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SUGARLOAF – WESTERN MOUNTAIN EXPANSION
CLASS B & C HIGH INTENSITY SOIL SURVEY

CARRABASSET VALLEY, MAINE

Submitted: September 13, 2021
Revised: January 25, 2022

PROJECT OVERVIEW

A Class B & C High Intensity Soil Survey was completed for the project site. The project site is defined as an approximately 450-acre area located at Sugarloaf Ski Resort in Carrabassett Valley in Maine. The project site is generally bound by the Access Road, West Mountain Road, and West Mountain lift line.

The proposed West Mountain Expansion includes roughly 150 acres of new ski terrain, new chair lift, new parking lots totaling approximately 300 spaces, and a skier services building. In addition, real estate development will include 52 single family house lots, condominium buildings totaling roughly 80 to 120 units, and duplex townhomes totaling 40 units. A Class B High Intensity Soil Survey was conducted within areas of proposed condominiums and residential homes. All other areas, such as ski trails, were surveyed as Class C.

The soil survey was conducted to provide resource data for permit, planning, design, and construction for the proposed development. This information is submitted to Vanasse Hangen Brustlin (VHB) as part of their analysis of the proposed project design and permitting requirements.

RESOURCES AND METHODOLGY

Preliminary Data

Data made available by the Maine Office of GIS was consulted to review the site prior to the soil survey field work. This data included National Wetlands Inventory (NWI) wetlands, USDA Natural Resource Conservation Soil Survey Maps, and digital aerial photography. Wetland data provided by VHB was utilized in the hydric soil mapping of this soil survey.

Standards for Soil Survey

Soil surveying methods were completed in accordance with the ***Maine Association of Professional Soil Scientist Standards for Soil Surveys*** (March 2009). The Class B High Intensity Soil Survey incorporates the following standards, among others:

1. *Map units will not contain dissimilar limiting individual inclusions larger than 5 acres. Dissimilar limiting inclusions may total more than 1 acre per map unit delineation, in the aggregate, if not contiguous.*

2. *A map scale of 1-inch equals 200 feet or larger.*
   - The scale for this project map is 1" = 200'

3. *Ground control- test pits for which detailed data is recorded are located by means of compass by chaining, pacing, or taping from known survey points; or other methods of equal or greater accuracy*
   - Test pit and boring locations were captured by a handheld Trimble GPS Unit with sub-meter accuracy.
4. *Base map with 5' contours.*
   - The base map used in this soil survey involves surveyed property boundaries and 2' contour LiDAR data provided by VHB. The soils map was drafted in AutoCAD 2020.

The Class C Medium Intensity Soil Survey incorporates the following standards, among others:

1. *Map units will not contain dissimilar limiting individual inclusions larger than 5 acres. Dissimilar limiting inclusions may total more than 5 acres per map unit delineation, in the aggregate, if not contiguous.*

2. *A map scale of 1-inch equals 500 feet or larger.*
   - The scale for this project map is 1" = 200'

3. *Ground control-as determined by the mapper*
   - Test pit and boring locations were captured by a handheld Trimble GPS Unit with sub-meter accuracy.

4. *Base map -as determined by the mapper.*
   - The base map used in this soil survey involves surveyed property boundaries and 2' contour LiDAR data provided by VHB. The soils map was drafted in AutoCAD 2020.

Mapping Process and Soil Boundary Placement
Soil investigations were completed using a medium-sized machine excavator and hand tools (shovel, probe, screw auger). Refusal that limited hand dug pit depth was assumed to be. All recorded test locations were marked with survey tape. Locations of test sites were focused on areas of proposed development, potential stormwater treatment BMP areas, and unique landforms.

Soil boundary line placement and map units were determined by slope classes, map units, vegetation, and landforms. Additional hand auger borings were completed to verify soils; these verification borings were recorded but not shown in the soils map or logs. Once these breaks in soil boundaries were determined, a soil map was drafted using AutoCAD 2020.

RESULTS

Attached to this report are summary logs of all test borings and pits presented on DEP Form F.

