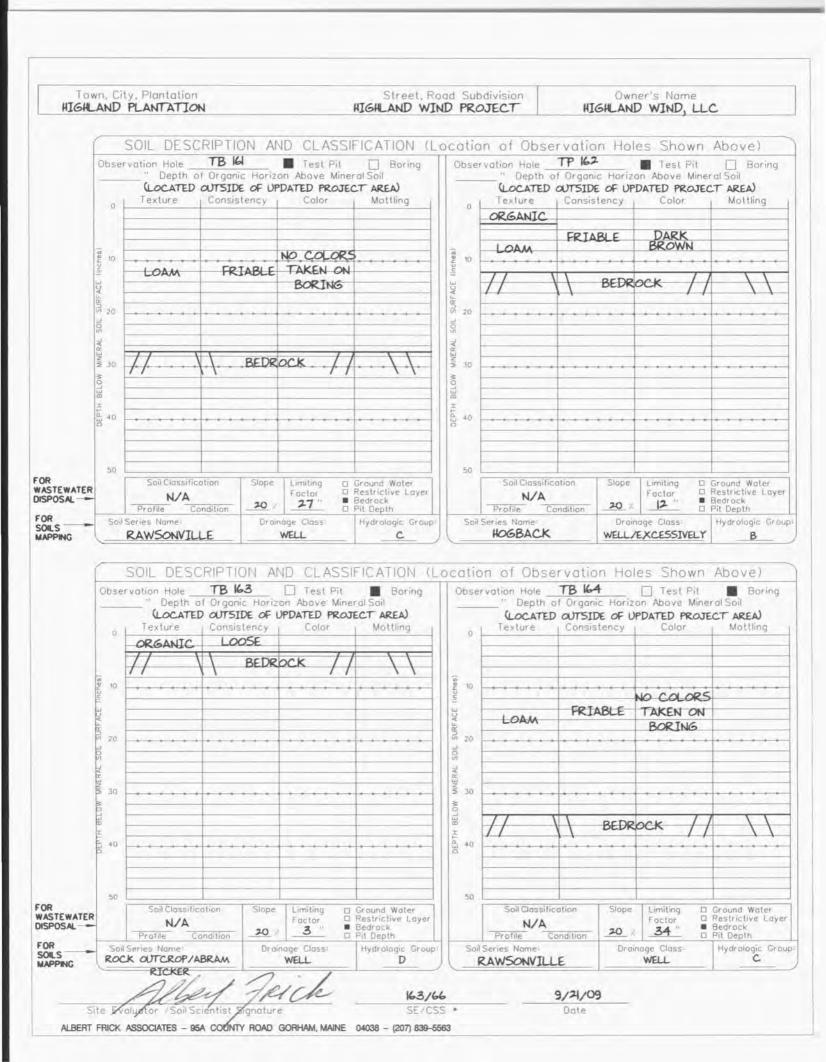
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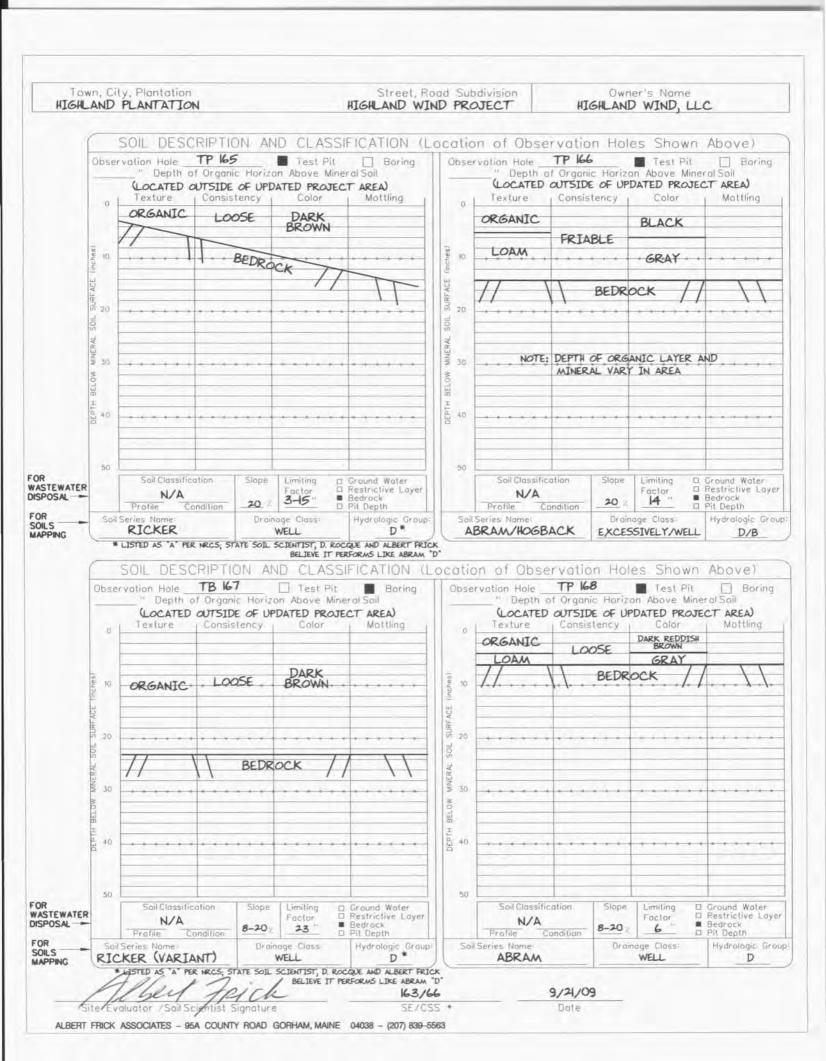
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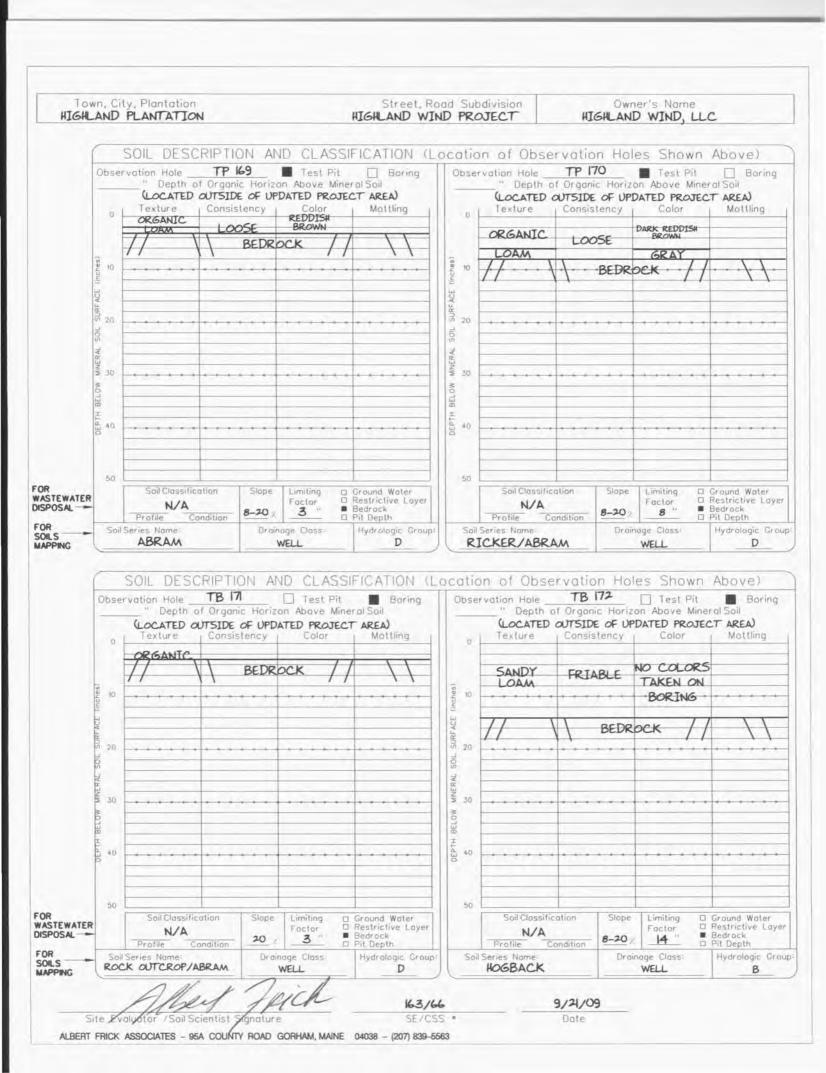
		, Plantation PLANTATIO				Street, R HIGHLAND WI			STA		BAYROOT, I	LC)
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-		N/A Profile Co	million	8-20%	16 "	Restrictive Layer Bedrock Pit Depth		N/A Profile	anditice	8-20	/12"	Restrictive Bedrock Pit Depth
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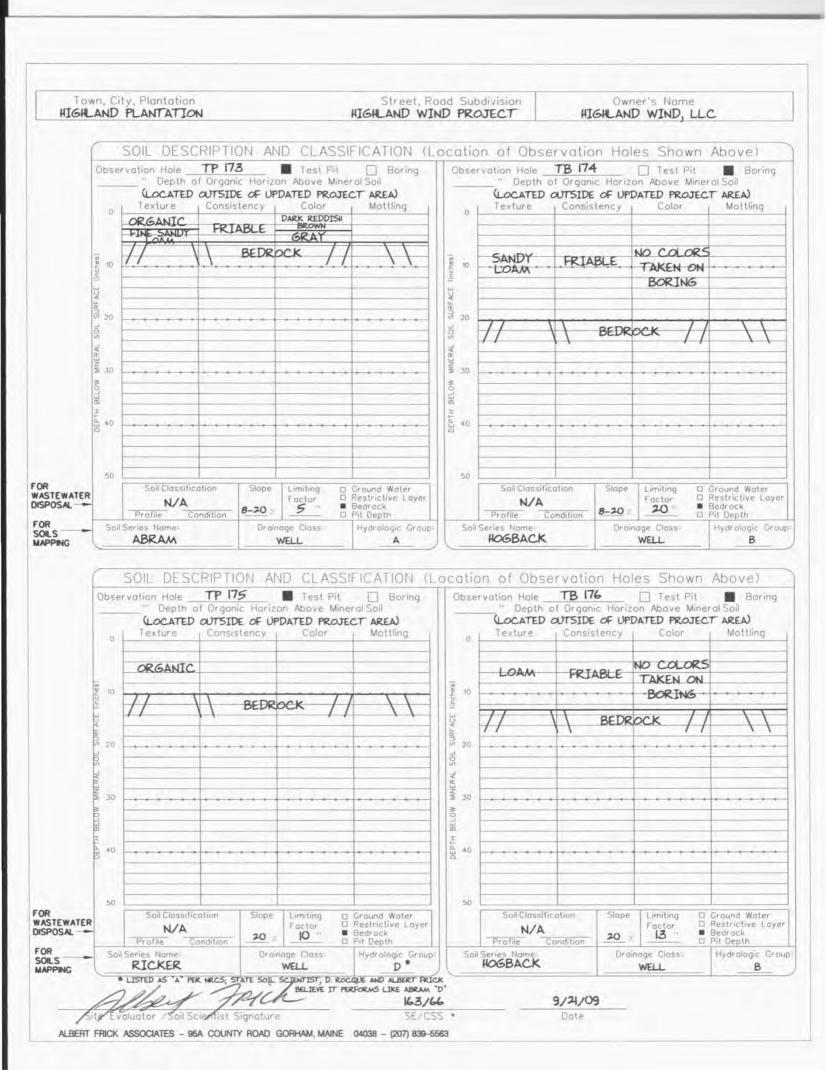
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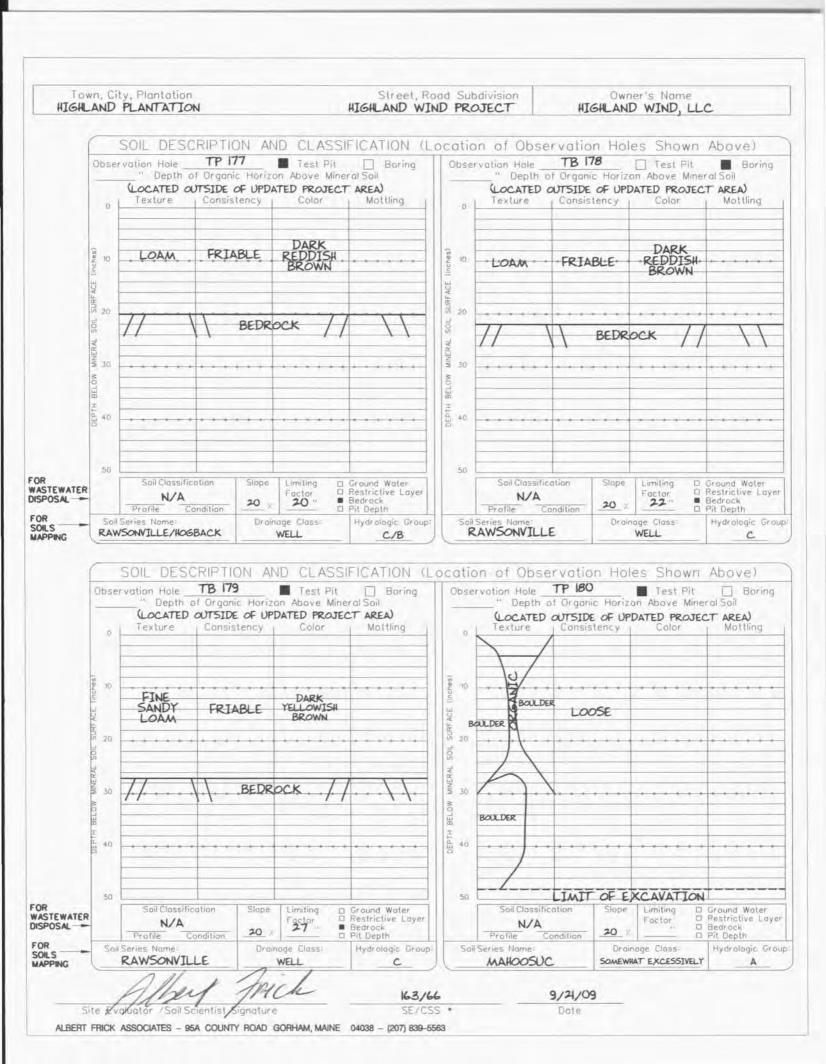


