



## STORMWATER POLLUTION PREVENTION PLAN

Saratoga BioChar Solutions, LLC  
Farnan Road  
Town of Moreau, NY

March 25, 2022

**DRAFT**

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## DESCRIPTION OF EXISTING SITE

The project site is comprised of two parcels located at the terminus of Farnan Road within the Moreau Industrial Park in the Town of Moreau, NY (Tax Map IDs 50.-4-22 and 50.-4-16). The site is approximately 5.89 ± acres of undeveloped land. The western portion is wooded while the eastern extremities are primarily grassed. A portion of a cul-de-sac located at the end of Farnan Road is positioned within the southeast bounds of the site. The site is zoned General Manufacturing and Industrial (M-1) in accordance with the Town of Moreau Comprehensive Land Use Plan. Majority of the surrounding parcels are undeveloped with the exception of roads, a sanitary sewer pump station with perimeter fencing located at the southeast corner of the site, and a chemical manufacturing facility, Hexion, Inc., located across Farnan Road to the east of the project site.

The eastern parcel generally slopes from northwest to southeast at grades varying from ±1% to ±1.7% along the western confines of the existing woods, approaching Farnan Road. The site is located greater than 1,000 feet west of the Hudson River. No other water bodies or wetlands exist within proximity of the site. A stormwater sewer collection system exists near the northeast corner of the site in Farnan Road.

## DESCRIPTION OF EXISTING SOILS

The United States Department of Agriculture (USDA) Soil Survey obtained from the Natural Resource Conservation Service website indicates the surficial soil type on the site to be Windsor loamy sand (WnB).

The WnB series is identified by the USDA as hydrologic soil group "A" and is characterized by being excessively drained with low runoff potential when thoroughly wet. These soils typically consist of loamy sand and sand material.

A geotechnical survey was performed by Terracon Consultants-NY, Inc. to evaluate the subsurface conditions at the site, the results are summarized and provided in the report titled "Geotechnical Engineering Report, Proposed Manufacturing Facility, Farnan Road, Moreau, New York" Dated July 21, 2021 (Geotechnical Report). A total of eight soil borings and four infiltration tests were performed in the vicinity of proposed development as part of the subsurface exploration efforts. Results of the soil borings indicate site soils to consist of poorly graded sand, sandy silt and some silt clay encountered at depths greater than 22 feet below existing grade. Results of the subsurface exploration indicate that the water table exists at the elevations of 273.5 - 274.5 feet. Four infiltration tests were performed in accordance with requirements of the NYS Stormwater Management Design Manual and results indicate stabilized infiltration rates to be equal or exceeding 45 inches per hour. Results of the soil borings and infiltration tests are presented in Terracon's Geotechnical Report, provided in Appendix C of this report.

## DESCRIPTION OF PROPOSED DEVELOPMENT

Proposed site development includes the construction of a new industrial facility, an asphalt parking lot, landscaping and lighting, municipal utility connections, and an extensive stormwater

management system. Existing forested areas will be preserved to the extent possible. Perimeter areas boarding the north and south property lines will be reforested or landscaped to implement screening from abutting properties. Pervious areas remaining after development will be landscaped with native plants, ornamental trees, or restored with grass, meadow, and flowering seed mixes. Proposed grading will generally preserve existing drainage patterns within the exception of new stormwater basins. Anticipated disturbance areas, pervious and impervious areas are as follows:

	Existing Conditions	Phase 1	Phase 2/3
Disturbance Area	N/A	±192,301 ft <sup>2</sup>	±10,015 ft <sup>2</sup>
Site Impervious	±2,340 ft <sup>2</sup>	±111,404 ft <sup>2</sup>	±133,684 ft <sup>2</sup>
Site Pervious	±254,228 ft <sup>2</sup>	±145,164 ft <sup>2</sup>	±122,884 ft <sup>2</sup>
Total Site Permeability	99%	57%	48%