The following soils were interpreted on the property. Abbreviations shown for these soils are used to identify them on the associated soils map:

Lyman-Tunbridge Complex (LN)

Brayton Soils (By)

Brayton-Colonel Complex (BC)

Colonel Series (Co)

Peru Series (Pe)

Croghan Series (Cr)

Surplus Series (Sr)

The following represent slope classes:

A = 0-3%
B = 3-8%
C = 8-15%
D = 15-20%
E= >20%

Slope breaks were determined using an AutoCAD function that processes 2' LiDAR contour data and groups slopes into the above categories.

Soil Suitability ratings are based on NRCS provided ratings. See the map unit descriptions for details on specific soil limitations, NRCS ratings, and potential solutions to limitations.

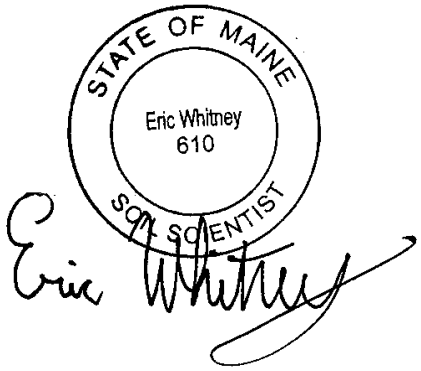
CONCLUSION

A Class B & C High Intensity Soil Survey was completed for the project site located at Sugarloaf Ski Resort in Carrabassett Valley. The proposed development entitled "West Mountain Expansion", consists of single-family house lots, condominiums, duplexes, ski trails, and associated infrastructure. This survey effort included field visits to gather soil mapping data, creation of a soil base map, and a narrative describing soil types and subsurface limitations. This soil survey consists of a soil map, test pit logs, site photos, and this report.

Soils in the project area are generally loamy basal glacial till and glacial fluvial soils ranging from poorly drained to moderately well-drained. Suitable soils for the proposed development exist within the subject property. Hydric soils, large boulders, shallow bedrock, shallow seasonal high-water tables, shrink/swell, and slopes greater than 20% are limitations for the proposed development. Soil test pit logs, soil map, and map unit descriptions are attached to this report.

SOIL SCIENTIST CERTIFICATION STATEMENT

The accompanying soil profile descriptions, soil survey map, and this soil narrative report was prepared by Eric R.T. Whitney S.S. #610. The soil survey was done in accordance with the standards adopted by the Maine Association of Professional Soil Scientist, March 2009. Eric Whitney certifies that the report meets the appropriate mapping standards for Class B & C Soil Surveys in Maine.



MAP UNIT DESCRIPTIONS

Brayton Series (By) *Loamy, mixed, active, nonacid, frigid, shallow Aeric Endoaquepts*	
Setting	
Parent Material:	Glacial Till
Landform:	Toe slopes and depressions
Slope Ranges:	0-3% (A) 3-8% (B)
Depth to Bedrock:	Very Deep (>40")

Water Related Properties	
Drainage Class:	Poorly drained to very poorly drained.
Hydrologic Soil Group:	D
Hydrologic Conductivity:	Moderate permeability in the surface layer and subsoil and very slow to moderately slow in the substratum
Flooding Frequency:	Possible during periods of high precipitation.

Typical Profile Description	
Surface:	Black highly decomposed organic material. Very granular structure.
Subsurface:	Gray, fine sandy loam. Sub angular blocky structure.
Subsoil:	Grayish brown, fine sandy loam. Sub angular blocky structure
Substratum:	Firm, gray fine sandy loam. Platy structure.

Inclusions	
Similar:	Peacham
Dissimilar:	Colonel, Peru, Tunbridge

Soil Suitability and Limitations
The Brayton series is rated as very limited for the proposed development. Due to shallow depths to groundwater, shallow depths to large boulders or bedrock, and seasonal ponding. The soils in this map unit are hydric soils that are associated with wetlands. These soils are not suitable for onsite wastewater disposal. Constructing artificial drainage and additions of coarse fill would be needed to develop in the Brayton series. On-site subsurface wastewater systems are not suitable in these soils.