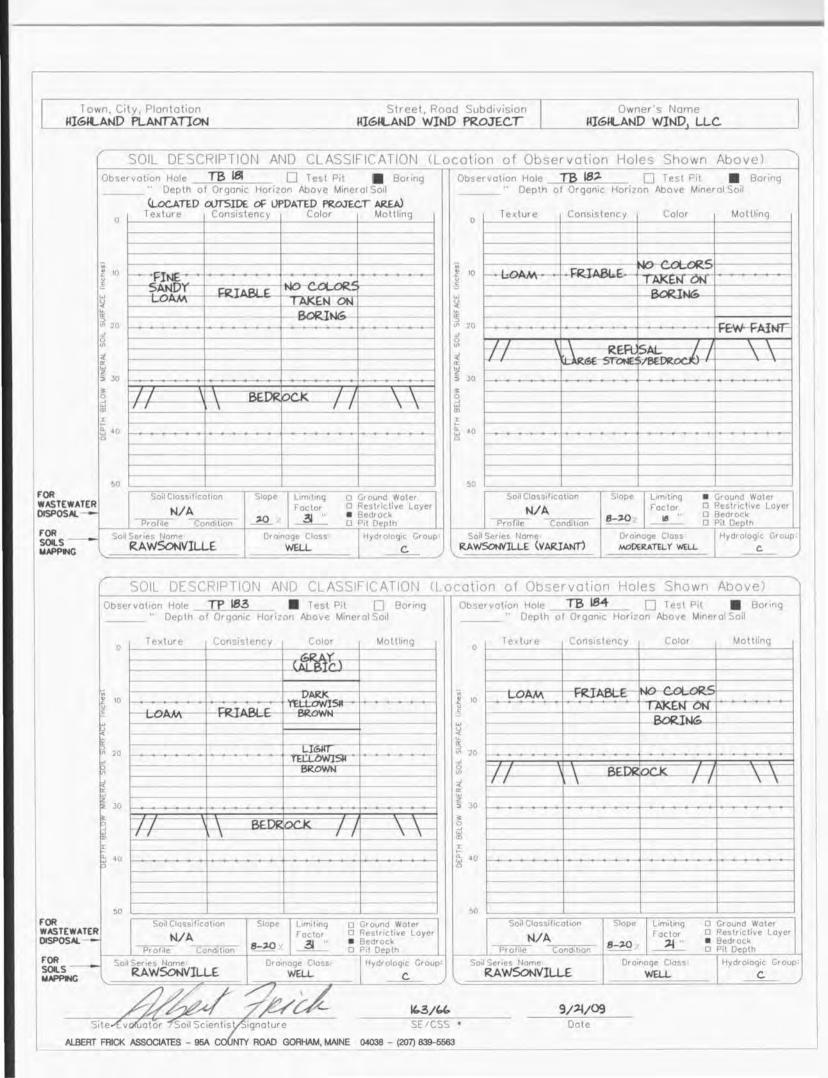


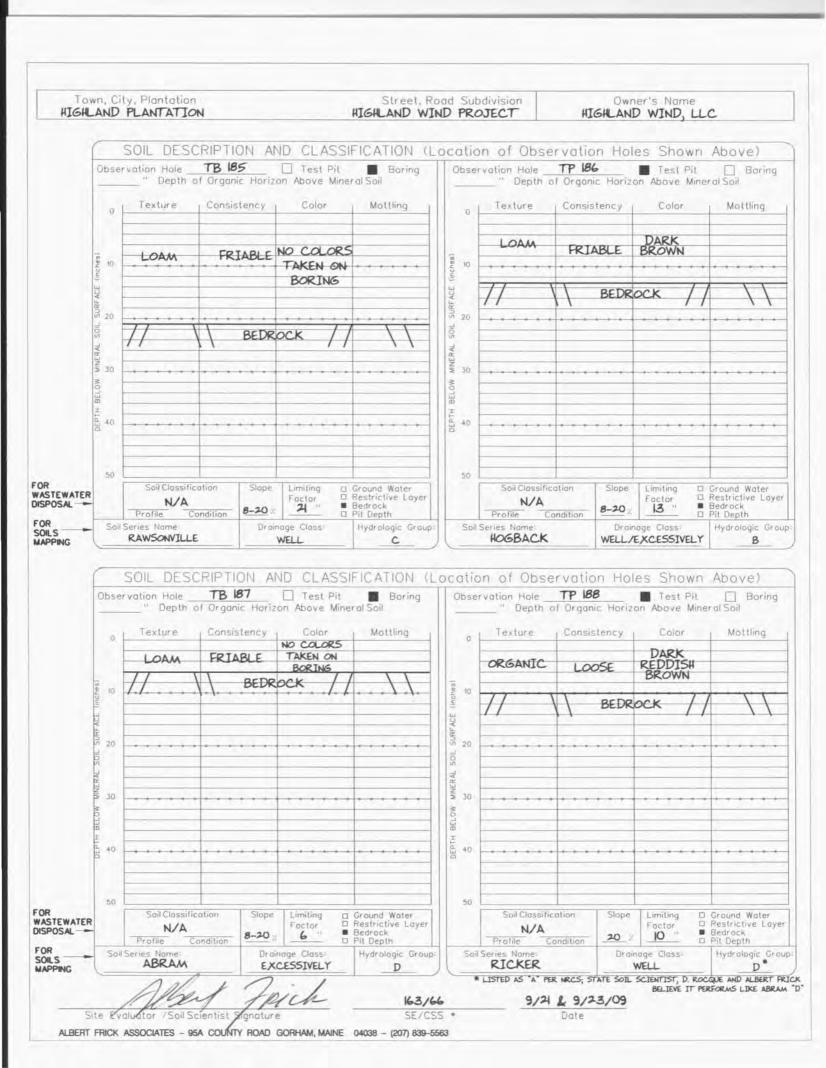


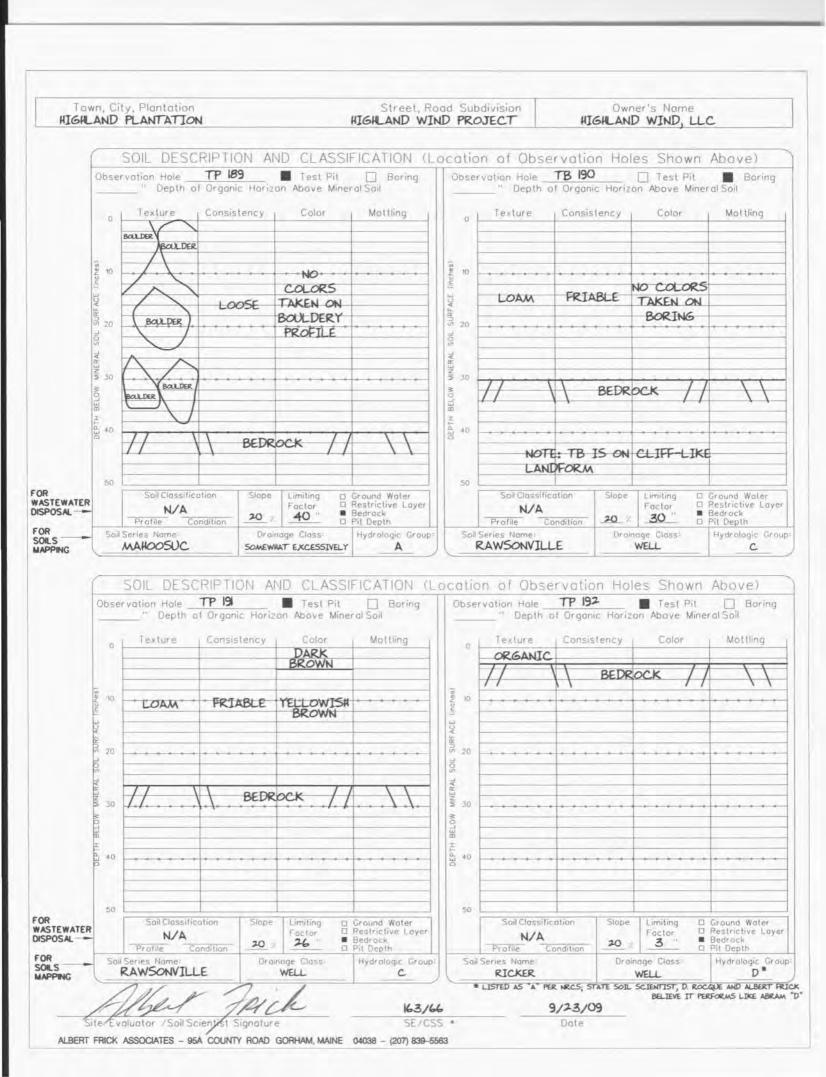




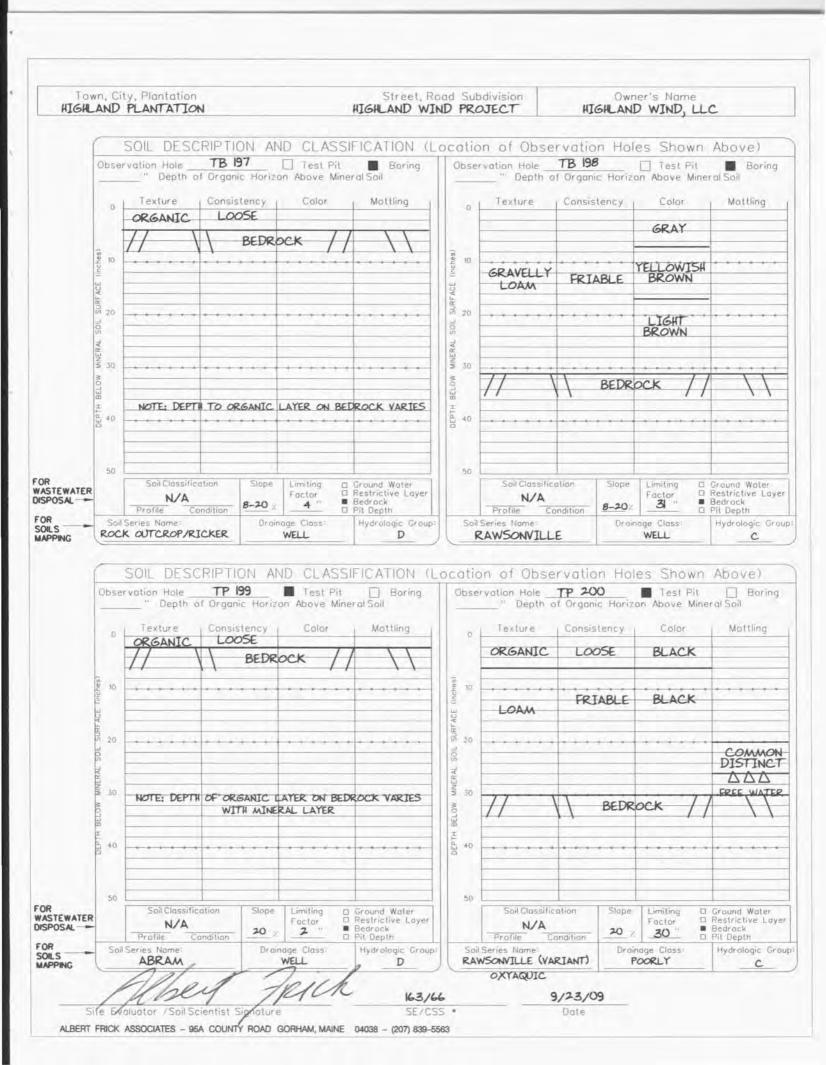


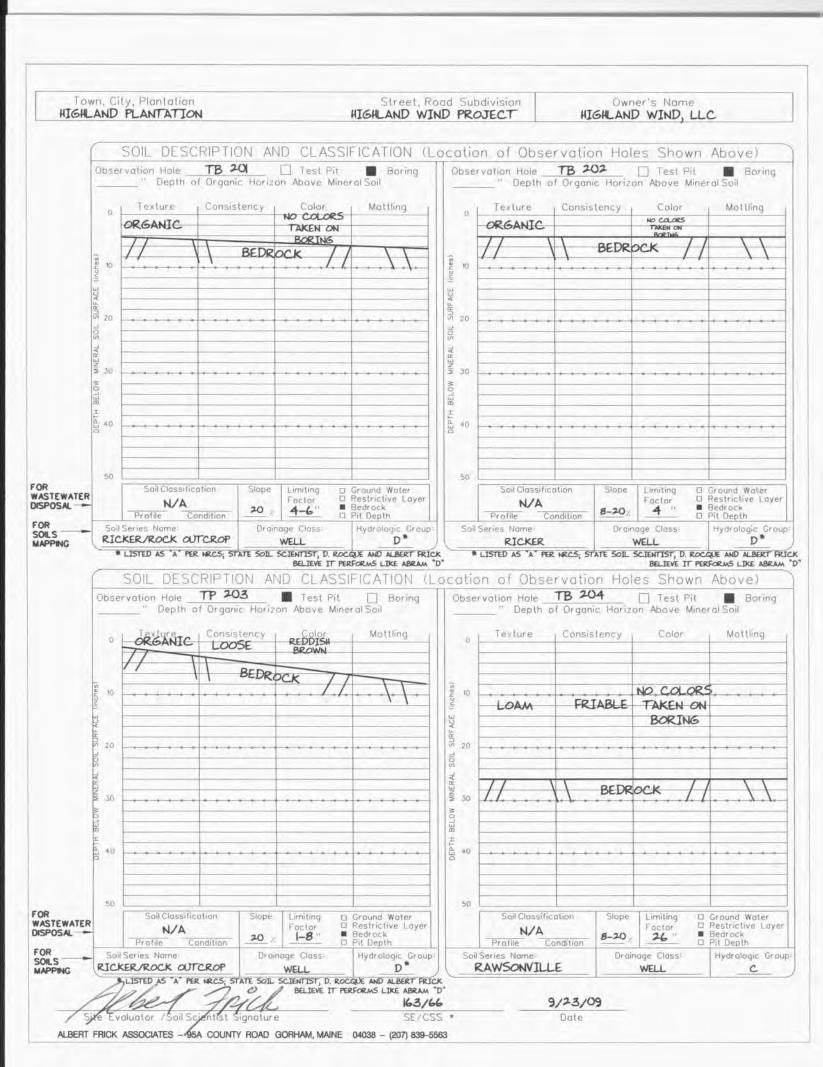


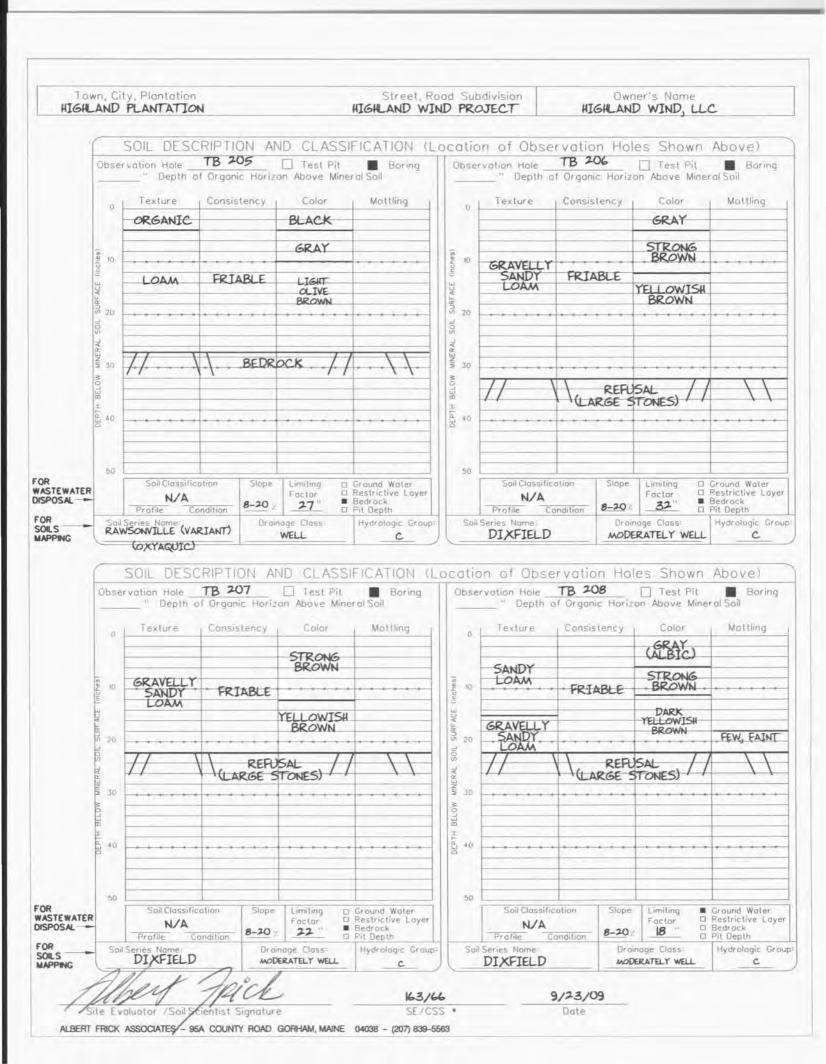


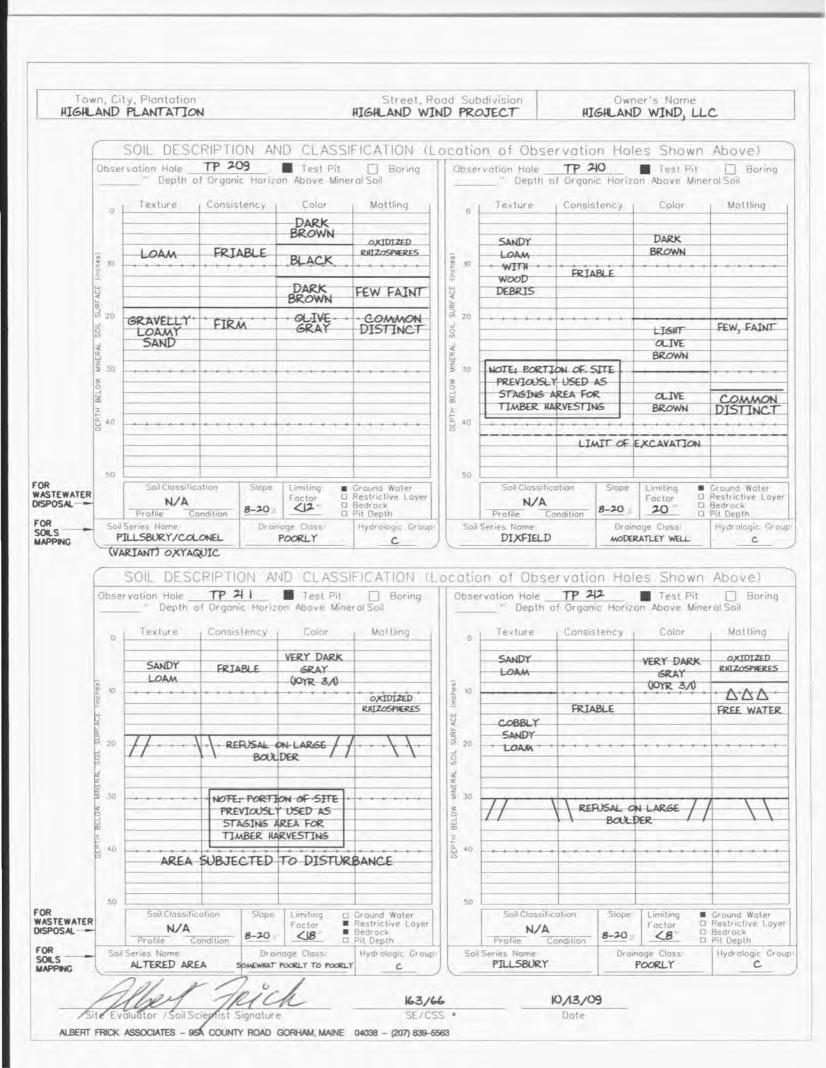


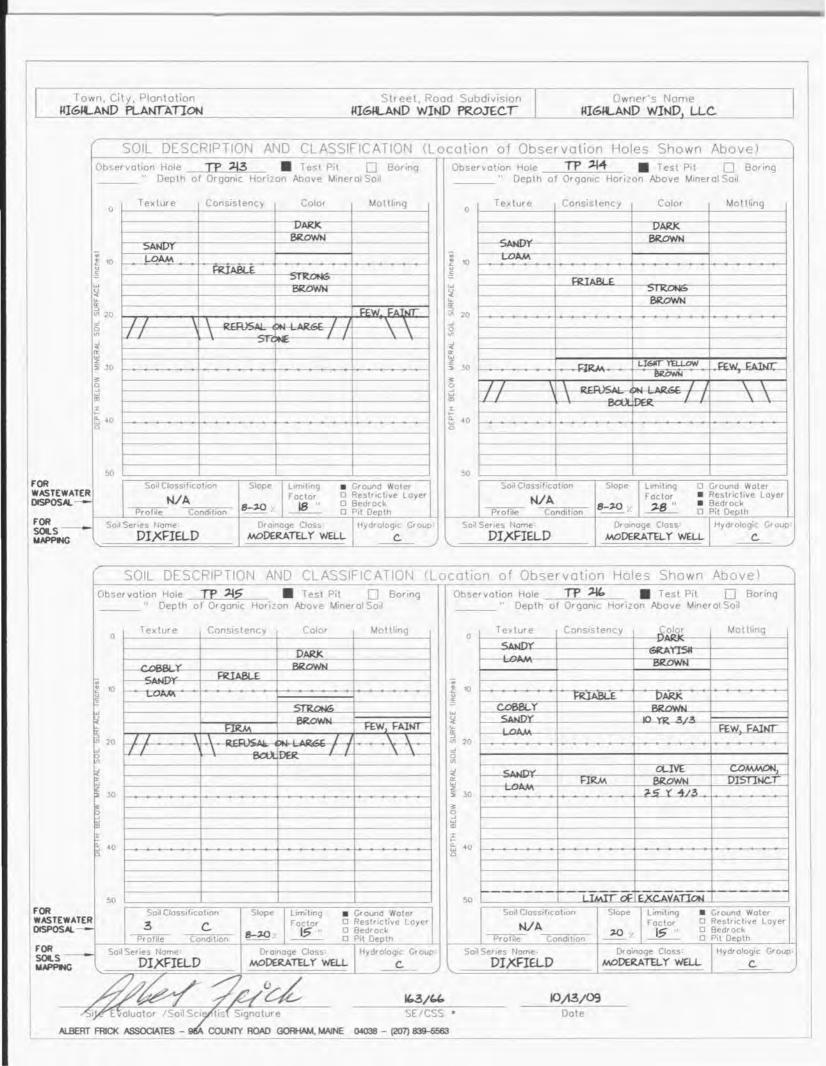
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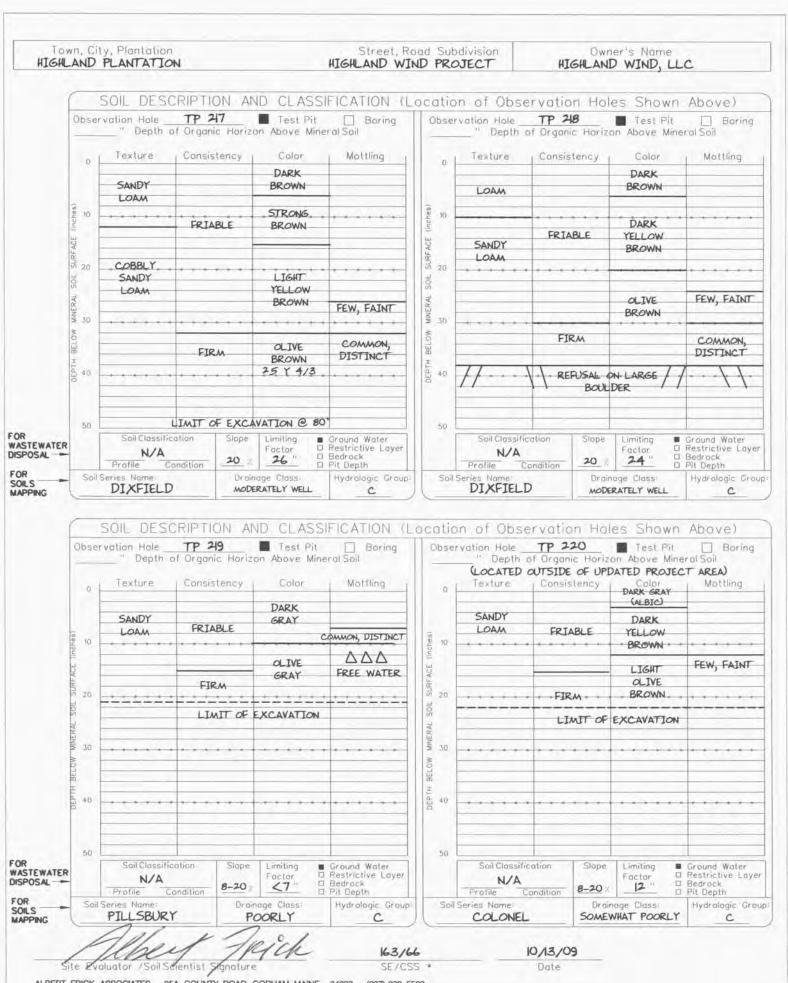












ALBERT FRICK ASSOCIATES - 95A COUNTY ROAD GORHAM, MAINE 04038 - (207) 839-5563

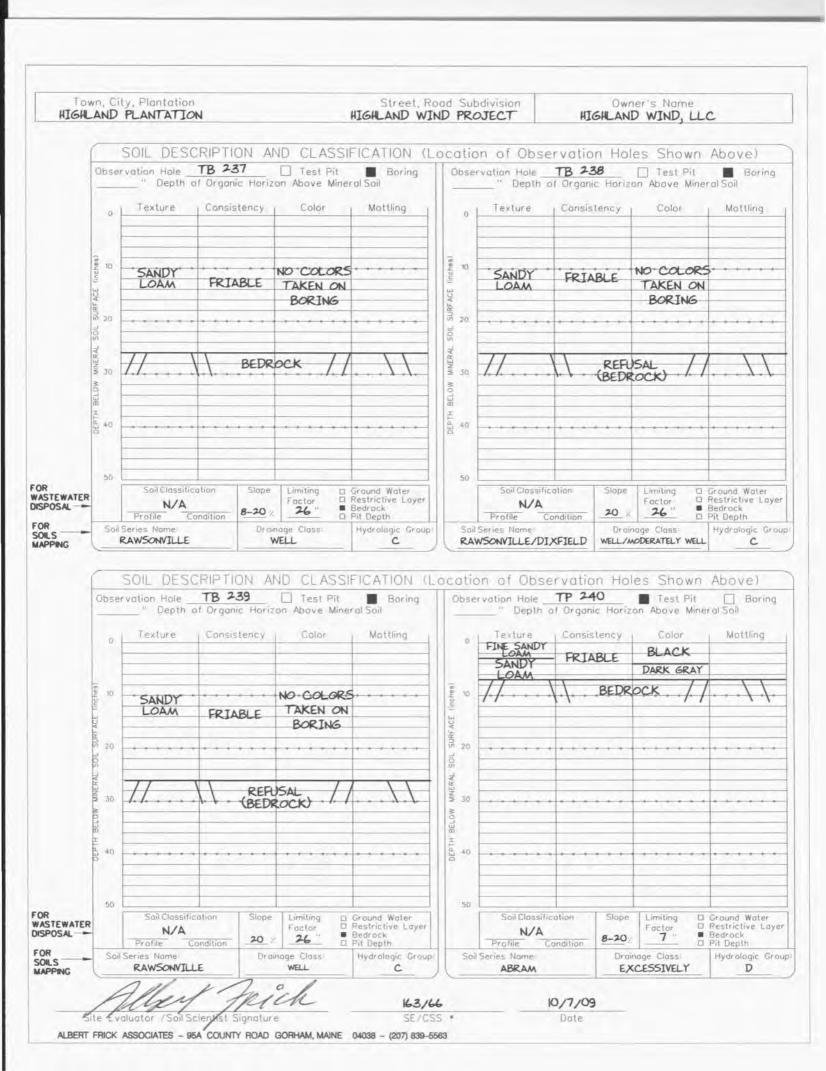
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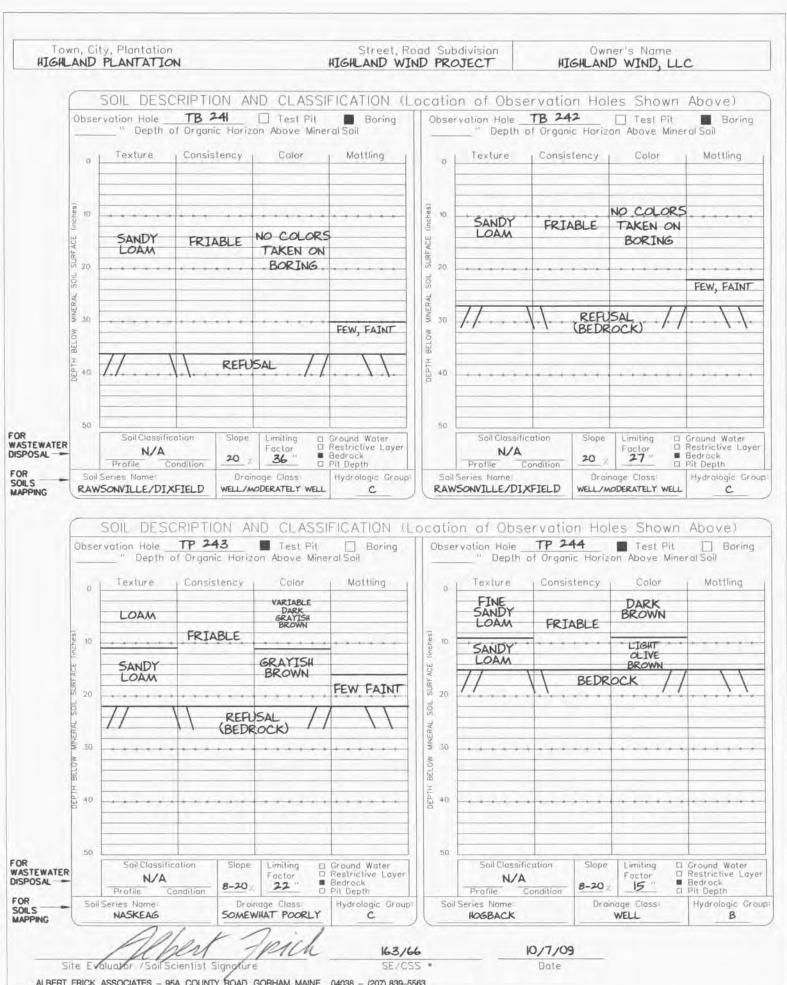
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TH BELOW MARHAL SDL SUBFACE TINCHES	0 10 20 40 50	Soit Classific	TB 227 f Organic Hori: Consistency, FRIABLE FIRM LIMIT OF	Limiting	IFICATION (L Boring eral Soil Mottling FEW, FAINT COMMON, DISTINCT	Obser 0 (Noted to the solution of the solution	n of Obs vation Hole " Depth Texture SANDY LOAM 	er vatio TP 2 of Organi Cansis FRIA FIR LIMIT C	In Ho 28 ic Horiz Itency BLE L 2M F EXC	es Shown Test Pit on Above Mine Color DARK BROWN IO YR 3/3 ISHT OLIVE BROW OLIVE AVATION	Above) Bor eral Sail Mottline

