

MEMORANDUM

To: Eric Douglas – Caritech Group, LLC
From: Joseph Corsello – Sanborn, Head & Associates, Inc.
Seth Soos – Sanborn, Head & Associates, Inc.
Michael Nicoloro – Sanborn, Head & Associates, Inc.
File: 4348.02
Date: November 13, 2020
Re: Dense subsoil investigation – Hannah’s Rest
cc: Joan Fontaine - Sanborn, Head & Associates, Inc.
File

This memo presents the results of a limited subsoil investigation to approximate the location of potentially dense material that may be encountered during excavation of soils within the proposed pipeline routes for the waterline rehabilitation design project located in Hannah’s Rest, St. Croix, US Virgin Islands. As outlined in Caritech Group LLC’s (Caritech’s) proposal to Virgin Islands Water and Power Authority (VIWAPA) dated December 20, 2019, Sanborn, Head & Associates, Inc (Sanborn Head) has performed this limited subsoil investigation to provide bidding Contractors with as much information on subsurface conditions as possible to allow them to better refine their quotes and avoid potential change-orders as the project progresses.

Sanborn Head has reviewed multiple sources of information to evaluate where dense material may be encountered during excavation, including soil classification data obtained from the US Virgin Islands Geospatial Information Systems and “Soil Survey of the United States Virgin Islands” (the Soil Survey) prepared by the US Department of Agriculture and the Natural Resources Conservation Service and ground penetrating radar (GPR) data provided by BCSC-Dospiva, LLC.

Review of the US Virgin Islands Geospatial Information Systems and the Soil Survey indicate one type of soil for Hannah’s Rest, Hesselberg clay (HeA and HeB). Descriptions of these soil classifications are provided as attachments to this memo. The approximate locations of these soil types within Hannah’s Rest are highlighted on sheet P01 of the Hannah’s Rest Waterline Rehabilitation Design drawings sets (the Drawings).

GPR data was reviewed to approximate the horizontal extent of potentially dense material that may be encountered within the vertical extent of the trench excavation along the entire system pipe alignments. These areas of potentially dense material were approximated based on interpretation of the GPR data collected in October 2020. The resulting horizontal extent

of potentially dense subsurface material is shown on Figure 1 (attached) and in the profile views on sheets P03 through P23 of the Drawings.

The results of this dense subsoil investigation provide general soil descriptions in addition to the approximate horizontal extent of potentially dense material that may be encountered within the vertical extent of the trench excavation. The areas and locations denoted on Figure 1 and in the Drawings should be considered approximate and therefore it is recommended that the Contractor include a test pit program to confirm some of the longer areas of potentially denser material. In addition, a test pit program may be used to evaluate if existing soils are acceptable for use as backfill material.

SPS/MAN: jwc

Encl. Soil & land descriptions provided by the "Soil Survey of the US Virgin Islands"

- Hesselberg Clay (HeA)
- Hesselberg Clay (HeB)
- Figure 1 – Soil Evaluation

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Minor Components

Contrasting inclusions

- Arawak—shallow soils that have a loamy-skeletal subsoil
- Carib—somewhat poorly drained soils that have a fine-loamy subsoil
- Hesselberg—shallow soils that have a clayey subsoil
- Sion—soils that have a coarse-loamy subsoil
- Solitude—somewhat poorly drained soils that have a fine-loamy subsoil

Similar inclusions

- Soils that have a very gravelly surface layer
- Soils that have a stony or very stony surface layer
- Soils that have less clay in the subsoil

Typical Profile

Glynn

Surface layer:

0 to 4 inches, dark brown gravelly loam

Subsurface layer:

4 to 10 inches, dark brown gravelly clay loam

Subsoil:

10 to 17 inches, dark yellowish brown very gravelly clay

17 to 27 inches, yellowish brown very gravelly clay loam

Substratum:

27 to 32 inches, yellowish brown very gravelly sandy clay loam

32 to 41 inches, light olive brown very gravelly clay

41 to 60 inches, light olive brown very gravelly sandy clay loam

Soil Properties and Qualities

Glynn

Drainage class: Well drained

Permeability: Moderately slow

Available water capacity: Medium

Organic matter content: Moderately low to high

Natural fertility: Moderate to high

Hazard of erosion: Severe

Seasonal high water table: More than 6 feet deep

Depth to bedrock: More than 60 inches

Root zone: More than 60 inches

Shrink-swell potential: Moderate

Salinity: Nonsaline

Flooding: Rare

Stoniness: Nonstony

Use and Management

This map unit is used mainly as rangeland. A few areas are used for pasture, hay, or cultivated crops.