Colonel Series (Co) *Loamy, isotic, frigid, shallow Aquic Haplorthods*	
Setting	
Parent Material:	Basal glacial till
Landform:	Hills and mountains of glaciated uplands
Slope Ranges:	8-15% (C) 15-20% (D) >20% (E)
Depth to Bedrock:	Very Deep (>40")

Water Related Properties	
Drainage Class:	Somewhat Poorly Drained
Hydrologic Soil Group:	D
Hydrologic Conductivity:	Moderately high or high in the solum, and low to moderately high in the dense substratum
Flooding Frequency:	None

Typical Profile Description	
Surface:	Black, moderately decomposed organic material.
Subsurface:	Dark brown, fine sandy loam. Granular structure.
Subsoil:	Fine sandy loam. Brown to olive brown in color. Sub angular blocky structure.
Substratum:	Firm, mottled, olive fine sandy loam

Inclusions	
Similar:	Peru, Tunbridge, Lyman, Naskeag
Dissimilar:	Abram, Brayton

Soil Suitability and Limitations
The Colonel soil series is rated as very limited for the proposed development. Shallow depths to groundwater and shallow depths to large boulders cause limitations during development. Colonel soils are suitable for onsite wastewater disposal. To overcome limitations in this soil type artificial drainage should be constructed to address the shallow depths to ground water. Large boulders should be moved with a machine excavator. On-site subsurface wastewater systems will require an 18" vertical separation from the bottom of the disposal field to the seasonal high-water table and a soils sizing factor of 3.3.

Brayton - Colonel Complex (BC) *Coarse-loamy, isotic, frigid Aquic Haplorthods*	
Setting	
Parent Material:	Basal glacial till
Landform:	Hills and mountains of glaciated uplands
Slope Ranges:	3-8% (B) 15-20% (D)
Depth to Bedrock:	Very Deep (>40")

Water Related Properties	
Drainage Class:	Moderately Well Drained
Hydrologic Soil Group:	D
Hydrologic Conductivity:	Moderately high or high in the solum, and low to moderately high in the dense substratum
Flooding Frequency:	Possible during periods of high precipitation.

Typical Profile Description	
Surface:	Black, moderately decomposed organic material.
Subsurface:	Dark brown, fine sandy loam. Granular structure.
Subsoil:	Fine sandy loam. Brown to olive brown in color. Sub angular blocky structure.
Substratum:	Firm, mottled, olive fine sandy loam

Inclusions	
Similar:	Naskeag
Dissimilar:	Peru, Tunbridge, Waumbek

Soil Suitability and Limitations
The Brayton-Colonel complex is rated as very limited for the proposed development. Shallow depths to groundwater and shallow depths to large boulders cause limitations during development. Refer to the Colonel and Brayton map unit descriptions for further details.

Peru Series (Pe) *Coarse-loamy, isotic, frigid Aquic Haplorthods*	
Setting	
Parent Material:	Basal glacial till
Landform:	Hills and mountains of glaciated uplands
Slope Ranges:	3-8% (B) 15-20% (D)
Depth to Bedrock:	Very Deep (>40")

Water Related Properties	
Drainage Class:	Moderately Well Drained
Hydrologic Soil Group:	C
Hydrologic Conductivity:	Moderately high or high in the solum, and moderately low or moderately high in the dense substratum
Flooding Frequency:	None

Typical Profile Description	
Surface:	Black, moderately decomposed organic material.
Subsurface:	Dark brown, fine sandy loam. Granular structure.
Subsoil:	Fine sandy loam. Brown to olive brown in color. Sub angular blocky structure.
Substratum:	Firm, mottled, olive fine sandy loam

Inclusions	
Similar:	Tunbridge, Waumbek
Dissimilar:	Abram, Lyman, Brayton

Soil Suitability and Limitations
Soils in the Peru series are suitable for the proposed development but have potential limitations. Shallow depths to groundwater and shallow depths to large boulders cause limitations during development. Peru soils are suitable for onsite wastewater disposal. To overcome limitations in this soil type artificial drainage should be constructed to address the shallow depths to ground water. Large boulders should be moved with a machine excavator. On-site subsurface wastewater systems will require a 12" vertical separation from the bottom of the disposal field to the seasonal high-water table and a soils sizing factor of 3.3.