ALBERT FRICK ASSOCIATES - 95A COUNTY ROAD GORHAM, MAINE 04038 - (207) 839-5

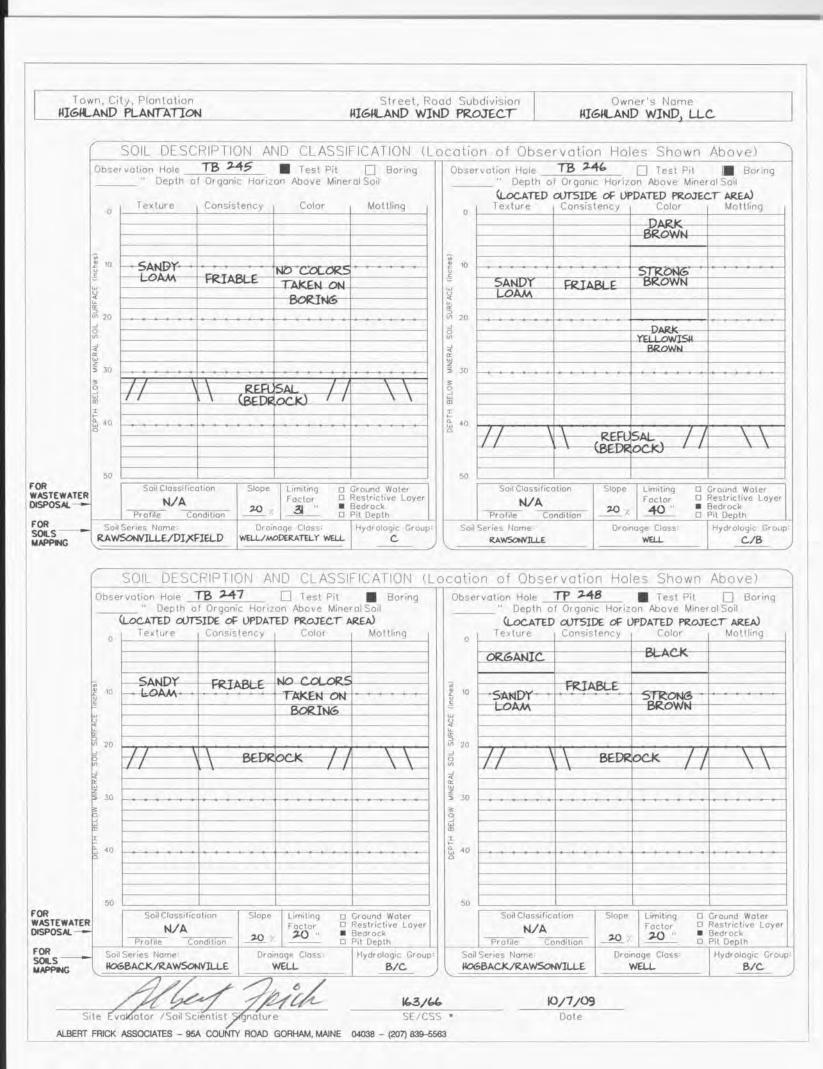
LAND	PLANTATIC			-	Street, R			HI		D WIND, LL	c
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	rvation Hale	TP 22	10.1		Boring	11	vation Hole				D Be
	" Depth	al Organic	Horiza	on Above Mine	ral Soil	Coact				on Above Mine	ralSoil
	LOCATED C	Consiste		Color	Mottling		Texture	Consis	tency	Color	Mottli
0	10xtbrc	Consiste	circy	OLIVE	mortning	0		COUSIS	rency	VERY DARK	MOLTI
	LOAM			BROWN			SANDY			BROWN	
12				25 YR 4/3		()		FREE		10YR 3/2	
(inches)	SANDY			• • • • • • •		(inches)	• • • • • • •	FRIA	BLE .	GRAYISH	FEW F
ACE (LOAM	FRIAB	SLE	OLIVE		ACE G	GRAVELLY	-		BROWN	COM
SURFA 05				BROWN	FEW FAINT	SURFA	SANDY LOAM				DIST
	- FINE		* * *	25 YR 5/4.	* * * * * *		+ + + + + +	+ + + +	+ + + +	GRAYISH	+ + + + +
T SOIL	SAND				COMMON,	E SOIL		FIR	M	BROWN	
MINERAL		-			DISTINCT	WINERAL 30				10YR 4/2	
MOTSB	GRAVEL					BELOW		-			-
E						E					
40.	+ + + + + + + + + + + + + + + + + + + +		+ + +			HL 40					
								-			-
50	Soil Classifi	cotion	Slope	Limiting 🔳	Ground Water	50	Soil Classific	atlan	Slope	Limiting	Ground We
2	N/A		0-3	Factor D	Restrictive Layer Bedrock		N/A	D LIGHT		Factor D	Restrictive Bedrock
	Series Nome NISH (VARI)		Drain		Pit Depth Hydrologic Group C		Profile Co Series Nome ONEL (VARI	ANT)		AI2"	Pit Depth Hydrologi
	NISH (VARI)	ANT)	Drain SOME	age Class: WHAT POORLY	Pit Depth Hydrolagic Graup C	COL	Series Name: ONEL (VARI)	ANT)	Drain SOMEV TC	NHAT POORLY	Pit Depth Hydrolog
COR	NISH (VARI)	CRIPTIO	Drain Some	ND CLASS	Pit Depth Hydrolagic Graup 	Locatio	n of Obse	rvatio	Drain SOMEV TC	what Poorly Poorly es Shown	Above
Obse	SOIL DES	CRIPTIO	Drain Some	ND CLASS	Pit Depth Hydrolagic Graup C FICATION (Locatio	n of Obse	rvatio	Drain SOMEV TC n Hol	es Shown	Above
Obse	SOIL DES	CRIPTIO	Drain Some	ND CLASS	Pit Depth Hydrolagic Graup C FICATION (Locatio	n of Obse votion Hole	rvatio	Drain SOMEV TC n Hol 32 c Horiz	what Poorly Poorly es Shown	Pit Depth Hydrolog Above
Obse	SOIL DES	CRIPTIO	Droir SOME	ND CLASSI Test Pit on Above Mine Color	Pit Depth Hydrolagic Graup C FICATION (I Boring ral Soil Mottling	Locatio	n of Obse votion Hole	rvatio TP 2: f Organi	Drain SOMEV TC n Hol 32 c Horiz	es Shown Test Pit on Above Mine Color	Above
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TH BELOW WINERAL SOIL SURFACE (methes)	NISH (VARI) SOIL DES "Depth Texture SANDY LOAM COBBLY SANDY	CRIPTIO TP 23 of Organic Consiste	Drain SOME IN Af Horiz ency	Dage Class: WHAT POORLY WD CLASSI ■ Test Pit on Above Mine Color TERY DARK BROWN UOYR 3/0 LIGHT GRAY UOYR 7/0 DARK REDDISH BROWN SY 3/4 OLIVE BROWN 25 Y 4/3	Pit Depth Hydrolagic Graup C FICATION (I Boring ral Soil Mottling	Obser	n of Obse votion Hole (Located SanDY	ANT) r v atic TP 2: f Organi Consis FRI	Brain SOMEV TC n Hol 32 c Horiz tency BLE	MAT POORLY POORLY es Shown Test Pit on Above Mine DATED PROJE Color DARK BROWN DARK YELLOW	Above
TH BELOW WINERAL SOIL SURFACE (inclusion) 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	NISH (VARI) SOIL DES "Depth Texture SANDY LOAM COBBLY SANDY	CRIPTIO TP 23 of Organic Consiste	Drain SOME IN Af Horiz ency	VD CLASSI WHAT POORLY VD CLASSI Test Pit on Above Mine Color ERY DARK BROWN UOYR 3/0 LIGHT GRAY UOYR 7/0 DARK REDDISH BROWN SY 3/4 OLIVE BROWN	Pit Depth Hydrolagic Graup C FICATION (I Boring ral Soil Mottling	COLO Locatio Obser 0 10 10 10 10 10 10 10 10 10	n of Obse votion Hole (Located SanDY	ANT) r v atic TP 2: f Organi Consis FRI	Brain SOMEV TC n Hol 32 c Horiz tency BLE	MAT POORLY POORLY es Shown Test Pit on Above Mine DATED PROJE Color DARK BROWN DARK YELLOW	Pit Depth Hydrologi Above Baral Soil CT AREA Motth
OPPHH BELOW WINEXAL SOIL SURFACE finches)	NISH (VARI) SOIL DES "Depth Texture SANDY LOAM COBBLY SANDY	CRIPTIO TP 23 of Organic Consiste	Drain SOME IN Af Horiz ency	Dage Class: WHAT POORLY WD CLASSI ■ Test Pit on Above Mine Color TERY DARK BROWN UOYR 3/0 LIGHT GRAY UOYR 7/0 DARK REDDISH BROWN SY 3/4 OLIVE BROWN 25 Y 4/3	Pit Depth Hydrolagic Graup C FICATION (I Boring ral Soil Mottling	Obser 0 10 10 10 10 10 10 10 10 10 10 10 10 1	n of Obse votion Hole (Located SanDY	ANT) r v atic TP 2: f Organi Consis FRI	Brain SOMEV TC n Hol 32 c Horiz tency BLE	MAT POORLY POORLY es Shown Test Pit on Above Mine DATED PROJE Color DARK BROWN DARK YELLOW	Pit Depth Hydrologi Above Baral Soil CT AREA Motth
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OPPHH BELOW WINEXAL SOIL SURFACE finches)	NISH (VARI)	CRIPTIO TP 23 of Organic Consiste ERIAB	Droir SOME IN Al Horiz ency	Limiting Limiting Limiting Limiting Limiting Limiting Limiting Limiting Limiting Limiting Limiting Limiting Limiting	Pit Depth Hydrolagic Group C FICATION (I Boring ral Soil Mottling	Obser 0 10 10 10 10 10 10 10 10 10 10 10 10 1	Soil Clossific	ANT) r v atic TP 2: f Organi Consis FRI FRI FIR FIR ation	Brain SOMEV TC In Hol 32 c Horiz tency BLE	Limiting	Pit Depth Hydrologi Above Baral Soil CT AREA Motth DISTI
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Obse 0 00 00 00 00 00 00 00 00 00 00 00 00 0	NISH (VARI)	CRIPTIO TP 23 of Organic Consists FIRM FIRM	Droir SOME IN Al Horiz ency LE N Slope 8-20 x	Limiting EXCAVATION	Pit Depth Hydrolagic Group C FICATION (I Boring iral Soil Mottling	Obser 0 10 10 10 10 10 10 10 10 10	Soil Clossific N/A Profile	ANT) r v atic TP 2: f Organi Consis FRI FRI FIR FIR ation	Brain SOMEV TC IN HOI 32 C Horiz C Hor	Limiting Factor IB B Limiting B Limiting B Limiting B B Color DARK B B Color DARK B B Color DARK B CO CO CO CO CO CO CO CO CO CO CO CO CO	Pit Depth Hydrologi Above Baral Soil CT AREA Motth DISTI

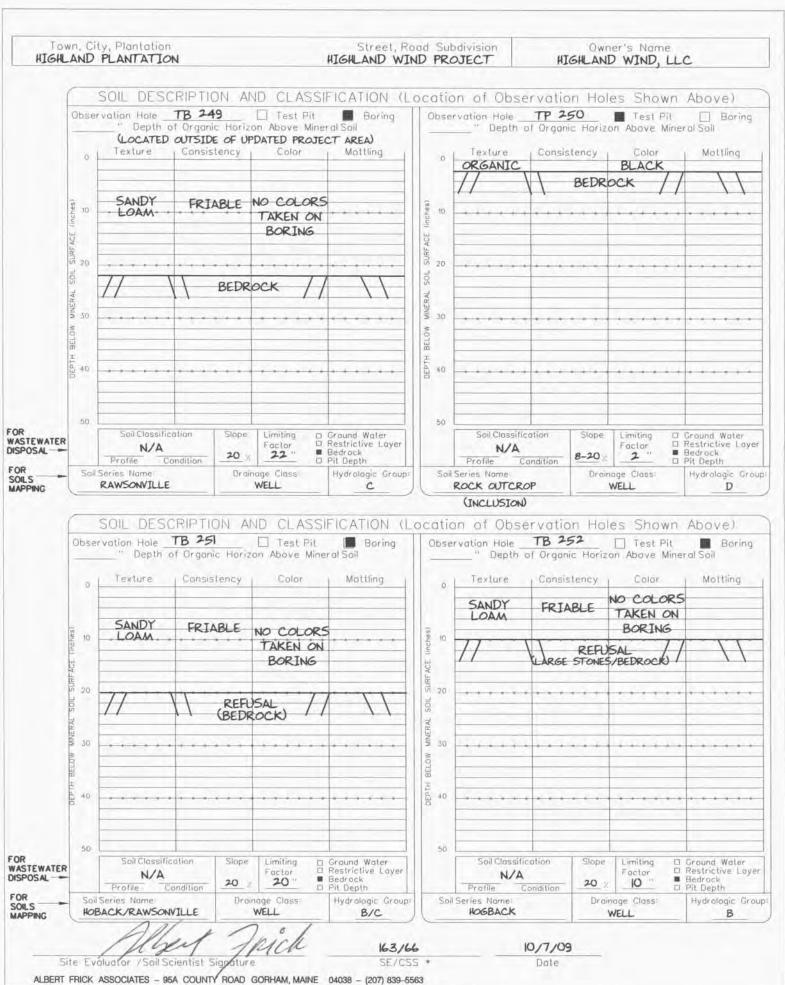
HLAND	ty, Plantation PLANTATIO	4		Street, R			HI		ner's Name D WIND, LL	с
	rvation Hole " Depth o	TP 233 I Organic Hori	ND CLASSI Test Pit con Above Mine DATED PROJEC Color DARK BROWN DARK YELLOWISH BROWN		Observ 0	Vation Hole "Depth of Texture ORGANIC SANDY LOAM GRAVELLY COBBLY SANDY	TP 2: of Organi Consis	34 c Horiz	es Shown Test Pit on Above Mine Color BLACK GRAY IOYRG/ DARK GRAYISH BROWN IOYR3/4	Bor
DEPTH BELOW MINERAL SOIL		FIRM			DEPTH BELOW WINERAL SOIL	· LOAM · ·	FIR		• • • • • • •	
50 ER Soil	Soil Classifice N/A Profile Co Series Name:	ndition 8-20	Foctor	Ground Water Restrictive Loyer Bedrock Pit Depth	50	Soil Classific N/A Profile C	otion	Slope	Factor	Ground Wate Restrictive I Bedrock Pit Depth
DTX	ETEL D (VAP	TANT) MOD	inage Class	Hydrologic Group	Soil S	ARI OW		Drain	nage Class:	
DIX	SOIL DESC	RIPTION A	ERATELY WELL	IFICATION (L Boring	ocation Obser	MARLOW n of Obse vation Hole	TP 2	on Hol 36	WELL	Above)
DIX	SOIL DESC	RIPTION A	ND CLASS	IFICATION (L Boring	ocation Obser	MARLOW n of Obse vation Hole	TP 2	on Hol 36 ic Horiz	WELL les Shown Test Pit	Above)
0 (10 (10 (10) (10)	SOIL DESC rvation Hole " Depth o	IANT) MOD RIPTION A TB 235 I Organic Hori	ND CLASS	IFICATION (L Boring eral Soil Mattling	Ocation Obser	MARLOW	TP 2 of Organ	on Hol 36 ic Horiz itency	WELL les Shown Test Pit on Above Mine	Above)
Obse 0 20 20 20	SOIL DESC rvation Hole " Depth o Texture SANDY.	IANT) MOD RIPTION A TB 235 f Organic Hori Consistency	ND CLASS Test Pit con Above Mine Color NO COLORS TAKEN ON	IFICATION (L Boring eral Soil Mattling	Observer 10 10 10 10 10 10 10 10 10 10 10 10 10	MARLOW n of Obse vation Hole " Depth o Texture SANDY	TP 2 of Organ Consis	on Hol 36 ic Horiz itency	WELL les Shown Test Pit on Above Mine Color	Above)
Obse 0 10 30 30	SOIL DESC rvation Hole " Depth o Texture SANDY.	IANT) MOD RIPTION A TB 235 f Organic Hori Consistency	ND CLASS	IFICATION (L Boring eral Soil Mattling	OCATION Observer 0 10 10 10 10 10 10 10 10 10 10 10 10 10	MARLOW n of Obse vation Hole " Depth o Texture SANDY	TP 2 of Organ Consis	on Hol 36 ic Horiz itency	WELL Les Shown Test Pit on Above Mine Color STRONG BROWN LIGHT YELLOWISH BROWN	Above)
Obse 0 20 20 20	SOIL DESC rvation Hole " Depth o Texture SANDY.	IANT) MOD RIPTION A TB 235 f Organic Hori Consistency	ND CLASS	IFICATION (L Boring eral Soil Mattling	Obser	MARLOW n of Obse vation Hole " Depth o Texture SANDY	TP 2 of Organ Consis	on Hol 36 ic Horiz itency	WELL Les Shown Test Pit on Above Mine Color STRONG BROWN LIGHT YELLOWISH BROWN	Above)
	SOIL DESC rvation Hole " Depth o Texture SANDY. LOAM	IANT) MOD RIPTION A TB 235 f Organic Hari Consistency FRIABLE BEDR A BEDR A BEDR A BEDR A BEDR A BEDR A BEDR A BEDR A BEDR A BEDR A BEDR A BEDR A BEDR A BEDR A BEDR A BEDR	Imiting	IFICATION (L Boring eral Soil Mottling	OCATION Observing 0 10 10 10 10 10 10 10 10 10 10 10 10 1	MARLOW n of Observation Hole " Depth of Texture SANDY LOAM // Soil Clossifie N/A	TP 2 of Organ Cansis FRIA	an Hol 36 ic Horiz itency BEE BEDR	WELL les Shown Test Pit on Above Mine Color STRONG BROWN LIGHT YELLOWISH BROWN OCK	Above)

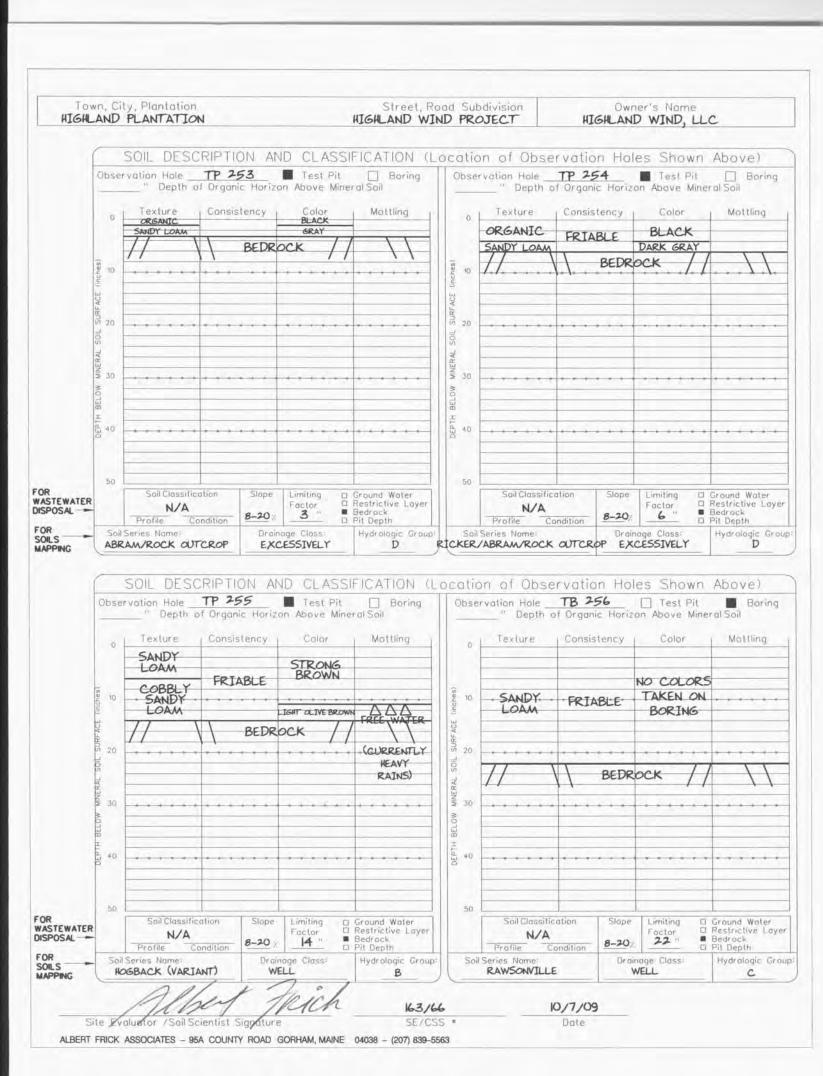


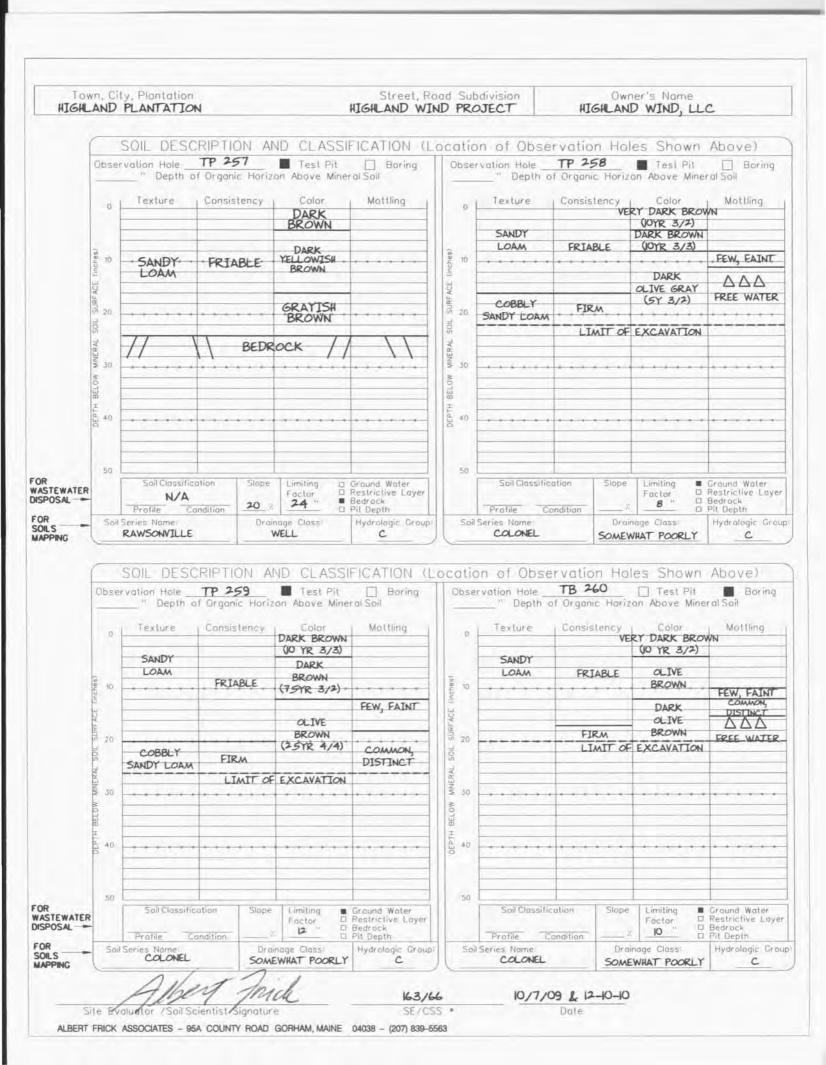


ALBERT FRICK ASSOCIATES - 95A COUNTY ROAD GORHAM, MAINE 04038 - (207) 839-5563









Dotailed Do	corintion of Sub	curface Conditi	ions at Project Site	~

Hoject Name: Applicant Name: Highland Wind Project Highland W				Highland Wind LLC	;			Project Location (mu	Highland Plantation,	ME
		SOIL DESCRIPTION AND	CLASSIFICATION					SOIL DESCRIPTION AN	D CLASSIFICATION	
	Exploration Symbol:		Test Pit	Boring		Exploration Symbol	l:		Test Pit	Boring
	Texture	Depth of Organic Horizon Above Consistency	Mineral Soil Color	Mottling		• Texture		Depth of Organic Horizon Above Consistency	Mineral Soil Color	Mottling
					_	1				
	8				_	3				
4					-	5				
(Se	8				(Sé	6				
(Inches)	5				DEPTH BELOW MINERAL SOIL SURFACE (Inches)	8				
ACE (ACE (9				
L II	2				I I	12				
					- SU	14				
					SOI.	18				
IERAL ∞					RAL	20				
MINE					AINE					
					/ MO					
H BELOW					BEL	30				
HLa					HLa					
DE					DE					
40					-	40				
50	•					50				
60	•		L	<u> </u>	-	60				┠─────┤
_	hydric	Slope %	Limiting factor	 ground water 	_	hydric		Slope %	Limiting factor	ground water
0	non-hydric			ground water restrictive layer bedrock	0	non-hydric				 ground water restrictive layer bedrock
C.S.S. L.S.E.	Soil Series / phase name: Soil Classification:		Drainage Class	Hydrologic Group	C.S.S.	Soil Series / phase Soil Classification:	name:		Drainage Class	Hydrologic Group
L.S.E.	1	Profile SOIL DESCRIPTION AND	Drainage Class	Design Class	L.S.E.			Profile SOIL DESCRIPTION AN	Drainage Class	Design Class
	Exploration Symbol:	SOIL DESCRIPTION AND	Test Pit	Boring		Exploration Symbol	l:	SOIL DESCRIPTION AN	Test Pit	Boring
		Depth of Organic Horizon Above						Depth of Organic Horizon Above		
	Texture	Consistency	Color	Mottling	-	Texture		Consistency	Color	Mottling
					-	2				
4						4				
						6				
(Inches)	1				AINERAL SOIL SURFACE (Inches)	7				
<u>Е</u> (h	8				Е (J	9				
FACE					RFAC	10				
SURF					SUF	14				
	8				- SOIL	16				
ERAL 3					SAL S					
I					INEF	24				
M M					<					
DEPTH BELOW A					DEPTH BELOW	30				
THE					THE					
DEP					DEP					
40					-	40				
50	,				_	50				
60					_	60				
					_					
	hydric non-hydric	Slope %	Limiting factor	ground water restrictive layer bedrock		hydric non-hydric		Slope %	Limiting factor	ground water restrictive layer bedrock
C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group	C.S.S.	Soil Series / phase	name:		Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.E.	Soil Classification:		Profile	Drainage Class	Design Class
Brof	seional Enderson	e (as applicable)								
F101	essional Endorsement	a (as applicable)								
c.s.s	4				ſ	Date:				
<u> </u>	signature:					ia #1				
					ľ	_ic.#:				
	name printed/typed:				-	Date:				
L.S.E	signature:				ľ	Date: 10/6/09				
		Michael Gless	sner		L	.ic.#: 397		- Marine I. I. I. I. I. I.		
	name printed/typed:					331		affix professional seal		