This map unit is poorly suited for cultivated crops. The slope, the severe hazard of erosion, and the high content of gravel are management concerns. The management systems needed in areas of cropland are those that protect or improve the soil, help to control erosion, and minimize the water pollution caused by plant nutrients, soil particles, and plant residue carried by runoff.

This map unit is suited to pasture and hay. The slope is a management concern. Establishing and maintaining a mixture of grasses and legumes, deferring grazing as needed, controlling weeds, using proper stocking rates, and maintaining soil fertility increase the production of forage and feed and help to control erosion. The range site condition of this map unit is poor because less than 25 percent, by weight, of the present vegetation consists of the same species as the original or potential vegetation.

This map unit is unsuited to most urban uses. The flooding is a severe limitation.

This map unit is poorly suited for recreational uses. The flooding, the slope, and small stones are management concerns.

This map unit is well suited to use as wildlife habitat. It does not have any significant management concerns, although it is poorly suited to use as wetland wildlife habitat. The depth to water is a severe limitation.

This map unit is in capability subclass IIIe.

HeA—Hesselberg clay, 0 to 2 percent slopes

Setting

Landform position: On alkaline marine terraces that are adjacent to the sea

Shape of areas: Irregular

Size of areas: 4 to 200 acres

Composition

Hesselberg and similar soils: 85 percent

Contrasting inclusions: 15 percent

Minor Components

Contrasting inclusions

- Arawak—soils that have a loamy-skeletal subsoil
- Glynn—very deep soils
- Hogensborg—very deep soils

- Sion—very deep soils

Similar inclusions

- Soils that have a gravelly, very gravelly, stony, or very stony surface layer
- Soils that have a discontinuous petrocalcic layer
- Soils that are moderately deep over a petrocalcic layer

Typical Profile

Hesselberg

Surface layer:

0 to 7 inches, dark reddish brown clay

Subsurface layer:

7 to 12 inches, dark reddish brown clay

Subsoil:

12 to 17 inches, dark red gravelly clay

17 to 18 inches, reddish yellow, pinkish white, and very pale brown partly silicified marl

18 to 24 inches, white partly silicified marl

Substratum:

24 to 60 inches, very pale brown gravelly sandy loam

Soil Properties and Qualities

Hesselberg

Drainage class: Well drained

Permeability: Slow

Available water capacity: Low

Organic matter content: Moderate to high

Natural fertility: Moderate to high

Hazard of erosion: Slight

Seasonal high water table: More than 6 feet deep

Depth to bedrock: 10 to 20 inches

Root zone: 10 to 20 inches

Shrink-swell potential: High

Salinity: Nonsaline

Flooding: None

Stoniness: Nonstony

Use and Management

This map unit is used mainly as rangeland. A few areas are used for pasture, hay, or cultivated crops.

This map unit is suited for cultivated crops. The shallow rooting depth and the low available water capacity are management concerns. The management systems needed in areas of cropland are those that protect or improve the soil and minimize the water pollution caused by plant nutrients, soil particles, and plant residue carried by runoff.

This map unit is suited to pasture and hay. The low available water capacity and the shallow rooting depth are management concerns. Establishing and

maintaining a mixture of grasses and legumes, deferring grazing as needed, controlling weeds, using proper stocking rates, and maintaining soil fertility increase the production of forage and feed. The range site condition of this map unit is poor because less than 25 percent, by weight, of the present vegetation consists of the same species as the original or potential vegetation.

This map unit is poorly suited to most urban uses. The depth to a cemented pan is a management concern for dwellings and small commercial buildings. All structures should be designed so that they conform to the natural slope of the land. Ripping the cemented pan or building above it and landscaping with fill material help to overcome the depth to bedrock. The depth to a cemented pan and the slow percolation rate are severe limitations for septic tank absorption fields.

This map unit is poorly suited for recreational uses. The depth to a cemented pan and the clayey texture of the soil are management concerns.