### CONSTRUCTION PHASING

Construction of proposed development will proceed in three phases. Majority of development will be completed during Phase 1, including the construction of the main building, asphalt driveway, utility connections, landscaping and lighting, and stormwater controls. Phases 2 and 3 will include two building expansions extending off the eastern side of the initial building footprint. Construction will begin with clearing and grubbing in areas of proposed disturbance. Excavation and grading will proceed subsequent to clearing and grubbing, including the installation of stormwater management practices. Proposed structures will be erected, and underground utilities installed simultaneously to grading and excavation activities. Landscaping and lighting will be completed following the completion of earthwork. Silt fence shall be installed in accordance with the construction drawings prior to any disturbance of the existing ground surface. Immediately following the installation of silt fence, a stabilized construction entrance consisting of crushed stone and geotextile stabilization fabric will be installed as shown on the construction drawings. Required erosion and sediment control measures shall be installed prior to disturbance involved with each phase of construction and maintained throughout the duration of construction and resulting ground disturbance.

### POLLUTION PREVENTION MEASURES

Any litter on site, including construction debris, will be picked up each day and disposed of into solid waste containers. The contractor shall provide an approved secondary containment system for all fuel and petroleum temporarily stored on site. During the placement of concrete for the building foundation, measures will be taken to ensure that fresh concrete does not enter any defined drainage paths and a concrete washout area will be provided by the contractor in accordance with the construction drawings. Topsoil and imported fill materials will be stockpiled in the protected areas indicated on the construction drawings.

All industrial activities associated with carbon manufacturing at the proposed facility are to be performed indoors or under cover with no exposure to precipitation. A No Exposure Certification

must be filed with NYSDEC every five years certifying that industrial activity is not exposed to precipitation. If operations change such that a No Exposure Certification no longer applies, the facility must apply for MSGP coverage. A copy of the current No Exposure Certification is provided in Appendix D of the NYSDEC Solid Waste Management Facility Permit provided in Appendix J.

### **SEDIMENTATION AND EROSION CONTROL**

Prior to commencing any land clearing silt fence will be installed in accordance with the construction drawings, and in accordance with the New York State Stormwater Management Design Manual, January 2015 and the New York Standards and Specifications for Erosion and Sediment Control.

A stabilized temporary construction entrance(s) at the location(s) indicated on the construction drawings will be required for all construction traffic entering and leaving the site. The contractor is required to maintain all silt fences and the temporary construction entrance(s) throughout the duration of construction.

All exposed surfaces not covered with paving, structures, and similar finished surfaces will be covered with topsoil and seeded within 14-days following substantial completion of construction to establish a turf covering or will be landscaped in accordance with the construction drawings. The areas receiving seed will be mulched to minimize erosions. Silt fences shall be installed downslope of the newly seeded areas. The silt fences shall be maintained and replaced as required for the duration of construction until a well-established vegetative cover is established.

Construction activities completed upgradient of proposed stormwater practices shall be completed and stabilized in accordance with the construction drawings prior to connection to the proposed practice including the establishment of vegetative cover over all exposed pervious surfaces.

### **PERMANENT STORMWATER CONTROLS**

Permanent stormwater controls for the proposed development will include the construction of stormwater runoff reduction and standard management practices (SMP) designed to meet water quality reduction and treatment goals. Runoff generated by the parking lot and building will be conveyed via sheet flow, catch basins, storm pipe and vegetated swales to infiltration basins. Culverts will be installed beneath the parking lot and entrance drive to facilitate conveyance of runoff to management practices.

Green infrastructure (GI) and standard stormwater management practices (SMP), sized in accordance with the New York State Department of Environmental Conservation Stormwater Management Design Manual, were applied under the proposed stormwater management system to provide a total Runoff Reduction Volume (RRv) greater than or equal to the minimum RRv generated from the proposed development. Applied GI techniques include a series of prefabricated infiltration chambers and two infiltration basins. The remaining WQv, after the application of the RRv practices, is then treated within the infiltration basins. Pre-treatment for the infiltration chambers is provided in an isolated row, wrapped in two layers of geotextile fabric to provide filtering and settling of sediment laden stormwater. Runoff entering the infiltration

basins will be pre-treated via sediment forebays and stone aprons. The peak runoff discharge passing through the stormwater system for the channel protection volume (Cpv: 1 year 24-hour storm event), overbank flood (Qp:10-year storm event) and extreme storm ((Qf)h: 100-year storm event) will be attenuated to less than or equal to the pre-development flow rates at design points common to both the pre- and post-development conditions.