Detailed Description of	Subcurface	Conditions	at Project Sites

Project Name: // Highland Wind Project			Applicant Name:	Highland Wind LL	<u> </u>		Project Location (mu	inicipality): Highland Plantation, I	
							-		
	Exploration Symbol:	SOIL DESCRIPTION AND TP-77	X Test Pit	Boring		Exploration Symbol:		X Test Pit	Boring
	2 Texture	_" Depth of Organic Horizon Above Consistency	Mineral Soil Color	Mottling	_	• Texture	Depth of Organic Horizon Above	Mineral Soil Color	Mottling
	LOAMY FINE SAND	FRIABLE	LIGHT GRAY		-	1 2 LOAM 3	FRIABLE	VERY DARK GRAYISH BROWN	
4					_	4 5 SILT LOAM		DARK OLIVE	
es)					es)	6		BROWN	
(Inches)	SANDY LOAM W/		OLIVE BROWN		(Inches)				
ACE	COARSE FRAGS			COMMON, MEDIUM,	SURFACE	VERY COARSE SAND		LIGHT YELLOWISH BROWN	
HANS 12				DISTINCT	SURF				
			AVATION = 14"		S 7IOS	6	LIMIT OF EXC	AVATION = 12"	
S 18					AL S				
NER 					BELOW MINERAL				
IW M					IM M				
BELOW					1" ETO	0			
TH B					TH E				
DEP					DEPTH				
40					4	0			
50					e	0			
60									
		01 01	l gentine et al.	ا بالمتحري			Olean (f	Line Weren Const	a goodeline t
•	hydric non-hydric	Slope % 8-15	Limiting factor 8"	ground water restrictive layer bedrock	•	hydric non-hydric	Slope % 8-15	Limiting factor	ground water restrictive layer bedrock
C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group	C.S.S.	Soil Series / phase name		Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class
	1	SOIL DESCRIPTION AN	D CLASSIFICATION			1	SOIL DESCRIPTION AN	D CLASSIFICATION	
	Exploration Symbol:		—	Boring		Exploration Symbol:	<u> </u>		Boring
0	Texture	Depth of Organic Horizon Above Consistency	Mineral Soil Color	Mottling		• Texture	_ Depth of Organic Horizon Above Consistency	Mineral Soil Color	Mottling
	LOAM	MUCKY	BLACK		=	1			
3		MOORT	BLACK		1 -	3			
	5					5			
es)		FRIABLE	VERY DARK GRAYISH BROWN		es)	6		/	/
(Inches)	8	MUCKY	BLACK		(Inches)	8			
ACE		SOMEWHAT FIRM	WHITE	MANY, COARSE, PROMINENT	SURFACE	9			
SURF	SANDY LOAM			PROMINENT	SURF				
		LIMIT OF EXC	AVATION = 12"		S SOIL S	6			
AL S					AL S				
NERAL					NERAL :	14	/		
DEPTH BELOW MI					DEPTH BELOW MI				
073					1" ETO	0			
TH B					THB				
DEP					DEP				
40					_	0	/		
50)					0			
- 60						0			
0	hydric	Slope %	Limiting factor	 ground water 		hydric	Slope %	Limiting factor	ground water
•	non-hydric		9"	 restrictive layer 	•	non hydric	Slope 78	Limiting factor	 restrictive layer
C.S.S.	Soil Series / phase name:			bedrock	C.S.S.	Søll Series / phase name	:		bedrock
0.0.0.			Drainage Class	Hydrologic Group	0.0.0.	/		Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.9.E.	Soil Classification:	Profile	Drainage Class	Design Class
Prof	essional Endorsemen	ts (as applicable)							
C.S.S						Date:			
0.0.0	signature:								
F					L	ic.#:	1		
L	name printed/typed:						-		
L.S.E					0	Date:			
L	signature:					10/6/09			
					L	ic.#:			
1	name printed/typed:	Michael Gless	sner			397	affix professional seal		

Doto	ilad Decoription	of Subcurfood	Conditions at Proie	ot Siton

Proj∉	ect Name: Highland Wine	d Project	Applicant Name:	Highland Wind L	LC			Project Location (mu	inicipality): Highland Plantation, I	ME
		SOIL DESCRIPTION AND	D CLASSIFICATION					SOIL DESCRIPTION AN		
	Exploration Symbol:	TP-73 _* Depth of Organic Horizon Above	X Test Pit	Boring		E	xploration Symbol:		X Test Pit	Boring
0	0	Consistency	Color	Mottling	-	0	Texture	Consistency	Color	Mottling
2	LOAM	FRIABLE	DARK BROWN		-	2	LOAM	FRIABLE	VERY DARK	NONE OBSERVED
4					-	4	EUAM	FRIABLE	GRAYISH BROWN	NONE OBSERVED
(se)	SANDY LOAM		DARK OLIVE BROWN		es)	6				
(Inch	VERY FINE			FEW, FINE, FAINT	(Inches)	8				
RFACE	SANDY LOAM	SOMEWHAT FIRM			SURFACE	10				
						14	SILT LOAM		DARK OLIVE BROWN	
18 20		LIMIT OF EXC	AVATION = 14"		TIOS T	16 18	SILT LOAM W/ COARSE FRAGS		GRAYISH BROWN	
VERA					VERA	1		LIMIT OF EXC	AVATION = 18"	
IM Mi					BELOW MINERAL	+				
BELC					BELC	30				
ЕРТН					DEPTH	7				
Q 40					0	40				
50					-	50				
60					-	60				
•	hydric non-hydric	Slope % 0-3	Limiting factor	ground water restrictive layer bedrock	•		hydric non-hydric	Slope % 8-15	Limiting factor	ground water restrictive layer
c.s.s.	Soil Series / phase name:				C.S.S	s. S	oil Series / phase name:			bedrock
L.S.E.	Soil Classification:		Drainage Class	Hydrologic Group	L.S.E	e. S	oil Classification:		Drainage Class	Hydrologic Group
	I	Profile SOIL DESCRIPTION AND		Design Class		/		Profile SOIL DESCRIPTION AN		Design Class
	Exploration Symbol:	TP-75 Depth of Organic Horizon Above	X Test Pit	Boring		E	xploration Symbol:	TP-76 _* Depth of Organic Horizon Above	X Test Pit	Boring
	Texture	Consistency	Color	Mottling		0	Texture	Consistency	Color	Mottling
2	SILT LOAM	FRIABLE	DARK BROWNISH GRAY	NONE OBSERVED	-	2	SILT LOAM	FRIABLE	DARK OLIVE BROWN	NONE OBSERVED
4					-	4			BROWN	
ies)					es)	6				
(Inch					(Inches)	8	SANDY LOAM W/ COARSE FRAGS		LIGHT YELLOWISH BROWN	
RFACE	LOAMY SAND				SURFACE	10				
14 16						14 16		LIMIT OF EXC	AVATION = 10"	
10S 7		LIMIT OF EXC	AVATION = 16"			18 20				
NERAL					NER/	24				
DEPTH BELOW MI					DEPTH BELOW MI	$ \rightarrow $				
BELC					BELC	30				
EPTH					EPTH	_				
۲ 40						40				
50					-	50				
60					-	60				
•	hydric non-hydric	Slope % 0-3	Limiting factor >16"	ground water restrictive layer bedrock	•		hydric non-hydric	Slope % 3-8	Limiting factor >10"	ground water restrictive layer
C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group	C.S.S		ioil Series / phase name:		Drainage Class	bedrock Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.E	E. S	oil Classification:	Profile	Drainage Class	Design Class
Profe	essional Endorsement	ts (as applicable)				1				
c.s.s						Date	9:			
	signature:					Lic.‡	¥:			
	name printed/typed:					Date	9:			
L.S.E.	signature:					Lic.	10/7/09			
	name printed/typed:	Michael Gless	sner				397	affix professional seal		
	Stantec Consu	Iting								Page 21

Dotailad	Description of Subsurface Conditions at Project Site	c .

FIUJ	Project Name: Applicant Name: Highland Wind Project Highland Wi				LC		Project Location (mu	Highland Plantation,	ME
		SOIL DESCRIPTION ANI	D CLASSIFICATION				SOIL DESCRIPTION AN	ID CLASSIFICATION	
	Exploration Symbol:	TP-69	X Test Pit	Boring		Exploration Symbol:		X Test Pit	Boring
		_ Depth of Organic Horizon Above					_ Depth of Organic Horizon Above		
1	Texture	Consistency	Color	Mottling		Texture	Consistency	Color	Mottling
2	SILT LOAM	FRIABLE	DARK OLIVE BROWN		_		FRIABLE	DARK OLIVE BROWN	
4			2.101.11		_	4		2.00	
(s) = 6					(%	6			
iche:	SANDY LOAM				(Inches,			LIGHT BROWN	
1) = (I)					100	9			
10 10	LOAMY COARSE SAND		LIGHT BROWN		SOIL SURFACE			LIGHT GRAYISH	FEW, FINE, FAINT
IN 13				FEW, FINE, FAINT	i su			BROWN	MANY, COARSE, PROMINENT
110S				MANY, COARSE,	soll				
20 BAL				PROMINENT	RAL	0	LIMIT OF EXC	AVATION = 18"	<u> </u>
MINE					MINE				
MO					DEPTH BELOW MINERAL				
BEL					BEL	0			
HT H					HTH:				
DE					DE				
40						0			
50			<u> </u>		5	0			├
60					6	0			
٥	hydric	Slope %	Limiting factor	 ground water 	•	hydric	Slope %	Limiting factor	 ground water
•	non-hydric			 restrictive layer bedrock 	•	non-hydric	3-8	9"	 restrictive layer bedrock
C.S.S.	Soil Series / phase name	•			C.S.S.	Soil Series / phase name		Decision of the second	
L.S.E.	Soil Classification:		Drainage Class	Hydrologic Group	L.S.E.	Soil Classification:		Drainage Class	Hydrologic Group
/		Profile SOIL DESCRIPTION ANI	Drainage Class	Design Class		1	Profile SOIL DESCRIPTION AN	Drainage Class	Design Class
	Exploration Symbol:		X Test Pit	Boring		Exploration Symbol:		X Test Pit	Boring
	Tautum	_ Depth of Organic Horizon Above		Maddina			Depth of Organic Horizon Above		Mattlina
1	Texture	Consistency	Color	Mottling		Texture	Consistency	Color	Mottling
2	LOAM	FRIABLE	VERY DARK GRAYISH BROWN		-		FRIABLE	VERY DARK GRAYISH BROWN	NONE OBSERVED
4					_	4			
(S)					(s)	6			
nche	LOAMY SAND		DARK OLIVE		(Inches)	7 SILT LOAM		DARK GRAYISH BROWN	
CE (BROWN		CE (9			
	LOAMY COARSE		LIGHT BROWN		IRFA	2			
12 14 14 16	SAND	SOMEWHAT FIRM	GRAY	FEW, FINE, FAINT	ין- ור צר	6	LIMIT OF EXC	AVATION = 12"	<u> </u>
7/OS 7					AINERAL SOIL SURFACE	8			
IERAL		LIMIT OF EXC	AVATION = 18"	I	ERA.				
≨ —					~	4			
DEPTH BELOW A					DEPTH BELOW	0			
H BE					H BE				
EPT.					EPT.				
40						0			
_					6	0			
50									
60					-6	0			<u> </u>
•	hydric non-hydric	Slope %	Limiting factor	 ground water restrictive layer 	•	hydric non-hydric	Slope %	Limiting factor	 ground water restrictive layer
<u> </u>			10"	 bedrock 				_>12"	 bedrock
C.S.S.	Soil Series / phase name	<u>.</u>	Drainage Class	Hydrologic Group	C.S.S.	Soil Series / phase name		Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class
		Profile	Drainage Class	Design Class		,	Profile	Drainage Class	Design Class
Profe	essional Endorsemen	ts (as applicable)							
c.s.s					C	late:			
	signature:								
					L	ic.#:			
<u> </u>	name printed/typed:						4		
L.S.E					C	late:			
	signature:					10/7/09			
					L	ic.#:			
	name printed/typed:	Michael Gless	sner			397	affix professional seal		
	Stantec Consu	Itina							Page 20

Detailed Description	of Subcurface	Conditions of	t Project Sites

Proje	ect Name:	d Day is at	Applicant Name:	I California Maria da I	~		Project Location (municipality):		
	Highland Wine			Highland Wind LL			•	Highland Plantation,	ME
	Exploration Symbol:	SOIL DESCRIPTION AN TP-65		Boring		Exploration Symbol:	SOIL DESCRIPTION AN TP-66	D CLASSIFICATION Test Pit	Boring
0	0 Texture	Depth of Organic Horizon Above	e Mineral Soil Color	Mottling		• Texture	Depth of Organic Horizon Above Consistency	Mineral Soil Color	Mottling
1					-		FRIABLE	OLIVE GRAY	FEW, FINE, FAINT
4	SILT LOAM	FRIABLE	DARK OLIVE BROWN		-	3			
es)	SAND	SOMEWHAT FIRM	LIGHT BROWNISH	MANY, COARSE,	es)	5			
(Inches)			GRAY	PROMINENT	(Inches)	8 9 LOAMY SAND W/			
RFACE					SURFACE	COARSE FRAGS			
		VERY FIRM						AVATION = 12"	
10S 7		LIMIT OF EXC	AVATION = 14"		ין דן מ ד 2017 די				
NERA					NERA				
× רסא שו					BELOW MINERAL				
∝					I I"	0			
DEPTH					DEPTH				
4) 				1	0			
50	, ,				6	0			
60					6	0			
•	hydric non-hydric	Slope % 3_	Limiting factor	ground water restrictive layer bedrock	•	hydric non-hydric	Slope % 3-8	Limiting factor	ground water restrictive layer bedrock
C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group	C.S.S.	Soil Series / phase name		Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class
	Exploration Symbol:	SOIL DESCRIPTION AN	D CLASSIFICATION	Boring		Exploration Symbol:	SOIL DESCRIPTION AN TP-68	D CLASSIFICATION X Test Pit	Boring
		_ Depth of Organic Horizon Above	Mineral Soil			(Depth of Organic Horizon Above	Mineral Soil	
1	Texture	Consistency	Color	Mottling			Consistency	Color	Mottling
	SANDY LOAM	FRIABLE	DARK BROWN		_	2 SILT LOAM	FRIABLE	DARK OLIVE BROWN	
4					-				
(Inches)					(Inches)				
	LOAMY SAND					9			
SURFACE	2				SURFACE	2 LOAMY COARSE		LIGHT BROWN	FEW, FINE, FAINT
S TIOS				COMMON, MEDIUM,	7 -	8			
JERAL S				DISTINCT	ERAL	0			MANY, COARSE, PROMINENT
			CAVATION = 20"		N 2	4	LIMIT OF EXC	AVATION = 22"	
DEPTH BELOW MI					DEPTH BELOW MI	0			
HH B					HH B				
					DEF				
40						0			
50					6	0			
60	hydric	Slope %	Limiting factor	 ground water 	-	hydric	Slope %	Limiting factor	 ground water
•	non-hydric Soil Series / phase name:	3-8	16"	 restrictive layer bedrock 	•	non-hydric Soil Series / phase name	3-8	12"	 restrictive layer bedrock
C.S.S.			Drainage Class	Hydrologic Group	C.S.S.	Soil Classification:		Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.E.	Soll Classification:	Profile	Drainage Class	Design Class
Profe	essional Endorsemen	ts (as applicable)							
c.s.s					C	Pate:			
	signature:				L	ic.#:	1		
L.S.E	name printed/typed:				C	Pate:	1		
	signature:					10/7/09 ic.#:	4		
	name printed/typed:	Michael Gless	sner			397	affix professional seal		

Proje	ect Name:		Applicant Name:	tailed Description of Subsi			Project Location (mu	inicipality):	
	Highland Wind	d Project		Highland Wind L	C			Highland Plantation, I	ME
		SOIL DESCRIPTION AND	CLASSIFICATION				SOIL DESCRIPTION AN	D CLASSIFICATION	_
	Exploration Symbol:	TP-61	X Test Pit	Boring		Exploration Symbol:		X Test Pit	Boring
	0 Texture	Depth of Organic Horizon Above Consistency	Mineral Soil Color	Mottling		0 Texture	Depth of Organic Horizon Above Consistency	Mineral Soil Color	Mottling
				g		1			
- 2	LOAM	MUCKY	BLACK				FRIABLE	VERY DARK GRAYISH BROWN	
4					=	4			
(s)					s)	SILT LOAM		DARK OLIVE	COMMON, MEDIUM,
(Inches)	LOAMY COARSE SAND	FRIABLE	OLIVE GRAY	MANY, COARSE, PROMINENT	(Inches)	3		GRAY	FAINT
					4CE (i	3			
SURFACE	2				L KL	2			
7 S 7	8	LIMIT OF EXC	AVATION = 12"		ns 1		LIMIT OF EXC	AVATION = 12"	
OS 18	8				OS 1	3			
					=RAL				
MINE					MINE				
WO.					BELOW MINERAL				
BELOW					BEL				
HTH:-					DEPTH				
DE					DE				
40					4				
50					5				
60					6	5			
•	hydric	Slope %	Limiting factor	 ground water 		hydric	Slope %	Limiting factor	 ground water
	non-hydric	3-8	5"	 restrictive layer bedrock 	•	non-hydric	0-3	4"	 restrictive layer bedrock
C.S.S.	Soil Series / phase name:				C.S.S.	Soil Series / phase name:			
	Soil Classification:		Drainage Class	Hydrologic Group		Soil Classification:		Drainage Class	Hydrologic Group
L.S.E.		Profile	Drainage Class	Design Class	L.S.E.	Con Classification.	Profile	Drainage Class	Design Class
	Exploration Symbol:	SOIL DESCRIPTION AND TP-63	X Test Pit	Boring	-	Exploration Symbol:	SOIL DESCRIPTION AN TP-64	X Test Pit	Boring
	3	Depth of Organic Horizon Above	Mineral Soil			0	Depth of Organic Horizon Above	Mineral Soil	
	Texture	Consistency	Color	Mottling	_	Texture	Consistency	Color	Mottling
- 2	LOAM	FRIABLE	VERY DARK GRAYISH BROWN			2		DERS @ SURFAC	
4			GRATISH BROWN			3		DERS @ SURFAC	
	SILT LOAM		DARK BROWNISH		-	5			
(Inches)			GRAY		(Inches)	7			
					н) <u>–</u>	3			
SFAC	VERY FINE SANDY LOAM	SOMEWHAT FIRM	LIGHT OLIVE GRAY	COMMON, MEDIUM, DISTINCT	RFAC	2			
SOIL SURFACE					SOIL SURFACE	1			
	8	LIMIT OF EXC	AVATION = 14"		TIOS	3			
RAL					ERAL .				
MINE						4			
/ MO					/ MO				
BEL					BEL				
DEPTH BELOW MIN.					DEPTH BELOW MIN				
DE					DE				
40					4				
50					5				
60	5				6	þ			
0	hydric	Slope %	Limiting factor	 ground water 	٥	hydric	Slope %	Limiting factor	 ground water
•	non-hydric	0-3	8"	 restrictive layer bedrock 	•	non-hydric	0-3		 restrictive layer bedrock
C.S.S.	Soil Series / phase name:				C.S.S.	Soil Series / phase name:			
L.S.E.	Soil Classification:		Drainage Class	Hydrologic Group	L.S.E.	Soil Classification:		Drainage Class	Hydrologic Group
L.O.E.		Profile	Drainage Class	Design Class	L.J.E.		Profile	Drainage Class	Design Class
Prof	essional Endorsement	s (as applicable)							
						ate:]		
C.S.S					ľ				
	signature:				L	c.#:			
	name printed/typed:								
						ate:			
L.S.E					ľ	10/7/09			
	signature:				L	ic.#:	•		