This map unit is poorly suited to use as wildlife habitat. The depth to a cemented pan, the low available water capacity, the depth to water, and the droughtiness of the soil are management concerns.

This map unit is in capability subclass IIIc.

HeB—Hesselberg clay, 2 to 5 percent slopes

Setting

Landform position: On alkaline marine terraces that are adjacent to the sea

Shape of areas: Irregular

Size of areas: 4 to 200 acres

Composition

Hesselberg and similar soils: 85 percent

Contrasting inclusions: 15 percent

Minor Components

Contrasting inclusions

- Arawak—soils that have a loamy-skeletal subsoil
- Glynn—very deep soils
- Hogensborg—very deep soils
- Sion—very deep soils

Similar inclusions

- Soils that have a gravelly, very gravelly, stony, or very stony surface layer
- Soils that have a discontinuous petrocalcic layer
- Soils that are moderately deep over a petrocalcic layer

Typical Profile

Hesselberg

Surface layer:

0 to 7 inches, dark reddish brown clay

Subsurface layer:

7 to 12 inches, dark reddish brown clay

Subsoil:

12 to 17 inches, dark red gravelly clay

17 to 18 inches, reddish yellow, pinkish white, and
very pale brown partly silicified marl

18 to 24 inches, white partly silicified marl

Substratum:

24 to 60 inches, very pale brown gravelly sandy
loam

Soil Properties and Qualities

Hesselberg

Drainage class: Well drained

Permeability: Slow

Available water capacity: Low

Organic matter content: Moderate to high

Natural fertility: Moderate to high

Hazard of erosion: Moderate

Seasonal high water table: More than 6 feet deep

Depth to bedrock: 10 to 20 inches

Root zone: 10 to 20 inches

Shrink-swell potential: High

Salinity: Nonsaline

Flooding: None

Stoniness: Nonstony

Use and Management

This map unit is used mainly as rangeland. A few areas are used for pasture, hay, or cultivated crops.

This map unit is suited for cultivated crops. The moderate hazard of erosion, the shallow rooting depth, and the low available water capacity are management concerns. The management systems needed in areas of cropland are those that minimize erosion, protect or improve the soil, and minimize the water pollution caused by plant nutrients, soil particles, and plant residue carried by runoff.

This map unit is suited to pasture and hay. The low available water capacity and the shallow rooting depth are management concerns. Establishing and maintaining a mixture of grasses and legumes, deferring grazing as needed, controlling weeds, using proper stocking rates, and maintaining soil fertility increase the production of forage and feed. The range site condition of this map unit is poor because less than 25 percent, by weight, of the present vegetation

consists of the same species as the original or potential vegetation.

This map unit is poorly suited to most urban uses. The depth to a cemented pan is a management concern for dwellings and small commercial buildings. All structures should be designed so that they conform to the natural slope of the land. Ripping the cemented pan or building above it and landscaping with fill material help to overcome the depth to bedrock. The depth to a cemented pan and the very slow percolation rate are severe limitations for septic tank absorption fields.

This map unit is poorly suited for recreational uses. The depth to a cemented pan and the clayey subsoil are management concerns.

This map unit is poorly suited to use as wildlife habitat. The depth to a cemented pan, the low available water capacity, the depth to water, and droughtiness of the soil are management concerns.

This map unit is in capability subclass IIIc.

HeC—Hesselberg clay, 5 to 12 percent slopes

Setting

Landform position: On alkaline marine terraces that are adjacent to the sea

Shape of areas: Irregular

Size of areas: 4 to 200 acres

Composition

Hesselberg and similar soils: 85 percent

Contrasting inclusions: 15 percent

Minor Components

Contrasting inclusions

- Arawak—soils that have a loamy-skeletal subsoil
- Glynn—very deep soils
- Hogensborg—very deep soils
- Sion—very deep soils

Similar inclusions

- Soils that have a gravelly, very gravelly, stony, or very stony surface layer
- Soils that have a discontinuous petrocalcic layer
- Soils that are moderately deep over a petrocalcic layer

Typical Profile

Hesselberg

Surface layer:

0 to 7 inches, dark reddish brown clay

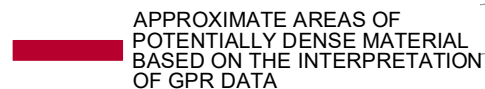


FIGURE NO. 1