Tunbridge-Lyman Complex (TLC) *50% Coarse-loamy, isotic, frigid Typic Haplorthods* *50% Loamy, isotic, frigid Lithic Haplorthods*	
Setting	
Parent Material:	Basal Glacial Till
Landform:	Mountains and hills
Slope Ranges:	8-15% (C)
Depth to Bedrock:	Shallow (10”-20”) to Moderately deep (20”-40”)

Water Related Properties	
Drainage Class:	Somewhat excessively drained to well drained
Hydrologic Soil Group:	D
Hydrologic Conductivity:	Moderately high or high throughout the mineral soil
Flooding Frequency:	None, flooding is not probable

Typical Profile Description	
Surface:	Dark reddish brown to black moderately decomposed organic material.
Subsurface:	Brown, fine sandy loam. Friable consistency granular structure.
Subsoil:	Olive, fine sandy loam. Friable consistency granular structure.
Substratum:	Bedrock

Inclusions	
Similar:	Peru, Colonel
Dissimilar:	Abram, Bedrock Outcrop

Soil Suitability and Limitations
The Tunbridge-Lyman Complex is rated as very limited for the proposed development. Tunbridge-Lyman soils have shallow depths to bedrock. To overcome limitations in this soil type blasting of bedrock may be required. On-site subsurface wastewater systems will require a 24” vertical separation from the bottom of the disposal field to bedrock and a soil sizing factor of 3.3.

Croghan Series (Cr) *Sandy, isotic, frigid Aquic Haplorthods*	
Setting	
Parent Material:	Glaciofluvial deposits
Landform:	Terraces and sand plains.
Slope Ranges:	8-15% (C)
Depth to Bedrock:	Very Deep (>40")

Water Related Properties	
Drainage Class:	Moderately Well Drained
Hydrologic Soil Group:	C
Hydrologic Conductivity:	High or very high in throughout the mineral soil
Flooding Frequency:	None, flooding is not probable

Typical Profile Description	
Surface:	Dark reddish brown to black moderately decomposed organic material.
Subsurface:	Dark grayish brown to gray, fine sand. Very friable consistency and granular structure.
Subsoil:	Brown, fine sand. Friable consistency and granular to blocky structure.
Substratum:	Pale brown to grayish brown sand. Loose consistency and massive structure.

Inclusions	
Similar:	Waumbek
Dissimilar:	Colonel, Brayton

Soil Suitability and Limitations
Croghan soils are suitable for the proposed development. On-site subsurface wastewater systems will require a 24" vertical separation from the bottom of the disposal field to bedrock and a soil sizing factor of 2.6.

Surplus Series (Cr) *Coarse-loamy, isotic Aquic Haplocryods*	
Setting	
Parent Material:	Basal Glacial Till
Landform:	Mountain side slopes
Slope Ranges:	15-20% (D)
Depth to Bedrock:	Very Deep (>40")

Water Related Properties	
Drainage Class:	Moderately Well Drained to Somewhat Poorly Drained
Hydrologic Soil Group:	D
Hydrologic Conductivity:	Moderately high or high in the organic surface layer and the mineral solum, and low to moderately high in the substratum
Flooding Frequency:	None, flooding is not probable

Typical Profile Description	
Surface:	Dark reddish brown to black moderately decomposed organic material.
Subsurface:	Dark grayish brown to brown, very stony fine sandy loam. Friable consistency and granular structure.
Subsoil:	Yellowish brown very stony fine sandy loam. Friable and moderate thin platy structure.
Substratum:	Light olive brown very stony, sandy loam. Friable consistency and platy structure.

Inclusions	
Similar:	Sisk, Saddleback,
Dissimilar:	Brayton, Waumbek

Soil Suitability and Limitations
Soils in the Surplus map unit are suitable for the proposed development but have some limitations. These soils have numerous boulders, a large machine excavator will be required. These soils are located at the higher elevations of the proposed development. Steep slopes may require large amounts of fill and earth work to level the grading for development. On-site subsurface wastewater systems will require a 12" vertical separation from the bottom of a disposal field to ground water and a soil sizing factor of 3.3.