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	Detailed Description of Subsurface Conditions at Project Sites									
Proje	ect Name:	d Project	Applicant Name:	Highland Wind LL			Project Location (mu		ME	
	Highland Win			Fighland Wind LL			•	Highland Plantation, N		
	1	SOIL DESCRIPTION AND	-				SOIL DESCRIPTION AN			
	Exploration Symbol:	* Depth of Organic Horizon Above	X Test Pit	Boring		Exploration Symbol:	TP-58 Depth of Organic Horizon Above	X Test Pit	Boring	
0	Texture	Consistency	Color	Mottling		Texture	Consistency	Color	Mottling	
1						011 7 1 0 4 14				
- 2	SILT LOAM W/ COARSE FRAGS	FRIABLE	DARK BROWNISH GRAY	NONE OBSERVED		SILT LOAM	FRIABLE	LIGHT GRAYISH BROWN	NONE OBSERVED	
4					4					
(n 6						5 5				
Inches)					(Inches)					
<u>د</u>						8				
10					SURFACE					
S 710S					7					
)S 18 7 20					OS 7 20		LIMIT OF EXC	AVATION = 16"		
22 22					ERA					
NIW.		LIMIT OF EXC	AVATION = 22"		BELOW MINERAL × ×					
MO .					MO7					
BEL										
HTT					DEPTH					
DE					DE					
40					40					
50					50					
					60					
-60										
•	hydric non-hydric	Slope %	Limiting factor	ground water restrictive layer	•	hydric non-hydric	Slope %	Limiting factor	 ground water restrictive layer 	
-			_>22"	 bedrock 	Ľ,			>16"	 bedrock 	
C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group	C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group	
L.S.E.	Soil Classification:				L.S.E.	Soil Classification:		Dialitage Class		
L.O.L.		Profile SOIL DESCRIPTION AND	Drainage Class	Design Class	E.O.E.	1	Profile SOIL DESCRIPTION AN	Drainage Class	Design Class	
	Exploration Symbol:		X Test Pit	Boring		Exploration Symbol:		X Test Pit	Boring	
		_ Depth of Organic Horizon Above	Mineral Soil			0	Depth of Organic Horizon Above	Mineral Soil		
	Texture	Consistency	Color	Mottling		Texture	Consistency	Color	Mottling	
2						LOAM	FRIABLE	VERY DARK BROWN		
3	SAND	FRIABLE	YELLOWISH BROWN			5				
5					ŧ					
(seu					ies)	s /				
(Inches)					(Inches)	SILT LOAM		LIGHT OLIVE		
								BROWN		
SURFACE					SURFACE					
IS 14										
7/OS								LIGHT GRAYISH BROWN	FEW, FINE, FAINT	
20 BAL					22 BAL			BROWN		
AINE	FINE SAND		LIGHT YELLOWISH BROWN							
DEPTH BELOW MINER			Вкоин		DEPTH BELOW MINE					
3EL(∋EL(
1 HT		LIMIT OF EXC	AVATION = 30"		1 HT					
DEF					DEF					
40					40					
50					50					
60					60					
•	hydric	Slope %	Limiting factor	ground water		hydric	Slope %	Limiting factor	 ground water 	
	non-hydric		_>30"	 restrictive layer bedrock 	•	non-hydric	3-8	14"	 restrictive layer bedrock 	
c.s.s.	Soil Series / phase name:				C.S.S.	Soil Series / phase name:				
	Soil Classification:		Drainage Class	Hydrologic Group	L.S.E.	Soil Classification:	_	Drainage Class	Hydrologic Group	
L.S.E.		Profile	Drainage Class	Design Class	L.S.E.		Profile	Drainage Class	Design Class	
Profe	essional Endorsemen	ts (as applicable)			Т					
c.s.s.					D	ate:				
	signature:									
					Li	c.#:				
	name printed/typed:									
					D	ate:				
L.S.E.						10/7/09				
	signature:				1		1			

Lic.#:

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Michael Glessner

Detailed Description of	Subcurface (Conditions at	Project Sites

Proj∉	ect Name: Highland Wine	d Project	Applicant Name:	Highland Wind L	LC			Project Location (mu	nicipality): Highland Plantation, I	ME
	9	SOIL DESCRIPTION ANI	D CLASSIFICATION	5				SOIL DESCRIPTION AN		
	Exploration Symbol:	TP-53 Depth of Organic Horizon Above	X Test Pit	Boring			Exploration Symbol:	TP-54 Depth of Organic Horizon Above	X Test Pit	Boring
	0	Consistency	Color	Mottling		0	Texture	Consistency	Color	Mottling
2	SILT LOAM	FRIABLE	DARK OLIVE			2	SILT LOAM	FRIABLE	DARK OLIVE BROWN	
4			BROWN			4			Бконк	
(Seu					les)	6				
= (Incl	LOAMY SAND		LIGHT OLIVE	FEW, FINE, FAINT	E (Inches)	8				
10 12			GRAY		SURFACE	10	FINE SANDY LOAM		LIGHT BROWNISH GRAY	
						14 16				
OS 7		LIMIT OF EXC	AVATION = 16"		TIOS TI	18 20				
NER/					NER/	22				FEW, FINE, FAINT
W MC					BELOW MINERAL			LIMIT OF EXC	AVATION = 22"	
I BEL(I BEL(30				
ЕРТН					DEPTH					
40					D	40				
50						50				
60						60				
	hydric	Slope %	Limiting factor	 ground water]	hydric	Slope %	Limiting factor	 ground water
•	non-hydric	3-8	8"	 restrictive layer bedrock 	•	-	non-hydric	8-15		restrictive layer bedrock
C.S.S.	Soil Series / phase name:	:	Drainage Class	Hydrologic Group	C.S.	а. Г	Soil Series / phase name:	:	Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.E	•)	Soil Classification:	Profile	Drainage Class	Design Class
	Exploration Symbol:	SOIL DESCRIPTION ANI TP-55	D CLASSIFICATION X Test Pit	Boring			Exploration Symbol:	SOIL DESCRIPTION AN TP-56	D CLASSIFICATION X Test Pit	Boring
	0 Texture	_ Depth of Organic Horizon Above	Mineral Soil Color	Mottling				Depth of Organic Horizon Above	Mineral Soil Color	Mottling
1	SILT LOAM	MUCKY	DARK BROWN	Motting		1	SILT LOAM	FRIABLE	DARK OLIVE	Motting
3	SILT LOAN	MOCKI	DARK BROWN			3			BROWN	MANY, COARSE,
5	LOAM	FRIABLE	V. DK. GRAY BROWN			5	FINE SAND		2201011 01111	PROMINENT
ches,	LOAMY SAND	SOMEWHAT FIRM	LIGHT GRAY	MANY, COARSE, PROMINENT	(Inches)	7	LOAMY FINE SAND		YELLOWISH BROWN	
						9				
	LOAMY COARSE SAND & GRAVEL	LOOSE	BROWN		SURFACE	12				
S 7/OS					S TIOS	16 18				
RAL S					VERAL S	20		LIMIT OF EXC	AVATION = 16"	
MINE!		LIMIT OF EXC	AVATION = 19"			24				
DEPTH BELOW MI					DEPTH ВЕLOW MI	30				
TH BE					TH BE					
DEP					DEP					
40						40				
50						50				
60						60	b			
•	hydric non-hydric	Slope % 8-15	Limiting factor 5"	 ground water restrictive layer 	•		hydric non-hydric	Slope % 3-8	Limiting factor 3 "	 ground water restrictive layer
c.s.s.	Soil Series / phase name:			bedrock	C.S.	s.	Soil Series / phase name:			bedrock
L.S.E.	Soil Classification:		Drainage Class	Hydrologic Group	L.S.E		Soil Classification:		Drainage Class	Hydrologic Group
/		Profile	Drainage Class	Design Class		_		Profile	Drainage Class	Design Class
Profe	essional Endorsemen	ts (as applicable)								
						Da	ite:	1		
C.S.S.	signature:					Da				
						Lic	:#:			
	name printed/typed:					-		4		
L.S.E.						Da				
<u> </u>	signature:					Lic	10/6/09	1		
	name printed/typed:	Michael Gless	sner				397	affix professional seal		
	Stantec Consu	Iting								Page 16

Detailed Description of Subsurface Conditions at Project Sites

Proje	ect Name: Highland Wind	d Project	Applicant Name:	Highland Wind LL	<u> </u>		Project Location (mu	inicipality): Highland Plantation, I	ME
		SOIL DESCRIPTION ANI					SOIL DESCRIPTION AN		
	Exploration Symbol:	TP-49	X Test Pit	Boring		Exploration Symbol:	TP-50	X Test Pit	Boring
G	0 Texture	Depth of Organic Horizon Above	Mineral Soil Color	Mottling	_	0 ₀ Texture	Depth of Organic Horizon Above	Mineral Soil Color	Mottling
2					-	1			
4		LEDGE @	SURFACE			4 FINE SANDY LOAM	FRIABLE	LIGHT OLIVE BROWN	NONE OBSERVED
(sey)	5 				(Inches)	6			
E (Inc	5				E (Inc	8			
10 12	2				SURFACE	2			
						4			
10S					SO	8			
ERAL					BELOW MINERAL	1			
NIN,					NIN,		LEDGE OR	ROCK @ 21"	
M07:					то 1	0			
H BE					H BE				
DEPT					DEPTH				
40	,				4	0			
50					6	0			
60	5				6	0			
0	hydric	Slope %	Limiting factor	ground water		hydric	Slope %	Limiting factor	ground water
•	non-hydric	3-8	0"	 ground water restrictive layer bedrock 	•	non-hydric	3-8		 restrictive layer bedrock
C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group	C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class
	Exploration Symbol:	SOIL DESCRIPTION ANI TP-51	CLASSIFICATION X Test Pit	Boring		Exploration Symbol:	SOIL DESCRIPTION AN TP-52	CLASSIFICATION Test Pit	Boring
	0	Depth of Organic Horizon Above	Mineral Soil			0	Depth of Organic Horizon Above	Mineral Soil	
1	Texture	Consistency	Color	Mottling	-	Texture	Consistency	Color	Mottling
2	SILT LOAM W/ CRUSHED ROCK	FRIABLE	DARK BROWN		-		MUCKY	VERY DARK GRAYISH BROWN	
4	CRUSHED ROCK				_			LIGHT GRAY	
hes)	6				(səų		FRIABLE	STRONG BROWN	MANY, COARSE, PROMINENT
: (Inc					(Inches)	9			
FACE					SURFACE	0			
						3			
	5				- - SOIL 3	8	LEDGE OR	ROCK @ 13"	
20 EKAL	UCAMY FINE SAND	SOMEWHAT FIRM	OLIVE BROWN	COMMON, MEDIUM, DISTINCT	vERAL.	0			
MINE						4			
DEPTH BELOW MI					DEPTH BELOW MI	0			
H BE					H BE				
DEPT					DEPT				
1 40					1 4	0			
50					6	o			
60))				6	0			
0	hydric	Slope %	Limiting factor	 ground water 		hydric	Slope %	Limiting factor	 ground water
•	non-hydric	<u>0-3</u>	18"	 restrictive layer bedrock 	•	non-hydric	<u>3-8</u>		 restrictive layer bedrock
C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group	C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.E.	Soil Classification:	Profile	 Drainage Class	Design Class
Profe	essional Endorsement	ts (as applicable)			-				
C.S.S					0	late:			
	signature:				L	ic.#:			
	name printed/typed:								
L.S.E					C	Pate:			
	signature:				,	10/7/09			
	name printed/typed:	Michael Gless	sner			ic.#: 397	affix professional seal		

Dotailad Decaription of S	Subsurface Conditions at Project Sites	

Proje	ect Name: Highland Wind		Applicant Name: Highland Wind LLC					Project Location (municipality): Highland Plantation, ME		
		SOIL DESCRIPTION ANI		3	-			SOIL DESCRIPTION AN		
	Exploration Symbol:	TP-45	X Test Pit	Boring			Exploration Symbol:			Boring
0	0 Texture	Depth of Organic Horizon Above	Mineral Soil Color	Mottling		0	0 Texture	Depth of Organic Horizon Above	Mineral Soil Color	Mottling
1 2 3	SANDY LOAM	FRIABLE	10YR 3/2 VERY DARK GRAYISH BROWN	NONE OBSERVED		1	SANDY LOAM	FRIABLE	10YR 3/2 VERY DARK GRAYISH BROWN	NONE OBSERVED
5	LOAMY SAND		10YR 4/4			5	LOAMY SAND		10YR 4/4	
ches)	LOAMT GAND		DARK YELLOWISH BROWN		(Inches)	7	LOAMT GAND		DARK YELLOWISH BROWN	
u) =C			BROWN			9			BROWN	
10 12					SURFACE	10 12				
14 15 11					IL SL	14 16				
OS 7 20					T SOIL	18				
VERA		LIMIT OF EXC	AVATION = 18"		VERA	\neg		LIMIT OF EXC	AVATION = 18"	
IIW MI					IIN MI	\neg				
BELO					BELOW MINERAL	30				
HTH E					DEPTH E					
DEI					DEI					
40						40				
50						50				
60						60				
•	hydric non-hydric	Slope % 	Limiting factor _>18"	ground water restrictive layer bedrock	•		hydric non-hydric	Slope % 	Limiting factor >18"	ground water restrictive layer bedrock
C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group	C.S.	.s.	Soil Series / phase name		Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile SOIL DESCRIPTION ANI	Drainage Class	Design Class	L.S.	E.	Soil Classification:	Profile SOIL DESCRIPTION AN	Drainage Class	Design Class
	Exploration Symbol:		X Test Pit	Boring			Exploration Symbol:		X Test Pit	Boring
0	0	Depth of Organic Horizon Above Consistency	Mineral Soil Color	Mottling		0	Texture	Depth of Organic Horizon Above Consistency	Mineral Soil Color	Mottling
1	LOAMY SAND	FRIABLE	10YR 4/6			1				
3			DARK YELLOWISH BROWN			3		LEDGE @	SURFACE	
5						5				
ches,					(Inches)	7				
u) =C	LOAMY FINE SAND		10YR 4/4			9				
10 12			DARK YELLOWISH BROWN		SURFACE	10				
0 14 15					IL SU	14				
OS 7		SOMEWHAT FIRM	2.5Y 5/3 LIGHT OLIVE BROWN		TIOS T	18 20				
NERA 50		LIMIT OF EXC	AVATION = 18"		INERAL	24				
						\neg				
DEPTH BELOW N					BELOW A	30				
HT C					DEPTH E					
DEI					DEI					
40						40				
50						50				
60						60				
•	hydric non-hydric	Slope % 	Limiting factor	 ground water restrictive layer bedrock 	•		hydric non-hydric	Slope % 	Limiting factor	ground water restrictive layer bedrock
C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group	C.S.	.s.	Soil Series / phase name		Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.	E.	Soil Classification:	Profile	Drainage Class	Design Class
Dest										
	essional Endorsement	is (as applicable)				Da	te:	1		
C.S.S.	signature:									
	name printed/typed:					Lic	.#:			
L.S.E.	signature:						nte: 10/7/09			
		Michael Gless	spor			Lic	207			
L	name printed/typed: Stantec Consu		Silei			1	397	affix professional seal		Page 14

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SOIL PROFILE/CLASSIFICATION INFORMATION Detailed Description of Subsurface Conditions at Project Sites

Proje	ect Name:		Applicant Name:			÷	Project Location (mu		
	Highland Wine	d Project	<u> </u>	Highland Wind LL	<u>_C</u>			Highland Plantation,	ME
	Exploration Symbol:	SOIL DESCRIPTION AN TP-44	X Test Pit	Boring	1	Exploration Symbol:		Test Pit	Boring
	1 Texture	Depth of Organic Horizon Above Consistency	Mineral Soil Color	Mottling	0	Texture	_ Depth of Organic Horizon Above Consistency	Mineral Soil Color	Mottling
1	LOAM	,	10YR 2/2 VERY DARK BROWN		1				
3		FRIABLE			3				
4	SILT LOAM W/ COARSE FRAGS		10YR 3/2		4				
(a 6	COARSE FRAGS		VERY DARK GRAYISH BROWN		6				
ches,					(Inches)			/	
() = 0									
=ACE	SANDY LOAM		2.5Y 3/3		SURFACE				
12 12			DARK OLIVE BROWN		HUN 12				
16 S					S 7/0				
OS	SANDY LOAM W/ CRUSHED ROCK		2.5Y 4/4 OLIVE BROWN	FEW, FINE, FAINT	TIOS 7			/	
20					ERA		/		
NIN		LIMIT OF EXC	CAVATION = 18"		MINERAL		/		
i Nc					MC				
3EL(3EL(
цнг 					DEPTH BELOW				
DEP					DEF				
40					40				
_						7			
50					50				
60					60				
0	hydric	Slope %	Limiting factor	 ground water 	0	hydric	Slope %	Limiting factor	ground water
•	non-hydric	3-8		 restrictive layer bedrock 	D	non-hydric		5	 restrictive layer
	Soil Series / phase name:					Søil Series / phase name:			bedrock
C.S.S.			Drainage Class	Hydrologic Group	0.0.0.			Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile		Design Class	L.9/E.	Soil Classification:	Brofile	Drainage Class	Design Class
		SOIL DESCRIPTION AN	Drainage Class D CLASSIFICATION	Design class			Profile SOIL DESCRIPTION AN	ID CLASSIFICATION	Design Class
	Exploration Symbol:		Test Pit	Boring	E	Exploration Symbol:		Test Pit	Boring
		Depth of Organic Horizon Above					_ Depth of Organic Horizon Above		
1	Texture	Consistency	Color	Mottling	0	Texture	Consistency	Color	Mottling
2					2				
3					3				
5					5				
es)					(Sel			/	(
(Inct					(Inches)			/	
CE CE									
12 IS					SURFACE				
7S					NS 71				
10 18					OS 18				
20 ZAL			<u> </u>					/	
INER/		/					/		
N MI		/			W N		/		
BELOW					107:		/		
H BE									
<i>DЕРТН</i>					H B				
۵ –					EPTH B				
40		/			DEPTH BELOW M				
	/				DEPTH B				
50					40	/			
50					40 50				
50					40 50 60				
0	hydric non-frydric	Slope %	Limiting factor	ground water restrictive layer	40 50	hyghć norvňydric	Slope %	Limiting factor	ground water
0	non-hydric	Slope %	Limiting factor		40 50 60	non-hydric		Limiting factor	
0	hydric non fydric Sofi Series / phase name:	Slope %		restrictive layer bedrock	40 50 60	hydric noryfydric Sofl Series / phase name:			restrictive layer bedrock
c.s.s.	non-hydric	Slope %	Limiting factor	restrictive layer	40 50 60 C.S.S.	non-hydric		Limiting factor	 restrictive layer
c.s.s.	non-hydric Soil Series / phase name:	Slope %		restrictive layer bedrock	40 50 60 C.S.S.	non-hydric Soril Series / phase name:			restrictive layer bedrock
c.s.s.	non-hydric Soil Series / phase name:		Drainage Class	restrictive layer bedrock Hydrologic Group	40 50 60 C.S.S.	non-hydric Soril Series / phase name:		Drainage Class	restrictive layer bedrock Hydrologic Group
c.s.s.	non-hydric Soil Series / phase name:		Drainage Class	restrictive layer bedrock Hydrologic Group	40 50 60 C.S.S.	non-hydric Soril Series / phase name:		Drainage Class	restrictive layer bedrock Hydrologic Group
C.S.S.	non-Kydric , Sof Series / phase name: , Soil Classification:	Profile	Drainage Class	restrictive layer bedrock Hydrologic Group	40 50 60 C.S.S.	non-hydric Soril Series / phase name:		Drainage Class	restrictive layer bedrock Hydrologic Group
C.S.S.	non-hydric Soil Series / phase name:	Profile	Drainage Class	restrictive layer bedrock Hydrologic Group	40 50 60 C.S.S.	non-hydric Soril Series / phase name:		Drainage Class	restrictive layer bedrock Hydrologic Group
c.s.s.	non-fydric Sof Series / phase name: Soil Classification:	Profile	Drainage Class	restrictive layer bedrock Hydrologic Group	40 50 60 C.S.S.	noy-flydric Soll Series / phase name: Soil Classification:		Drainage Class	restrictive layer bedrock Hydrologic Group
C.S.S.	non-fydric Soil Series / phase name: Soil Classification:	Profile	Drainage Class	restrictive layer bedrock Hydrologic Group	40 60 60 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	noy-flydric Soll Series / phase name: Soil Classification:		Drainage Class	restrictive layer bedrock Hydrologic Group
C.S.S. L.S.€.	non-fydric Sof Series / phase name: Soil Classification:	Profile	Drainage Class	restrictive layer bedrock Hydrologic Group	40 60 60 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ooyfydric Soll Series / phase name: Soil Classification: e:		Drainage Class	restrictive layer bedrock Hydrologic Group
C.S.S. Profe C.S.S.	non-fydric Soil Series / phase name: Soil Classification: essional Endorsement signature:	Profile	Drainage Class	restrictive layer bedrock Hydrologic Group	de eo eo c.s.s. Lse Dat	ooyfydric Soll Series / phase name: Soil Classification: e:		Drainage Class	restrictive layer bedrock Hydrologic Group
C.S.S. Profe	non-fydric Soil Series / phase name: Soil Classification:	Profile	Drainage Class	restrictive layer bedrock Hydrologic Group	40 50 60 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	e:		Drainage Class	restrictive layer bedrock Hydrologic Group
Profe C.S.S.	non-fydric Soil Series / phase name: Soil Classification: essional Endorsement signature: name printed/typed:	Profile	Drainage Class	restrictive layer bedrock Hydrologic Group	de eo eo c.s.s. Lse Dat	e:		Drainage Class	restrictive layer bedrock Hydrologic Group
C.S.S. Profe C.S.S.	non-fydric Soil Series / phase name: Soil Classification: essional Endorsement signature: name printed/typed:	Profile	Drainage Class	restrictive layer bedrock Hydrologic Group	40 50 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	nor/fydric Soll Series / phase name: Soil Classification: e: #: #: e: 10/6/09		Drainage Class	restrictive layer bedrock Hydrologic Group
Profe C.S.S.	non-fydric Soil Series / phase name: Soil Classification: essional Endorsement signature: name printed/typed:	Profile	Drainage Class	restrictive layer bedrock Hydrologic Group	40 50 60 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	nor/fydric Soll Series / phase name: Soil Classification: e: #: #: e: 10/6/09		Drainage Class	restrictive layer bedrock Hydrologic Group

Detailed Description of Subsurface Conditions at Project Sites

Proje	ect Name:		Applicant Name:		_		Project Location (mu		
	Highland Wind	d Project		Highland Wind LI	_C			Highland Plantation, N	ME
	Exploration Symbol:	SOIL DESCRIPTION AND TP-40A	X Test Pit	Boring		Exploration Symbol:		X Test Pit	Boring
	Texture	Depth of Organic Horizon Above Consistency	Color	Mottling		Texture	Depth of Organic Horizon Above Consistency	Color	Mottling
	LOAMY SAND	FRIABLE	2.5Y 6/4 LIGHT YELLOWISH BROWN				FRIABLE	10YR 2/2 V. DK. BROWN 2.5Y 4/2 DK. GRAYISH BROWN	
			2.5Y 4/3		=		SOMEWHAT FIRM	2.5Y 6/3 LIGHT YELLOWISH	
(se)			OLIVE BROWN		(Se	8		BROWN	COMMON, MEDIUM,
Inches,	3				(Inches)	8			DISTINCT
CE (I	3						VERY FIRM	2.5Y 6/3	MANY, COARSE,
	2				SURFACE			LIGHT YELLOWISH	PROMINENT
INS 14	4							BROWN	
	3				TIOS				
ZAL 70	LOAMY SAND	SOMEWHAT FIRM	2.5Y 5/2 GRAYISH BROWN	COMMON, MEDIUM, DISTINCT	2AL	D	LIMIT OF EXC	AVATION = 16"	
MINE					#INE				
V MO	3				V MC				
BELO			AVATION = 28"		BELOW MINERAL	D			
TH I					DEPTH				
DEF					DEF				
40					4	D			
50	2				_5	0			
60					6				
•	hydric non-hydric	Slope % 	Limiting factor16"	ground water restrictive layer bedrock	•	hydric non-hydric	Slope % 	Limiting factor	 ground water restrictive layer bedrock
C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group	C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:				L.S.E.	Soil Classification:			
		Profile SOIL DESCRIPTION AND	Drainage Class	Design Class		1	Profile SOIL DESCRIPTION AN	Drainage Class	Design Class
	Exploration Symbol:			Boring		Exploration Symbol:	TP-43		Boring
		Depth of Organic Horizon Above					Depth of Organic Horizon Above		
	Texture	Consistency	Color	Mottling	_	Texture	Consistency	Color 10YR 2/2	Mottling
		FRIABLE	10YR 2/2 VERY DARK BROWN		_		FRIABLE	VERY DARK BROWN 10YR 6/1 GRAY	
4		TRABLE	10YR 7/1			SILT LOAM	TRIABLE	7.5YR 4/4	
0			LIGHT GRAY 7.5YR 2.5/3		_	5		BROWN	
ches,	7		VERY DARK BROWN		(Inches)	7		7.5YR 3/4	
JE (Inc	VERY FINE SANDY LOAM		7.5YR 3/4 DARK BROWN					DARK BROWN	
10 -10			10YR 4/4		SURFACE			10YR 4/6 STRONG BROWN	
	3		DK. YELLOW BROWN	FEW, FINE, FAINT	SUR	4			
	LOAMY VERY FINE SAND	SOMEWHAT FIRM	2.5Y 5/4 LIGHT OLIVE	COMMON, MEDIUM,	1 1 SOIL	LOAMY VERY FINE SAND	SOMEWHAT FIRM	2.5YR 4/4 OLIVE BROWN	COMMON, MEDIUM, DISTINCT
IERAL S			BROWN	DISTINCT	NERAL S				
	5					4			
DEPTH BELOW MII		LIMIT OF EXC	AVATION = 23"		DEPTH BELOW MI		LIMIT OF EXC	AVATION = 24"	
]≊ I	0				°	D			
HH					THE				
DEP					DEP				
40)				4	D			
50	b				5	D.			
60					6				
•	hydric non-hydric	Slope %	Limiting factor 10 "	 ground water restrictive layer 	•	hydric non-hydric	Slope % 3-8	Limiting factor 12"	 ground water restrictive layer
—	Soil Series / phase name:			bedrock		Soil Series / phase name:			bedrock
C.S.S.	con Genes / priase name:		Drainage Class	Hydrologic Group	C.S.S.	con denes / priase name:		Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class
		FIOIlle	Drainage Class	Design Class			Fiolile	Drainage Class	Design Class
Prof	essional Endorsement	t s (as applicable)			-				
					D	ate:			
C.S.S									
	signature:				L	ic.#:			
1	name printed/typed:								
						ate:			
L.S.E									
	signature:					10/6/09 ic.#:			
1		Michael Gless	sner		ľ	397	- the second states in the		
L	name printed/typed:	michael Gless				291	affix professional seal		

. ·	- M			tailed Description of Subsu	rface	Con				
Proje	ect Name: Highland Wind		Applicant Name:	Highland Wind LL	.C			Project Location (mu	Highland Plantation, N	ИЕ
	Exploration Symbol:	SOIL DESCRIPTION AND TP-40	CLASSIFICATION X Test Pit	Boring		E	xploration Symbol:	SOIL DESCRIPTION AN TP-41	D CLASSIFICATION X Test Pit	Boring
0	0 Texture	Depth of Organic Horizon Above	Mineral Soil Color	Mottling		0	0 Texture	Depth of Organic Horizon Above Consistency	Mineral Soil Color	Mottling
1	VERY FINE SAND	LOOSE	2.5Y 5/4			1	LOAMY SAND	.	10YR 6/2 LT. BROWNISH GRAY	y
3		TO FRIABLE	LIGHT OLIVE BROWN			3		FRIABLE	2.5Y 6/6	
5						5	SANDY LOAM		OLIVE YELLOW	
(nches) ∞ ₁ ₀	SILT LOAM	FRIABLE	2.5Y 3/2		ches)	7				
CE (In ° °	SILT LOAM	FRIADLE	VERY DARK GRAYISH BROWN		u) =c	9				
IRFA(GRATISH BROWN		IRFA	10			0.5% 5%	
14 14 15 NR			2.5Y 4/4 OLIVE BROWN		SOIL SURFACE (Inches)	14 16	LOAMY FINE SAND W/ COARSE FRAGS	FIRM	2.5Y 5/4 LIGHT OLIVE BROWN	COMMON, MEDIUM, DISTINCT
AL SO	FINE SAND SILT LOAM W/	SOMEWHAT FIRM	2.5Y 4/3	FEW, FINE, FAINT	AL SC	18 20			BROWN	
INER 20 20 20 20	COARSE SAND & GRAVEL		OLIVE BROWN	MANY, COARSE, PROMINENT	DEPTH BELOW MINERAL					
ммс		LIMIT OF EXC	AVATION = 22"		M MC					
BEL					BEL	30				
EPTH					EPTH					
۵ 40					D	40				
50						50				
60						60				
0	hydric	Slope %	Limiting factor	 ground water 	۵		hydric	Slope %	Limiting factor	 ground water
•	non-hydric	3-8	14"	 restrictive layer bedrock 	•		non-hydric	3-8	10"	 restrictive layer bedrock
c.s.s.	Soil Series / phase name:		Drainage Class	Hydrologic Group	C.S.	5. S	oil Series / phase name:		Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.E	S	Soil Classification:	Profile	Drainage Class	Design Class
	Exploration Symbol:	SOIL DESCRIPTION AND	CLASSIFICATION Test Pit	Boring		1	exploration Symbol:	SOIL DESCRIPTION AN	D CLASSIFICATION Test Pit	Boring
		_ Depth of Organic Horizon Above	Mineral Soil					 Depth of Organic Horizon Above	Mineral Soil	
0	Texture	Consistency	Color	Mottling		0	Texture	Consistency	Color	Mottling
2						2				
4				/		4				
1es)			/	Ý	les)	6			/	
(Inches)					(Inch	8				
FACE					SURFACE (Inches)	10				
SUR SUR					SUR	14				
16 18 7/OS -						16 18				
ERAL					2	20		/	/	
DEPTH BELOW MINEF					DEPTH BELOW MINE	24				
ELOV					NOTE	30				
					DTH E					
40	/					40	/			
50						50				
60						60				
0	hydric non hydric	Slope %	Limiting factor	ground water restrictive layer	0		hydric non-hydric	Slope %	Limiting factor	 ground water restrictive layer
c.s.s.	Soil Series / phase name:			bedrock	C.S.	s. 9	oil Series / phase name:			bedrock
LŞÆ.	/ Soil Classification:		Drainage Class	Hydrologic Group	L, 8 .E	s	oil Classification:		Drainage Class	Hydrologic Group
//		Profile	Drainage Class	Design Class	Ľ	/		Profile	Drainage Class	Design Class
Dref	colonal Enderson	to (an applicable)								
	essional Endorsement	is (as applicable)				D '				
C.S.S.	signature:					Date	5.			
	olgnaturo.					Lic.#	#:			
	name printed/typed:									
L.S.E.						Date				
	signature:					Lic.#	9/18/09 #:			

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	Detailed Description of Subsurface Conditions at Project Sites	
Project Name:	Applicant Name:	Project Location (municipality):
Highland Wind Project	Highland Wind LLC	Highland Plantation, ME

	Exploration Symbol:	SOIL DESCRIPTION AN TP-36	X Test Pit	Boring			Exploration Symbol:		X Test Pit	Boring
0	Texture LOAM	_* Depth of Organic Horizon Above Consistency	e Mineral Soil Color 10YR 2/2 V. DK. BROWN	Mottling		0	Texture LOAMY SAND	Depth of Organic Horizon Above Consistency	Mineral Soil Color 10YR 6/2 LT. BRN. GRY	Mottling
2	SILT LOAM W/ COARSE FRAGS	FRIABLE	5Y 4/3 OLIVE			2		FRIABLE		NONE OBSERVED
4	LOAMY SAND		5Y 6/2	FEW, FINE, FAINT		4	FINE SANDY LOAM		10YR 3/6 DARK YELLOWISH	
es)		VERY FIRM	LIGHT OLIVE GRAY		(səu	6			BROWN	
(Inches)					SURFACE (Inches)	8				
FACE ₀ ₀					FACE	10				
12 14					SUR	12				
10S			CAVATION = 15"		SOIL	18				
ERAL 02			CAVATION = 15		ERAL	20			AVATION = 16"	
v min					NIN N					
BELOV s					ELOV	30				
					DEPTH BELOW MINERAL					
<i>DЕРТ</i> Н					DEF					
40						40				
50						50				
60						60				
•	hydric non-hydric	Slope % 3-8	Limiting factor	 ground water restrictive layer 	•		hydric non-hydric	Slope % 3-8	Limiting factor >16"	 ground water restrictive layer
	Soil Series / phase name:		<u>_</u>	bedrock	_		Soil Series / phase name:			bedrock
0.0.0.			Drainage Class	Hydrologic Group	C.S.				Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.I	.E.	Soil Classification:	Profile	Drainage Class	Design Class
	Exploration Symbol:	SOIL DESCRIPTION AN TP-38		Boring	_		Exploration Symbol:	SOIL DESCRIPTION AN TP-39	X Test Pit	Boring
	3	Depth of Organic Horizon Above	e Mineral Soil Color	Mottling			2 Texture	Depth of Organic Horizon Above	Mineral Soil Color	Mottling
1	LOAM	consistency	10YR 2/2 V. DK. BROWN	Motting		1	Texture	Consistency	6000	Motting
3	LOAMY SAND	FRIABLE	10YR 4/6			3				
5			DARK YELLOWISH BROWN			4	SANDY LOAM	FRIABLE	7.5YR 3/4	
ches)					(seu;	6			DARK BROWN	
E (Inc					SURFACE (Inches)	8				
10 12	LOAMY FINE SAND		2.5Y 5/6 LIGHT OLIVE		RFAC	10				
13 14 INS 71			BROWN	COMMON, MED, DIST	IT SU	14 16				
OS 16	VERY FINE SAND	VERY FIRM	2.5Y 5/4	MANY, COARSE, PROMINENT	TIOS T	18 20				
VERA ⁵⁰			LIGHT OLIVE BROWN		VERA	24				
25 IW M					W WI	-				
BELO 8		LIMIT OF EXC	CAVATION = 25"		BELO	30				COMMON, MEDIUM,
<i>DЕРТН В</i> І					DEPTH BELOW MINERAL	32				DISTINCT
PE PE					DE	40	LOAMY FINE SAND	FIRM	2.5Y 4/4 OLIVE BROWN	MANY, COARSE, PROMINENT
50						50			AVATION = 40"	
60						60				
	hydric	Slope %	Limiting factor	 ground water 	٥		hydric	Slope %	Limiting factor	 ground water
•	non-hydric	<u>3-8</u>	13"	 restrictive layer bedrock 	•		non-hydric	25-40		 restrictive layer bedrock
c.s.s.	Soil Series / phase name:		·		C.S.	.s.	Soil Series / phase name:			
L.S.E.	Soil Classification:		Drainage Class	Hydrologic Group	L.S.I	.E.	Soil Classification:		Drainage Class	Hydrologic Group
/		Profile	Drainage Class	Design Class		_/		Profile	Drainage Class	Design Class
Prote	essional Endorsement	ts (as applicable)				L				
C.S.S.						Da	ate:			
	signature:					Lic	o.#:			
	name printed/typed:									
L.S.E.						Da	ate:			
	signature:					, ·	9/18/09			
	name printed/typed:	Michael Gless	sner			Lic	397	affix professional seal		

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Detailed Departmention	of Subsurface Conditions at Project Sites	

Proje	oject Name: Applicant Name: Highland Wind Project Highland Wind LL			.c	Project Location (municipality): Highland Plantation, ME					
		SOIL DESCRIPTION AN	D CLASSIFICATION				SOIL DESCRIPTION AN	ID CLASSIFICATION		
	Exploration Symbol:	TP-32	X Test Pit	Boring		Exploration Symbol:		X Test Pit	Boring	
0	1 Texture	Depth of Organic Horizon Above Consistency	e Mineral Soil Color	Mottling		3 ₀ Texture	Depth of Organic Horizon Above Consistency	Mineral Soil Color	Mottling	
1	FINE SAND	Consistency	7.5YR 6/1 GRAY		=	LOAMY FINE SAND		7.5YR 4/2 BROWN		
3		FRIABLE			1 =	3	FRIABLE			
- 4	FINE SANDY LOAM		7.5YR 4/4 BROWN			FINE SANDY LOAM		7.5YR 3/4 DARK BROWN		
es)					les)	6				
(Inct					(Inches,	8				
					ACE	9				
					SURFAC	2				
					S 71OS		SOMEWHAT FIRM	10YR 4/6	FEW, FINE, FAINT	
AL S						SANDY LOAM	SOMEWIATTIKM	DARK YELLOWISH BROWN		
NER					MINERAL ₂ ₂	1				
W M 28							LIMIT OF EXC	AVATION = 21"		
SELO	LOAMY SAND	FIRM	10YR 5/6 YELLOWISH BROWN	COMMON, MEDIUM, DISTINCT	BELOW	0				
HT I				Diofinio	E					
DEF		LIMIT OF EXC	CAVATION = 30"		DEP					
40					4	0				
50					5	0				
60					6	0				
0	hydric	Slope %	Limiting factor	 ground water 	٥	hydric	Slope %	Limiting factor	 ground water 	
•	non-hydric	3-8	28"	 restrictive layer bedrock 	•	non-hydric	3-8	15"	 restrictive layer bedrock 	
C.S.S.	Soil Series / phase name:				C.S.S.	Soil Series / phase name				
L.S.E.	Soil Classification:		Drainage Class	Hydrologic Group	L.S.E.	Soil Classification:		Drainage Class	Hydrologic Group	
L.J.E.		Profile SOIL DESCRIPTION AN	Drainage Class	Design Class	L.3.E.		Profile SOIL DESCRIPTION AN	Drainage Class	Design Class	
	Exploration Symbol:	TP-34	X Test Pit	Boring		Exploration Symbol:		X Test Pit	Boring	
		Depth of Organic Horizon Abov		Mattling			_ Depth of Organic Horizon Above		Mattling	
1	Texture	Consistency	Color	Mottling			Consistency	Color 10YR 2/2	Mottling	
2	LOAM	FRIABLE	10YR 2/2 VERY DARK				FRIABLE	VERY DARK BROWN		
4			BROWN					7.5YR 6/1 GRAY		
(Se) 9	SILT LOAM		10YR 3/3		(Se	6		GIAT		
/lnche			DARK BROWN		(Inches)	SANDY LOAM		7.5YR 4/4		
9 10 10			10YR 4/6			9		BROWN		
	FINE SANDY LOAM		DRAK YELLOWISH BROWN		SURFACE	2				
S 7/0	LOAMY FINE SAND	FIRM		MANY, COMMON,	1	5				
18 0S 7P	LOAMY FINE SAND	FIRM	2.5Y 5/4 LIGHT OLIVE	PROMINENT					COMMON, MEDIUM, DISTINCT	
			BROWN		INERAL [2]	4	FIRM	2.5Y 4/4 OLIVE BROWN		
IW M			CAVATION = 24"			6				
BELOW N					BELOW A	0	LIMIT OF EXC	AVATION = 26"		
					DEPTH E					
DEPTH					DEF					
40					4	0				
50					6	0				
60					6	0				
٥	hydric	Slope %	Limiting factor	 ground water 	•	hydric	Slope %	Limiting factor	 ground water 	
•	non-hydric	3-8	14"	 restrictive layer bedrock 	•	non-hydric	3-8	15"	 restrictive layer bedrock 	
C.S.S.	Soil Series / phase name:		Derit Ci		C.S.S.	Soil Series / phase name		Deal Ci		
L.S.E.	Soil Classification:		Drainage Class	Hydrologic Group	L.S.E.	Soil Classification:		Drainage Class	Hydrologic Group	
		Profile	Drainage Class	Design Class			Profile	Drainage Class	Design Class	
Profe	essional Endorsement	ts (as applicable)					ļ			
C.S.S.					C	ate:				
0.0.0	signature:									
					L	ic.#:				
	name printed/typed:									
L.S.E.					C	ate:				
L.J.C.	signature:					9/18/09				
					L	ic.#:]			
		Michael Gles	sner			397	affix professional seal			
	Stantec Consul	Iting							Page 9	

	ect Name:		Applicant Name:			onditions at Project Sites	Project Location (mu	nicipality):	
	Highland Wind			Highland Wind L	LC		•	Highland Plantation, I	ЛЕ
	Exploration Symbol:	SOIL DESCRIPTION AN TP-28	D CLASSIFICATION X Test Pit	Boring		Exploration Symbol:	SOIL DESCRIPTION AN TP-29	D CLASSIFICATION Test Pit	Boring
	1	Depth of Organic Horizon Above	e Mineral Soil			0	_ Depth of Organic Horizon Above	Mineral Soil	
0	Texture LOAMY FINE SAND	Consistency	Color 7.5YR 5/2	Mottling	1	Texture LOAM	Consistency	Color 10YR 3/2 V.DK.GRY.BRN	Mottling
2		FRIABLE	BROWN		2	VERY FINE	FRIABLE	10YR 4/6	
4	FINE SANDY LOAM		7.5YR 4/6 STRONG BROWN		4	SANDY LOAM		DARK YELLOWISH BROWN	
s) °	FINE SANDT LOAM		STRONG BROWN		(se			BROWN	
(Inches) 8 2 2					(Inches,				
9 10 10									
16					16				
OS 78							FIRM	2.5Y 5/6	COMMON, MEDIUM,
NEK/			10YR 4/4 DARK YELLOWISH					LIGHT OLIVE BROWN	DISTINCT
22 M			BROWN				LIMIT OF EXC	AVATION = 23"	
		LIMIT OF EXC	CAVATION = 22"	1	BELOW				
					THE				
<u>–</u>					DEF				
40					40				
50					50				
60					60				
0	hydric	Slope %	Limiting factor	 ground water 	۵	hydric	Slope %	Limiting factor	 ground water
•	non-hydric	3-8	>22"	 restrictive layer bedrock 	•	non-hydric	3-8	16"	 restrictive layer bedrock
:.s.s.	Soil Series / phase name:				C.S.S.	Soil Series / phase name:			
.S.E.	Soil Classification:		Drainage Class	Hydrologic Group	L.S.E.	Soil Classification:		Drainage Class	Hydrologic Group
		Profile SOIL DESCRIPTION AN	Drainage Class	Design Class	L.J.L.		Profile SOIL DESCRIPTION AN	Drainage Class	Design Class
	Exploration Symbol:	TP-30	X Test Pit	Boring		Exploration Symbol:		X Test Pit	Boring
		Depth of Organic Horizon Above Consistency	e Mineral Soil Color	Mottling			_ Depth of Organic Horizon Above Consistency	Mineral Soil Color	Mottling
1	Texture LOAM LOAMY SAND	consistency	10YR 2/2 V. DK. BROWN 10YR 6/2 LT. BRN. GRY		1	Texture LOAM	Consistency	10YR 2/2 V. DK. BROWN	Motting
2		FRIABLE			3		FRIABLE		NONE OBSERVED
5	FINE SANDY LOAM		7.5YR 3/4 DARK BROWN		4	VERY FINE SANDY LOAM		10YR 4/6 DARK YELLOWISH	
es)					es)			BROWN	
(Inches)					(Inches,				
-ACE					SURFACE				
					12 12				
16 18 18					2 14				
					14 16 18 110 110				
J 19					7/OS				
ΥΥ Έ	LOAMY COARSE	FIRM	2.5Y 5/4	MANY, COARSE,	ERAL SOIL		SOMEWHAT FIRM		
ΥΥ Έ	LOAMY COARSE SAND	FIRM	2.5Y 5/4 LIGHT OLIVE BROWN	MANY, COARSE, PROMINENT	ERAL SOIL			AVATION = 24"	
ΥΥ Έ	LOAMY COARSE SAND	FIRM	LIGHT OLIVE		ERAL SOIL			AVATION = 24"	
IH BELOW MINERA	LOAMY COARSE SAND		LIGHT OLIVE		ERAL SOIL			AVATION = 24"	
DEPTH BELOW MINERA	LOAMY COARSE SAND		LIGHT OLIVE BROWN		DEPTH BELOW MINERAL SOIL			AVATION = 24"	
DEPTH BELOW MINEKA	LOAMY COARSE SAND		LIGHT OLIVE BROWN		ERAL SOIL			AVATION = 24"	
DEPIH BELOW MINEKA [s] [s]	LOAMY COARSE SAND		LIGHT OLIVE BROWN		DEPTH BELOW MINERAL SOIL			AVATION = 24"	
DEPTH BELOW MINEKA	LOAMY COARSE SAND		LIGHT OLIVE BROWN		DEPTH BELOW MINERAL SOIL			AVATION = 24"	
	LOAMY COARSE SAND		LIGHT OLIVE BROWN AVATION = 30" Limiting factor	PROMINENT	DEPTH BELOW MINERAL SOIL 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	hydric		Limiting factor	ground water ground water
	LOAMY COARSE SAND	LIMIT OF EXC	LIGHT OLIVE BROWN AVATION = 30"	PROMINENT	DEPTH BELOW MINERAL SOIL	hydric non-hydric	LIMIT OF EXC		ground water restrictive layer bedrock
	LOAMY COARSE SAND	LIMIT OF EXC Slope %	LIGHT OLIVE BROWN AVATION = 30" Limiting factor		DEPTH BELOW MINERAL SOIL 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	hydric	LIMIT OF EXC	Limiting factor	restrictive layer bedrock
	LOAMY COARSE SAND	LIMIT OF EXC Slope % 3-8	LIGHT OLIVE BROWN AVATION = 30" Limiting factor 	PROMINENT ground water restrictive layer bedrock Hydrologic Group	■ □ DEPTH BELOW MINERAL SOIL	hydric non-hydric	LIMIT OF EXC	Limiting factor	restrictive layer bedrock Hydrologic Group
	LOAMY COARSE SAND	LIMIT OF EXC Slope %	LIGHT OLIVE BROWN AVATION = 30" Limiting factor		10 = 12 2 2 2 2 2 2 2 2 2	hydric non-hydric Soil Series / phase name:	LIMIT OF EXC	Limiting factor	restrictive layer bedrock
	LOAMY COARSE SAND	LIMIT OF EXC Slope % 3-8	LIGHT OLIVE BROWN AVATION = 30" Limiting factor 	PROMINENT ground water restrictive layer bedrock Hydrologic Group	10 = 12 2 2 2 2 2 2 2 2 2	hydric non-hydric Soil Series / phase name:	LIMIT OF EXC	Limiting factor	restrictive layer bedrock Hydrologic Group
	LOAMY COARSE SAND	LIMIT OF EXC	LIGHT OLIVE BROWN AVATION = 30" Limiting factor 	PROMINENT ground water restrictive layer bedrock Hydrologic Group	10 = 12 2 2 2 2 2 2 2 2 2	hydric non-hydric Soil Series / phase name:	LIMIT OF EXC	Limiting factor	restrictive layer bedrock Hydrologic Group
	LOAMY COARSE SAND	LIMIT OF EXC	LIGHT OLIVE BROWN AVATION = 30" Limiting factor 	PROMINENT ground water restrictive layer bedrock Hydrologic Group	100 TH2500 MINEST	hydric non-hydric Soil Series / phase name:	LIMIT OF EXC	Limiting factor	restrictive layer bedrock Hydrologic Group
	LOAMY COARSE SAND	LIMIT OF EXC	LIGHT OLIVE BROWN AVATION = 30" Limiting factor 	PROMINENT ground water restrictive layer bedrock Hydrologic Group	100 TH2500 MINEST	hydric non-hydric Soil Series / phase name:	LIMIT OF EXC	Limiting factor	restrictive layer bedrock Hydrologic Group
	LOAMY COARSE SAND	LIMIT OF EXC	LIGHT OLIVE BROWN AVATION = 30" Limiting factor 	PROMINENT ground water restrictive layer bedrock Hydrologic Group		hydric non-hydric soil Series / phase name:	LIMIT OF EXC	Limiting factor	restrictive layer bedrock Hydrologic Group
	LOAMY COARSE SAND	LIMIT OF EXC	LIGHT OLIVE BROWN AVATION = 30" Limiting factor 	PROMINENT ground water restrictive layer bedrock Hydrologic Group		hydric non-hydric Soil Series / phase name:	LIMIT OF EXC	Limiting factor	restrictive layer bedrock Hydrologic Group
	LOAMY COARSE SAND	LIMIT OF EXC	LIGHT OLIVE BROWN AVATION = 30" Limiting factor 	PROMINENT ground water restrictive layer bedrock Hydrologic Group	110S TRAJNIN MOTJER HLAED	hydric non-hydric Soil Series / phase name: Soil Classification:	LIMIT OF EXC	Limiting factor 	restrictive layer bedrock Hydrologic Group
	LOAMY COARSE SAND	LIMIT OF EXC	LIGHT OLIVE BROWN AVATION = 30" Limiting factor 	PROMINENT ground water restrictive layer bedrock Hydrologic Group	110S TRAJNIN MOTJER HLAED	hydric non-hydric soil Series / phase name:	LIMIT OF EXC	Limiting factor 	restrictive layer bedrock Hydrologic Group

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Detailed Departmention of Culturations Conditions at Depicet Cites	
Detailed Description of Subsurface Conditions at Project Sites	

i i oje	Highland Wind Project Highland Wind Project Highland Wind Project				LC Highland Plantation, ME					
		SOIL DESCRIPTION AND			- T			SOIL DESCRIPTION AN		
	Exploration Symbol:	TP-24	X Test Pit	Boring			Exploration Symbol:		X Test Pit	Boring
		Depth of Organic Horizon Above	_					_ Depth of Organic Horizon Above		
0	Texture	Consistency	Color	Mottling		0	Texture	Consistency	Color 10YR 3/2 V. DARK	Mottling
2	LOAM FINE SAND		10YR 3/2 V.DK.GRY.BRN 10YR 6/2 LT. BRN. GRY			2	LOAM		GRAYISH BROWN	
3		FRIABLE	10YR 4/6 DARK YELLOWISH			3	LOAMY SAND	FRIABLE	10YR 6/2 LT. BRN. GRY	
4	LOAMY SAND		BROWN			4			7.5YR 3/4 DK. BRN	
(Se					loc	6	SANDY LOAM		10YR 5/6	
(Inches) [~] ~] ~			10YR 5/8 YELLOWISH BROWN		- dor				YELLOWISH BROWN	
FACE (I					10	ц _ 9				
10 12					STIDEACE (Inches)	10				
					110	0 14				
16 18 7/OS					100	16 18				
					0 1 1 1	20		FIRM	2.5Y 5/6	MANY, COARSE,
MINERAL 5 0					NEC				LIGHT OLIVE BROWN	PROMINENT
		FIRM		MANY, COARSE,	17. 14					
BELOW		FINI		PROMINENT		28 07 30				
H BE			AVATION = 28"					LIMIT OF EXC	AVATION = 28"	
DEPTH			AVAILON = 20		DEDTH					
D					C					
40						40				
50						50				
60						60				
0	hydric	Slope %	Limiting factor	 ground water 			hydric	Slope %	Limiting factor	 ground water
•	non-hydric	3-8	25"	 restrictive layer 		•	non-hydric	8-15	16"	 restrictive layer
	Soil Series / phase name:			bedrock	-	- k	Soil Series / phase name:			bedrock
C.S.S.	con conce / priase name:		Drainage Class	Hydrologic Group	C.	.S.S.			Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:				L	S.E.	Soil Classification:			
/		Profile SOIL DESCRIPTION AND	Drainage Class D CLASSIFICATION	Design Class				Profile SOIL DESCRIPTION AN	Drainage Class D CLASSIFICATION	Design Class
	Exploration Symbol:		X Test Pit	Boring			Exploration Symbol:		X Test Pit	Boring
		_ Depth of Organic Horizon Above						_ Depth of Organic Horizon Above		
0	Texture LOAM	Consistency	Color 10YR 3/2 VERY DARK	Mottling		0	Texture FINE SAND	Consistency	Color 10YR 7/1 LIGHT GRAY	Mottling
2			GRAYISH BROWN			2	LOAMY SAND		7.5Y 3/4 DARK BROWN	
3	FINE SAND	FRIABLE	10YR 7/1 LIGHT GRAY			3		FRIABLE	10YR 5/6	
5	LOAMY SAND		7.5Y 3/4			5			YELLOWISH BROWN	
(es)			DARK BROWN		lac					
(Inches)	SANDY LOAM		10YR 4/6		(achoc)	1. 8				
			DARK YELLOWISH BROWN		LL C	<u><u> </u></u>				
SURFACE [c] [c			2		SUBEACE					
0 13					10		FINE SANDY LOAM	SOMEWHAT FIRM	10YR 5/8	
16 18 7/OS			10YR 5/6		100	18			YELLOWISH BROWN	
			YELLOWISH BROWN		INEDAL SOIL	20 5				
INERAL ⁵ ⁵ ³		SOMEWHAT FIRM			INFI	24		LIMIT OF EXC	AVATION = 20"	
		LIMIT OF EXC	AVATION = 24"		<	<				
30 13) 1 1 1 1 1 1 1 1 1 1 1 1 1				
TH E					בר ם					
DEPTH BELOW I					DEDTH RELOW					
40						40				
50						50		<u> </u>		
60						60				
•	hydric	Slope %	Limiting factor	ground water	0		hydric	Slope %	Limiting factor	ground water
•	non-hydric	3-8	20"	 restrictive layer bedrock 			non-hydric	8-15	14"	 restrictive layer bedrock
c.s.s.	Soil Series / phase name:				c	.s.s.	Soil Series / phase name:			
	0-11-0117		Drainage Class	Hydrologic Group	_	-{	0-11-0117		Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L	.S.E.	Soil Classification:	Profile	Drainage Class	Design Class
			-							
Profe	ssional Endorsement	ts (as applicable)								
						Da	ite:			
C.S.S.										
	signature:					Lic	.#:			
	name printed/typed:					+		1		
L.S.E.						Da	ite:			
	signature:						9/18/09]		
						Lic	2.#:			
	name printed/typed:	Michael Gless	sner				397	affix professional seal		
	Stantec Consul	Iting								Page 7

Dotailod	Decoription of	Subcurface	Conditions at	Project Sites

FIOJE	Dect Name: Applicant Name: Highland Wind Project Highland Wind					Project Location (municipality): Highland Plantation, ME				
		SOIL DESCRIPTION AN	D CLASSIFICATION					SOIL DESCRIPTION AN	ID CLASSIFICATION	
	Exploration Symbol:	TP-21	X Test Pit	Boring		-	Exploration Symbol:		X Test Pit	Boring
0	Texture	_" Depth of Organic Horizon Above Consistency	Color	Mottling		0	2 Texture	_ Depth of Organic Horizon Above Consistency	Mineral Soil Color	Mottling
2	LOAM	FRIABLE	10YR 3/2 VERY DARK			1	LOAM	FRIABLE	10YR 2/2	
3			GRAYISH BROWN			3			VERY DARK BROWN	
5	LOAMY SAND		7.5Y 5/6 STRONG BROWN			5				
(Inches)			STRONG BROWN		(Inches)	6 7			10YR 3/2	
						8	SILT LOAM W/ COARSE FRAGS		VERY DARK GRAYISH BROWN	
FACE					SURFACE	10	COARSE SANDY LOAM		2.5Y 4/4	MANY, COARSE,
						12	W/ ROCKS & GRAVEL		OLIVE BROWN	PROMINENT
7/OS					SOIL	16 18				
LAL RAL					RAL	20				
MINERAL	LOAMY VERY FINE SAND	FIRM	10YR 4/4 DARK YELLOWISH	COMMON, MEDIUM, DISTINCT	BELOW MINERAL			LIMIT OF EXC	AVATION = 20"	
A 29			BROWN		MO					
		LIMIT OF EXC	CAVATION = 29"		I BEL	30				
ЕРТН					DEPTH	-				
					Q	40				
40						+0				
50						50		<u> </u>		
60		 				60		 		
•	hydric non-hydric	Slope %	Limiting factor	 ground water restrictive layer 	•	_	hydric non-hydric	Slope %	Limiting factor	 ground water restrictive layer
	Soil Series / phase name:	<u>8-15</u>	19"	bedrock	_	k	Soil Series / phase name:	15-25		bedrock
C.S.S.	,		Drainage Class	Hydrologic Group	C.S.	.ə.			Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.I	E.	Soil Classification:	Profile	Drainage Class	Design Class
		SOIL DESCRIPTION AN	D CLASSIFICATION	_				SOIL DESCRIPTION AN	ID CLASSIFICATION	
	Exploration Symbol:	TP-23	X Test Pit	Boring		-	Exploration Symbol:	 _ Depth of Organic Horizon Above	Test Pit	Boring
0	Texture	Consistency	Color	Mottling		0	Texture	Consistency	Color	Mottling
2			7.5YR 5/1 GRAY 5YR 4/6			1				
4	LOAMY SAND	FRIABLE	YELLOWISH RED			3				
5			10YR 5/6 YELLOWISH BROWN			5				/
(Inches)					(Inches)	7			/	
						8				
					SURFACE	10				
					- SUI	14				
	LOAMY FINE SAND		10YR 6/6 BROWNISH YELLOW		SOIL	18				
					IINERAL	20			/	
		LIMIT OF EXC	CAVATION = 19"		~	24		· · · · /		
M073					мот	30				
H BE					H BE					
DEPTH BELOW A					DEPTH BELOW					
40					7	40				
50						50				7
60						60				
	hydric	Slope %	Limiting factor	ground water	_		bydro	Slope %	imiting factor	ground water
•	non-hydric	Slope %	>19"	restrictive layer	•		hydric non nydric	Slope %	Limiting factor	 restrictive layer
c.s.s.	Soil Series / phase name:			bedrock	C.S.	s	Søll Series / phase name:			bedrock
	Soil Classification:		Drainage Class	Hydrologic Group		X	Soil Classification:		Drainage Class	Hydrologic Group
L.S.E.	Soli Classification.	Profile	Drainage Class	Design Class	L8.1	E.	Soli Classification.	Profile	Drainage Class	Design Class
Profe	essional Endorsemen	ts (as applicable)								
						Da	te:			
C.S.S.	signature:					Du				
	signature.					Lic	:.#:			
	name printed/typed:]		
195						Da	te:			
L.S.E.	signature:					1	9/17/09			
						Lic		1		
	name printed/typed:	Michael Gles	sner				397	affix professional seal		
	Stantec Consu	Iting								Page 6

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SOIL PROFILE/CLASSIFICATION INFORMATION Detailed Description of Subsurface Conditions at Project Sites

Proje	ect Name: Highland Wind	d Project	Applicant Name:	Highland Wind LLC	;			Project Location (mu	inicipality): Highland Plantation, M	ME
		SOIL DESCRIPTION AND	D CLASSIFICATION					SOIL DESCRIPTION AN		
	Exploration Symbol:		X Test Pit	Boring		Exploration Syn			X Test Pit	Boring
0	Texture LOAMY SAND	Depth of Organic Horizon Above Consistency	Color 7.5YR 7/1 LT. GRAY	Mottling	_	0 Textur 1 LOAM		Depth of Organic Horizon Above Consistency	Color 10YR 3/2 V.DK.GRY.BRN	Mottling
2	FINE SANDY LOAM	FRIABLE	7.5YR 3/4		-	2 3 LOAMY S	SAND	FRIABLE	7.5Y 5/1 GRAY 7.5YR 3/4 DK. BROWN	
4			DARK BROWN		_	4 5			10YR 5/6	
ves)	SANDY LOAM		10YR 4/4 DARK YELLOWISH		hes)	6			YELLOWISH BROWN	
(hc)			BROWN		E (Inches)	8				
					URFACE					
Ins 14					<u>s</u>					
	SANDY LOAM W/ COARSE FRAGMENTS	SOMEWHAT FIRM	2.5Y 5/6 LIGHT OLIVE BROWN	FEW, FINE, FAINT	so/		OAM	FIRM		COMMON, MEDIUM, DISTINCT
ERAL			AVATION = 17"		MINERAL				AVATION = 20"	Diotinto
					NIN A				AVAIION = 20	
= 100 130					BELOW	30				
14 BI					PTH B					
					DEF					
40					-	40				
50					-	50				
60					-	50				
•	hydric non-hydric	Slope % 3-8	Limiting factor	ground water restrictive layer bedrock	•	hydric non-hydric		Slope % 	Limiting factor 14"	 ground water restrictive layer bedrock
c.s.s.	Soil Series / phase name:		Drainage Class	Hydrologic Group	C.S.S.	Soil Series / pha			Drainage Class	Hydrologic Group
S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.E.	Soil Classificati	on:	Profile	Drainage Class	Design Class
	Exploration Symbol:	SOIL DESCRIPTION AND TP-19	CLASSIFICATION X Test Pit	Boring		Exploration Syn	nbol:	SOIL DESCRIPTION AN TP-20	CLASSIFICATION Test Pit	Boring
	2	Depth of Organic Horizon Above	Mineral Soil				1	Depth of Organic Horizon Above	Mineral Soil	
1	Texture LOAM	Consistency	Color 10YR 3/2 VERY DARK	Mottling	-	o Textu	re	Consistency	Color 7.5Y 5/1 GRAY	Mottling
3	LOAMY FINE SAND	FRIABLE	GRAYISH BROWN 7.5Y 5/1 GRAY		-	3 LOAMY S	SAND	FRIABLE	5YR 5/6	
5	FINE SANDY LOAM		7.5YR 4/4			4 5			OLIVE	
hes)			BROWN		(Inches)	6				
						8				
10 12					SURFACE					
10 14					I I					
10S 7		SOMEWHAT FIRM	10YR 5/6		T SOIL				10YR 5/6 DARK YELLOWISH	
IERA.			YELLOWISH BROWN		VERAL	17			BROWN	
								LIMIT OF EXC	AVATION = 17"	
BELOW		LIMIT OF EXC	AVATION = 26"		DEPTH BELOW M	30				
DEPTH E					PTH E					
					DEI					
40						40				
50					-	50				
60					-	50				
•	hydric non-hydric	Slope % 3-8	Limiting factor 15"	 ground water restrictive layer 	•	hydric non-hydric		Slope % 8-15	Limiting factor >17"	 ground water restrictive layer
c.s.s.	Soil Series / phase name:		Drainage Class	bedrock	C.S.S.	Soil Series / pha	ase name:			bedrock
S.E.	Soil Classification:			Hydrologic Group	L.S.E.	Soil Classificati	on:		Drainage Class	Hydrologic Group
/		Profile	Drainage Class	Design Class	<u> </u>			Profile	Drainage Class	Design Class
Drof	sectoral Endorcoment	te (as applicable)								
	essional Endorsement	as applicable)			,	Date:				
C.S.S.	signature:				ľ	Julo.				
	Signature.				l	.ic.#:				
	name printed/typed:									
L.S.E.					[Date:				
	signature:					9/17/0	9			
	name printed/typed:	Michael Gless	sner		ľ			affix professional seal		

name printed/typed: Stantec Consulting

Detailed Description	of Cubourfood	Conditions of	Drojoot Citoo

FIUJ	Applicant Name: Applicant Name: Highland Wind Project Highland Wind Project Highland Wind				.c		ME		
		SOIL DESCRIPTION ANI	D CLASSIFICATION				SOIL DESCRIPTION AN	ID CLASSIFICATION	
	Exploration Symbol:	TP-13	X Test Pit	Boring		Exploration Symbol:	TP-14	X Test Pit	Boring
	6 Texture	Depth of Organic Horizon Above Consistency	Mineral Soil Color 7.5YR 5/1 GRAY	Mottling	_	o5	Depth of Organic Horizon Above	e Mineral Soil Color	Mottling
1 2 3 4	LOAMY SAND	FRIABLE	7.5YR 5/6			1 2 LOAM 3	FRIABLE	10YR 3/2 VERY DARK GRAYISH BROWN	
(0 6					(6			7.5YR 5/1 GRAY	
/Inches					(Inches)	8		5YR 3/3 DARK REDDISH	
aCE (i					ACE (9		BROWN	
12 14 14 14					SURFACE	LOAMY FINE SAND		10YR 4/6 DARK YELLOWISH	
S 7/OS					S 7/OS	6		BROWN	
24L S			AVATION = 18"		ZAL S		FIRM	2.5Y 5/6	FEW, FINE, FAINT
diner 					MINERAL	FINE SAND		LIGHT OLIVE BROWN	
имо —					BELOW I				
					H BEL	0			
DEPTI					DEPTH				
J 40					7	0			
50					5	0			
60					6	0			
•	hydric non-hydric	Slope % 25-40	Limiting factor >18 "	ground water restrictive layer bedrock	•	hydric non-hydric	Slope % 	Limiting factor	 ground water restrictive layer bedrock
C.S.S.	Soil Series / phase name:				C.S.S.	Soil Series / phase name	:		
L.S.E.	Soil Classification:	Profile SOIL DESCRIPTION ANI	Drainage Class	Hydrologic Group	L.S.E.	Soil Classification:	Profile SOIL DESCRIPTION AN	Drainage Class	Hydrologic Group
	Exploration Symbol:		X Test Pit	Boring		Exploration Symbol:	TP-16	X Test Pit	Boring
0	2 Texture	Depth of Organic Horizon Above Consistency	Mineral Soil	Mottling		Texture	Depth of Organic Horizon Above Consistency	e Mineral Soil Color	Mottling
1	LOAM	FRIABLE		inottinig	=		FRIABLE	7.5YR 5/1	motting
3	LOAM		10YR 3/2 VERY DARK GRAYISH BROWN				TRADEL	GRAY 7.5YR 3/4	
5	LOAMY SAND		7.5Y 5/1					DARK BROWN	
(Inches)	LOAMT GAND		GRAY		(Inches)			2.5Y 5/6	MANY, COARSE,
<u> </u>			7.5% 0//			FINE SAND		LIGHT OLIVE BROWN	PROMINENT
SURFACE			7.5Y 3/4 DARK BROWN		SURFACE	2			
						6			
16 18 20 7/OS 74					TI SOIT	8			
N MINERAL	FINE SAND	SOMEWHAT FIRM	2.5Y 5/6 LIGHT OLIVE BROWN	FEW, FINE, FAINT	w mineral		CEMENTED	G1 5/10Y GREENISH GRAY	
V MOTJE		LIMIT OF EXC	AVATION = 24"		DEPTH BELOW			AVATION = 28"	
DEPTH E					HTH E			AVATION = 20	
DE					DE				
40					4	0			
50					5				
60					6				
•	hydric non-hydric	Slope %	Limiting factor	ground water restrictive layer bedrock	•	hydric non-hydric	Slope %	Limiting factor6"	ground water restrictive layer bedrock
C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group	C.S.S.	Soil Series / phase name		Drainage Class	Hydrologic Group
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class
	essional Endorsemen	ts (as applicable)				ate:			
C.S.S.	signature:					ic.#:	-		
<u> </u>	name printed/typed:						-		
L.S.E.	signature:					bate: 9/17/09			
		Michael Gless	sner		L	ic.#:			
L	name printed/typed: Stantec Consu		SIIGI			397	affix professional seal		Page 4

Detailed Description	of Subsurface Conditions at Project Sites	

Proj	ect Name: Highland Wine	d Project	Applicant Name:	Highland Wind L	LC		Project Location (mi	unicipality): Highland Plantation, I	ME	
	SOIL DESCRIPTION AND CLASSIFICATION					SOIL DESCRIPTION AND CLASSIFICATION				
	Exploration Symbol:	TP-9	X Test Pit	Boring		Exploration Symbol:	TP-10	X Test Pit	Boring	
		Depth of Organic Horizon Abov					_ Depth of Organic Horizon Above			
	DETEXTURE	Consistency	Color 7.5YR 5/1 GRAY	Mottling		Texture	Consistency	Color	Mottling	
-	2					LOAM	FRIABLE	10YR 3/2	NONE OBSERVED	
	VERY FINE SANDY LOAM	FRIABLE	7.5YR 3/4 DARK BROWN		4			VERY DARK GRAYISH BROWN		
_			7.5YR 2.5/3		-	LOAMY SAND FINE SANDY LOAM		7.5YR 3/4 DARK BROWN		
(Inches)			VERY DARK BROWN		(Inches)			DARK BROWN		
(Inc	8				<i>[]</i>	VERY FINE		7.5Y 2.5/3		
ACE	0				SURFACE			VERY DARK BROWN		
	4									
	6				10					
- S 7	7					5				
I	LOAMY COARSE SAND		10YR 4/2 DARK GRAYISH	FEW, FINE, FAINT	NERA					
			BROWN		VIIV.					
BELOW MI	0		CAVATION = 22"		BELOW MINERAL		LIMIT OF EXC	AVATION = 23"		
H BE					H BE					
EPTI					DEPTH					
DEI	-									
41			<u> </u>		40					
51	0		+		50	·		<u>_</u>		
61	0				60					
0	hydric	Slope %	Limiting factor	 ground water 		hydric	Slope %	Limiting factor	ground water	
•	non-hydric	3-8	>22"	restrictive layer	•	non-hydric	3-8	>23"	 restrictive layer 	
C.S.S.	Soil Series / phase name:		·	bedrock	C.S.S.	Soil Series / phase name:			bedrock	
0.0.0.			Drainage Class	Hydrologic Group	0.0.0.			Drainage Class	Hydrologic Group	
L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	L.S.E.	Soil Classification:	Profile	Drainage Class	Design Class	
		SOIL DESCRIPTION AN	ID CLASSIFICATION				SOIL DESCRIPTION AN	ID CLASSIFICATION	_	
	Exploration Symbol:		X Test Pit	Boring		Exploration Symbol:	TP-12	X Test Pit	Boring	
	Texture	Depth of Organic Horizon Abov Consistency	Color	Mottling	0	Texture	Depth of Organic Horizon Above Consistency	Color	Mottling	
		FRIABLE	10VR 3/2	NONE OBSERVED		LOAM	FRIABLE	10YR 3/2 VERY DARK		
	3	TRABLE	10YR 3/2 DARK BROWN			LOAM		GRAYISH BROWN		
			7.5YR 5/1 GRAY			SILT LOAM		7.5Y 3/4		
(Se			7.5YR 3/4		(Se	5		DARK BROWN		
(Inches)	8		DARK BROWN		(Inches)	8				
CE (9				CE (
RFA	2				SURFACE	2				
1 ST			7.5YR 3/1		0 14 16	5				
IOS 1			7.5YR 3/1 VERY DARK GRAY			8				
ERAL		ROCK OR I	LEDGE @ 16"		ERAL					
MINE						VERY FINE SANDY LOAM		2.5Y 4/4 OLIVE BROWN	FEW, FINE, FAINT	
MO					MO 25					
DEPTH BELOW M	0				DEPTH BELOW A		ROCK OR I	EDGE @ 29"		
PTH					PTH					
DE					DE					
41	0		+		40	·		<u>_</u>		
51	D				50	0				
- 61	Q				60	,		<u> </u>		
		010/	Lindler frater				010/	Ling Miner Constant		
•	hydric non-hydric	Slope % 8-15	Limiting factor	ground water restrictive layer	•	hydric non-hydric	Slope % 15-25	Limiting factor 19"	 ground water restrictive layer 	
				 bedrock 		Soil Series / phase name:			bedrock	
	Soil Series / phase name:				C.S.S.					
C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group	0.0.0.			Drainage Class	Hydrologic Group	
C.S.S. L.S.E.	Soil Series / phase name: Soil Classification:				L.S.E.	Soil Classification:				
		Profile	Drainage Class	Hydrologic Group			Profile	Drainage Class Drainage Class	Hydrologic Group	
L.S.E.		Profile								
LS.E.	Soil Classification:	Profile			L.S.E.	Soil Classification:				
L.S.E.	Soll Classification: essional Endorsement	Profile			L.S.E.					
LS.E.	Soil Classification:	Profile			LS.E.	Soil Classification:				
LS.E.	Soil Classification: essional Endorsement signature:	Profile			LS.E.	Soil Classification:				
LS.E.	Soll Classification: essional Endorsement	Profile			LS.E. D	Soil Classification: ate: c.#:				
LS.E.	Soil Classification: essional Endorsement signature: name printed/typed:	Profile			LS.E. D	Soil Classification:				
Prof	Soil Classification: essional Endorsement signature: name printed/typed:	Profile			LS.E. D Li	Soil Classification: ate: c.#: 9/17/09				
Prof	Soil Classification: essional Endorsement signature: name printed/typed:	Profile	Drainage Class		LS.E. D Li	Soil Classification:				

SOIL PROFILE/CLASSIFICATION INFORMATION Detailed Description of Subsurface Conditions at Project Sites

Proj	ect Name: Highland Wine	d Project	Applicant Name:	Highland Wind LI	c		Project Location (mu	unicipality): Highland Plantation, M	AE	
L	righting this									
<u> </u>	SOIL DESCRIPTION AND CLASSIFICATION Exploration Symbol: TP-5 X Test Pit Boring					Exploration Symbol:	SOIL DESCRIPTION AND CLASSIFICATION TP-6 X Test Pit Boring			
1		P-5 _" Depth of Organic Horizon Abov					Depth of Organic Horizon Above			
	• Texture	Consistency	Color	Mottling	0	Texture	Consistency	Color	Mottling	
	LOAMY SAND	FRIABLE	7.5Y 7/1	NONE OBSERVED	2	LOAMY SAND	FRIABLE	7.5Y 7/1 LT. GRAY	NONE OBSERVED	
_	3		LIGHT GRAY		3			7.5Y 3/3 DARK BRWON		
-	5				4			DARK BRWON		
es)	6				es)					
Inch.	8		7.5Y 3/3		(Inches,					
UE CE	9		DARK BROWN					7.5Y 3/4 DARK BROWN		
IRFA	2				12 12					
	6				0S 7					
NOS 11	8				16 18					
RAL ∝	0	ROCK OR	LEDGE @ 16"		RAL 02		ROCK OR I	EDGE @ 18"		
MO					M M C					
BEL(0				BELOW MINERAL					
HLC					рертн 					
DEF					DEF					
41	0				40					
51	0				50			<u> </u>		
					60					
- 61										
•	hydric non-hydric	Slope %	Limiting factor	ground water restrictive layer	•	hydric non-hydric	Slope %	Limiting factor	 ground water restrictive layer 	
		0-3	16"	 bedrock 			8-15	18"	bedrock	
C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group	C.S.S.	Soil Series / phase name:		Drainage Class	Hydrologic Group	
L.S.E.	Soil Classification:				L.S.E.	Soil Classification:				
/		Profile SOIL DESCRIPTION AN	Drainage Class D CLASSIFICATION	Design Class			Profile SOIL DESCRIPTION AN	Drainage Class	Design Class	
	Exploration Symbol:	TP-7		Boring		Exploration Symbol:	TP-8		Boring	
		Depth of Organic Horizon Abov					_ Depth of Organic Horizon Above			
	Texture LOAM	Consistency FRIABLE	Color 10YR 3/2 VERY DARK	Mottling	0	Texture LOAM	Consistency FRIABLE	Color 10YR 3/2 V.D.GRY.BRN.	Mottling	
	2 3 LOAMY SAND		GRAYISH BROWN 7.5YR 7/1 LT. GRAY	NONE OBSERVED	2	LOAMY SAND		7.5YR 5/1 GRAY	NONE OBSERVED	
	4				4	SANDY LOAM		7.5YR 3/4	NONE OBGERTED	
			7.5YR 5/6 STRONG BROWN		6			DARK BROWN		
shes	7				(Inches)	VERY FINE		10YR 3/4		
- - - -	9		7.5YR 3/4 DARK BROWN			LOAMY SAND		DARK YELLOWISH BROWN		
FACE	0				FACH					
	4				SURFACE T C 0 6					
	5		2.5Y 5/6		16 18 S 7/OS					
AL S	LOAMY SAND		LIGHT OLIVE BROWN		RAL S		ROCK OR I	EDGE @ 16"		
VER 		LEDGE OR	ROCK @ 16"		NER.					
W MI					V MI					
DEPTH BELOW M	0				307					
H BF					36					
EPT					H.					
J 4					рертн (
<u> </u>	0				<i>DEPTH BELOW M</i> ⇒					
. —	0				40					
51	0				DEPTH E					
61					40					
61	₀ hydric	Slope %	Limiting factor	ground water	40	hydric	Slope %	Limiting factor	ground water	
61	0	Slope % 8-15	Limiting factor	 restrictive layer 	40 50 60	hydric non-hydric	Slope % 	Limiting factor	 restrictive layer 	
61	₀ hydric	8-15		restrictive layer bedrock	40		3-8		restrictive layer bedrock	
61 0 0 0 0 0	o hydric non-hydric Soil Series / phase name:	8-15	-	 restrictive layer 	40 50 60 C.S.S.	non-hydric Soil Series / phase name:	3-8	=	 restrictive layer 	
61	o hydric non-hydric	8-15		restrictive layer bedrock	40 50 60	non-hydric	3-8		restrictive layer bedrock	
61 0 0 0 0 0 0	o hydric non-hydric Soil Series / phase name:	8-15	 Drainage Class	restrictive layer bedrock Hydrologic Group	40 50 60 C.S.S.	non-hydric Soil Series / phase name:		 Drainage Class	restrictive layer bedrock Hydrologic Group	
61 0 0 0 0 0	o hydric non-hydric Soil Series / phase name:	8-15	 Drainage Class	restrictive layer bedrock Hydrologic Group	40 50 60 C.S.S.	non-hydric Soil Series / phase name:		 Drainage Class	restrictive layer bedrock Hydrologic Group	
 C.S.S. L.S.E.	hydric non-hydric Soil Series / phase name: Soil Classification:	Profile	 Drainage Class	restrictive layer bedrock Hydrologic Group	40 50 60 C.S.S.	non-hydric Soil Series / phase name:		 Drainage Class	restrictive layer bedrock Hydrologic Group	
 C.S.S. L.S.E.	o hydric non-hydric Soil Series / phase name:	Profile	 Drainage Class	restrictive layer bedrock Hydrologic Group	40 50 60 C.S.S.	non-hydric Soil Series / phase name:		 Drainage Class	restrictive layer bedrock Hydrologic Group	
C.S.S.	o hydric non-hydric Soil Series / phase name: Soil Classification:	Profile	 Drainage Class	restrictive layer bedrock Hydrologic Group		non-hydric Soil Series / phase name:		 Drainage Class	restrictive layer bedrock Hydrologic Group	
 C.S.S. L.S.E.	o hydric non-hydric Soil Series / phase name: Soil Classification:	Profile	 Drainage Class	restrictive layer bedrock Hydrologic Group		non-hydric Soil Series / phase name: Soil Classification:		 Drainage Class	restrictive layer bedrock Hydrologic Group	
C.S.S. L.S.E.	bydric non-hydric Soil Series / phase name: Soil Classification:	Profile	 Drainage Class	restrictive layer bedrock Hydrologic Group	-40 -50 -60 C.S.S. L.S.E.	non-hydric Soil Series / phase name: Soil Classification:		 Drainage Class	restrictive layer bedrock Hydrologic Group	
C.S.S.	bydric non-hydric Soil Series / phase name: Soil Classification:	Profile	 Drainage Class	restrictive layer bedrock Hydrologic Group	-40 -50 -60 C.S.S. L.S.E.	non-hydric Soil Series / phase name: Soil Classification: tte:		 Drainage Class	restrictive layer bedrock Hydrologic Group	
C.S.S.	a hydric non-hydric Soil Series / phase name: Soil Classification: a signature: name printed/typed:	Profile	 Drainage Class	restrictive layer bedrock Hydrologic Group	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	non-hydric Soil Series / phase name: Soil Classification: tte:		 Drainage Class	restrictive layer bedrock Hydrologic Group	
C.S.S.	a bydric non-hydric Soil Series / phase name: Soil Classification: essional Endorsement signature: name printed/typed:	Profile	 Drainage Class	restrictive layer bedrock Hydrologic Group	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	non-hydric Soil Series / phase name: Soil Classification: tte:		 Drainage Class	restrictive layer bedrock Hydrologic Group	
C.S.S.	a hydric non-hydric Soil Series / phase name: Soil Classification: a signature: name printed/typed:	Profile	 Drainage Class	restrictive layer bedrock Hydrologic Group	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	non-hydric Soil Series / phase name: Soil Classification: tte:		 Drainage Class	restrictive layer bedrock Hydrologic Group	

Stantec Consulting

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Detailed Description of	f Subsurface	Conditions at Project Sites	

Proje	ect Name:		Applicant Name:				Project Location (mu		
	Highland Wine	d Project		Highland Wind LL	С			Highland Plantation, I	ME
	•	SOIL DESCRIPTION AND	O CLASSIFICATION			-	SOIL DESCRIPTION AN	D CLASSIFICATION	
	Exploration Symbol:	TP-1	X Test Pit	Boring		Exploration Symbol:	TP-2	X Test Pit	Boring
	5	_ Depth of Organic Horizon Above		Mattling			_ Depth of Organic Horizon Above		Mattling
1		Consistency	Color	Mottling	-	Texture	Consistency	Color	Mottling
2	SILT LOAM W/	FRIABLE	5Y 3/1 VERY DARK GRAY		_	LOAM	FRIABLE	7.5Y 3/3 DARK BROWN	NONE OBSERVED
4	COARSE SAND		VERT DARK GRAT			3		DARK BROWN	
5	LOAMY SAND		5Y 5/1		_	5			
(set	LUAMIT SAND		GRAY		(Inches)	7			
(Incl						SILT LOAM		10YR 4/3	
9 4 CE	FINE SANDY LOAM	SOMEWHAT FIRM	5Y 6/1	MANY, COARSE, DISTINCT	SURFACE))		DARK GRAY	
JRF.			GRAY	DISTINCT	JRF.	2			
7S 71		LEDGE OR	STONE @ 11"	I			BOULDER OR	LEDGE @ 12"	
OS 18					1 SOIL				
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APPENDIX E

Glossary Of Soil Terminology

Depth Classes

These refer to the depth of the particle control section used to describe the central concept of each taxonomic unit. These are as follows:

Very shallow	less than 10" to bedrock
Shallow	10" to 20" to bedrock
Moderately deep	20" to 40" to bedrock
Deep	40" to 60" deep
Very deep	greater than 60"

Drainage Class

Drainage class is a reference to the frequency and duration of periods of soil saturation and/or action by seasonal groundwater tables, as evidenced by soil morphologic features identified within each respective soil profile.

Seven classes of soil drainage are recognized:

Excessively drained	water is removed from the soil very rapidly. These are commonly very coarse-textured, rocky or shallow. All are free of soil mottling related to wetness.
Somewhat excessively drained	water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy-textured and very pervious/porous. Some are shallow. Some occur on steep slopes where much of the water they receive is lost as runoff. These too are free of observed mottling due to wetness.
<u>Well drained</u>	Water is removed from the soil readily, but not rapidly. It may be available for plant growth at the deepest rooting depths, and not so wet as to inhibit the growth of plant roots for significant periods during most growing seasons. Well drained soils are often medium textured, or contain restrictive subhorizons generally below 24". They are mainly free of mottling related to wetness.
Moderately well drained	water is removed from the spoils somewhat slowly during wet periods and spring

seasons. Moderately well drained soils are saturated in the upper soil profile for short duration during the growing season. Often, they contain a slowly pervious (or restrictive) layer beneath the solum, and may receive additional runoff from upslope areas.
 Somewhat poorly drained
 water is removed so slowly that the soil is

Somewhat poorly drained water is removed so slowly that the soil is wet for significant periods during the growing season. Somewhat poorly drained soils commonly have an impervious substratum that contributes to a perched water table, additional water through sideslope seeps, long continuous sheet flows below large watershed areas with few or no outlets, or a combination of these together.

Poorly drainedwater is removed from these soils so slowly
that the soil is saturated during the growing
season or remains wet for long durations.
Water is present during the growing season
which may be prohibitive to plant root
growth, due to anaerobic/saturated
conditions. These soils are classified as
hydric, and may also have implications as
wetlands.Versue searly durinedwater is present from these soils as also have

<u>Very poorly drained</u> water is removed from these soils so slowly that free water can be observed at or very near the mineral soil surface for long durations during the growing season. These commonly occur on nearly level slopes or in depressional areas, and can be frequently ponded. Often they include thick organic surface horizons.

Hydrologic Soil Groups

A hydrologic soil group is a class of numerous soil series that all have the same runoff potential under similar climate and vegetative conditions. Soil properties that can influence runoff are those that affect minimum infiltration rates for a bare soil after prolonged wetting and with no frozen ground surface. Most important are depth to seasonal high groundwater table, permeability rates after prolonged wetting, and depth to slowly permeable (restrictive) layer.

Permeability

Permeability is the soil property which enables water to move downward through the soil profile. It is measured as the number of inches per hour of water that can be added to a particular soil as it moves downward through the unsaturated soil. Terminology and ranges are as flows:

Very slow	less than 0.06 in./hr
Slow	0.06 to 0.20 in./hr
Moderately slow	0.20 to 0.60 in./hr
Moderate	0.6 to 2.0 in./hr
Moderately rapid	2.0 to 6.0 in./hr
Rapid	6.0 to 20 in./hr

Soil Erodibility (K Factor)

The measure of soil erodability, or K factor, is the susceptibility of a soil particle to detachment and transport by rainfall. K factors for soil in Maine vary from 0.02 to 0.69. The higher the value, the more susceptible the named soil is to sheet or rill erosion by water.

Soil properties which influence erosion are those that can affect infiltration rates, movement of water through the soil profile and the water storage capacity of a soil. Other soil properties can affect the dispersion and mobility of soil particles by rainfall ad/or runoff. Some of the most important of these properties include soil layer, and the size and stability of the soil structural aggregates in the exposed faces of subsoils. Background levels of soil moisture and the presence of frozen soil horizons also can influence erosion.

Soil Texture

Soil texture refers to the USDA classification for the relative proportions by weight of the several soil particle size classes that are finer than 2 millimeters in diameter, which form the fine earth fraction. (Materials larger than 2 mm. in diameter are considered rock fragments).

Soil texture can influence on plant growth, or the soil mechanics of a particular site when used as construction and/or backfill material for foundations, etc. It influences such physical properties as load bearing strength, permeability, shrink/swell potential (frost action or due to wetness), compressibility and compaction. Rock fragment size and content can also affect applications for use as construction materials.

Soil Texture Modifiers

Named soil texture classes can be further modified by the addition of appropriate adjectives when rock fragment content approaches 15% by volume (i.e. gravelly sandy loam). "Mucky" or "peaty" are modifying terms used when organic matter content reaches 40% (i.e. mucky silt/loam).

Surface Runoff

Surface runoff is water that flows away from the soil over the surface of the site without infiltrating into the ground surface. It may originate from precipitation, or as drainage water from adjacent, upslope areas. The rate and amount of runoff are affected by internal physical characteristics of the soil as well as slope gradient ranges and landform shape (i.e. concave vs. convex slopes). Runoff can be significantly different on a given soil under natural vegetation, cultivation by man, or other kinds of management. Runoff from a particular site can also be affected by other factors such as rainfall amounts, snow pack accumulation or other climatic fluctuations. Surface runoff is usually significantly greater on frozen ground surfaces.

Six categories for runoff rates are provided:

Ponded	little or none of the precipitation and run-on (from surrounding, higher elevations) escapes the site as runoff. Free water stands on or above the existing soil surface for significant periods of time. Ponding normally appears on level to nearly level (i.e. <3%) slopes, in depressions or within concavities in a pit/mound micro-relief topography. Water depth may vary considerably throughout the year, or from year to year. Often this is consistent with very poorly drained soils.
Very slow	surface water flows away slowly, and free water may be present at the soil surface for portions of the year, or may infiltrate slowly into the soil surface when not ponded. These soils may be consistent with very poorly drained, or poorly drained soils that are coarser textured and somewhat porous.
Slow	surface water flows away from the soil quickly enough, either due to slope or the porosity of the soils, so that free water can be observed at the soil surface for moderate periods immediately following spring snowmelt or prolonged storm rainfall events. Most of the water passes through the soil, is used by plants, or evaporates.
Medium	surface water flows away quickly enough due to slope or soil porosity that water is observed at or near the soil surface for short durations, usually during spring snowmelt or immediately following significant storm rainfall events.
Rapid	surface water flows away quickly enough that any period of saturation is brief, and free water does not stand on the soil

surface. Only a small portion of the water enters the soil as infiltration, either due to steep slopes and/or fine textures with slow rates of absorption.

Very rapid surface water flows away so quickly that duration of any event is brief, and water never stands on the soil surface. Only a very small portion of the available moisture enters the soil as infiltration.

ADDITIONAL SOIL TERMS

Flooding (Hazard to flooding)

Flooding (Hazard to hooding)			
	Flooding is the temporary covering of the soil surface by flowing water from any source, including but not limited to: streams or rivers overflowing their banks, runoff from adjacent or upslope areas, inflow from high tide action, or a combination of sources. Water due to snowmelt is excluded from this definition, as is standing or ponded water that forms a permanent or semi-permanent cover above the soil surface.		
	Flooding hazard is further expressed by frequency classes, duration, and the time of year that the flooding occurs. The velocity and depth of the floodwater are also important factors.		
Oxyaquic	Soil drainage conditions that imply soil saturation for prolonged periods, which are rich in dissolved oxygen and therefore do not exhibit the anaerobic conditions necessary to create hydric soil morphology.		
Ponding	Ponding is standing water in a closed depression. The water is removed only by evaporation, transpiration by plants, or percolation through the ground.		
Soil complex	A map unit that consist of two or more kinds of soils (i.e. soil series/taxonomic unit) that occur on a non-regular, non-repeating pattern that cannot be separated out at the scale provided. The order of the soils named are generally in order of predominance within the map unit.		
Soil map unit	A collection of soils or soil areas that are delineated during soils mapping. It generally is an aggregate of several soil entities with a predominant named soil type. Kinds of soil map units may include complexes, consociations, or associations.		

Soil slope gradient range

The slope identified for any given map unit, based on the immediate topography within a specific portion of the mapping site. Designations generally are as follows:

А	0-3%	nearly level to level
В	3-8%	gently sloping
С	8-20%	moderately sloping
D	20%+	steeply sloping

- Stoniness This is a phase of surface characteristic that may be identified in soils mapping, ranging from stony or bouldery (0.01 to 0.1% of soil surface covered with stones) to rubbly or rubble land, in which up to 75% of the soil surface is covered with stones. Extremely stony sites or sites with rubble land may have additional limitations for use of mechanized equipment.
- Stony The areas have enough stones at or near the surface to be a continuing nuisance during operations that mix the surface layer, but they do not make most such operations impractical. Conventional, wheeled vehicles can move with reasonable freedom over the area. Stones may damage both the equipment that mixes the soil and the vehicles that move on the surface. Usually these areas have Class 1 stoniness. If necessary in a highly detailed survey, these areas may be designated as "slightly stony" and "moderately stony".
 - Very Stony The areas have so many stones at or near the surface that operations which mix the surface layer either require heavy equipment or use of implements that can operate between the larger stones. Tillage with conventionally powered farm equipment is impractical. Wheeled tractors and vehicles with high clearance can operate on carefully chosen routes over and around the stones. Usually, these areas have Class 2 stoniness.

Extremely Stony

The areas have so many stones at or near the surface that wheeled power equipment, other than some special types, can operate only along selected routes. Tracked vehicles may be used in most places, although some routes have to be cleared. Usually, these areas have Class 3 stoniness.

Rubbly The areas have so many stones at or near the surface that tracked vehicles cannot be used in most places. Usually, these areas have class 4 or 5 stoniness. If necessary in a highly detailed survey, they may be designated as "rubbly" and "very rubbly".

If the soil has stones, boulders, and smaller fragments, the name includes the kind of rock fragment that are most limiting in the use or management of the soil. This is not necessarily the kind that is most abundant or the kind that is used to modify texture class of horizons in the profile description.

APPENDIX F

Photographs

HIGHLAND WINDPOWER PROJECT PHOTOGRAPHS



Photo 1: Existing Transmission Line 6.5 miles+/- from Wyman Dam (Extremely Stony).



Photo 2: Dry DEP stream channel near Test Pit 134.



Photo 3: Fractured bedrock escarpment near Test Boring 179.



Photo 4: Portion of existing access road to westerly turbines.



Photo 5: Mahoosuc soil surface near Test Pit 189.



Photo 6: Mile 6 of existing transmission line viewed toward east.



Photo 7: Houston Brook on existing Transmission Line south of Rowe Pond Road.



Photo 8: Shallow to bedrock outcropping with thin layer of organic Rock Outcrop/Ricker land form.



Photo 9: Test Pit 11, *Rawsonville*, sandy loam textured soil greater than 20 inches but less than 40 inches to bedrock.



Photo 10: Test Pit 14, Ricker, shallow organic horizon overlying bedrock.



Photo 11: Test Pit 115 Dixfield/Skerry.



Photo 12: Test Pit 114 *Abram*, shallow to bedrock sandy loam soil overlying bedrock less than 10 inches in depth.