Based on the soil hydrologic group in the proposed construction areas, the following curve numbers were assumed for the hydrologic analyses:

<u>Land Cover Type</u>	<u>Curve Number</u>
50-75% Grass cover, Fair, HSG A	CN 49
>75% Grass cover, Good, HSG A	CN 39
Woods, Good, HSG A	CN 30
Woods/grass Combo, Good, HSG A	CN 32
Impervious surfaces	CN 98

The site was divided into six subcatchment areas based on the flow direction of runoff generated from the proposed development. Subcatchment land cover and runoff control descriptions are provided in Table 1.

Table 1. Subcatchment Area Descriptions

Subcatchment	Landcover	Stormwater Control Measures
1S	Undisturbed woods, grassed area, and a portion of the parking lot	Runoff generated from the parking lot and building will sheet flow to a series of catch basins. Flow will outlet the catch basins to the sediment forebay located along the west side of the parking lot. Overflow will discharge from the sediment forebay, FB1, to infiltration basin IF1. Excess runoff will overflow from IF1 via a stone lined weir, ultimately discharge to Design Point #1.
2S	Undisturbed woods, grassed area, parking lot area, and building roof area.	Runoff generated from the pavement and roof surface will be conveyed via sheet flow to a green space in the parking lot where it will be captured by a series of culverts. Flow will then be conveyed via culverts to a sediment forebay, IF2. Overflow will discharge from FB2 to infiltration basin, IF2. Excess runoff will overflow from the basin via a stone lined weir, ultimately discharging to Design Point #2.

3S	Parking lot area, a portion of the building roof and revegetated/landscaped areas.	Runoff generated from the building roof and pavement surface will be conveyed via sheet flow to a vegetated swale. Runoff will be conveyed by the swale to a catch basin. Captured runoff will then outlet the catch basin via storm pipe and discharge to the sediment forebay, FB3. Overflow will discharge from the sediment forebay to infiltration basin, IF3. Excess runoff will outlet the basin via a stone lined weir, ultimately discharging to Design Point #2.
4S	Enhanced buffer vegetated area, entrance drives, and asphalt area to be constructed during Phase 2&3 building expansions.	Runoff will primarily follow existing drainage pathways through the subcatchment area to the southeast extremities of the site where flow will be managed via natural infiltration within the enhanced grassed buffer area, and ultimately discharge to Design Point #2.
5S	Undisturbed woods	Runoff will follow existing drainage pathways through this subcatchment and ultimately discharge to Design Point #1.

Notes:

1. Refer to the Construction Drawings for permanent runoff control measure locations and details.
2. Stormwater management control measures shall be in accordance with New York State Stormwater Management Design Manual, January 2015

Design storm events were assumed to be customized storm curves based upon Extreme Precipitation Data in New York & New England available through a joint collaboration between the Northeast Regional Climate Center and Natural Resources Conservation Service for Type II, 24-hour 1-year, 25-year, and 50-year storm events. Precipitation Data for the 10-year and 100-year storm events were obtained from the New York State Stormwater Management Design Manual. Rainfall magnitudes for the storm events were determined as follows: 1-year: 2.22 inches, 10-year: 3.75" inches, 25-year: 4.54-inches, 50-year: 5.30-inches and 100-year: 6.50 inches. The runoff rates were modeled using HydroCAD version 10.0 software which calculates runoff based on the modified SCS TR-20 method. The peak runoff discharge passing through the proposed stormwater management system will be attenuated to be less than or equal to the pre-development flow rates for the 100-year 24-hour storm at established discharge design points. Peak off-site discharge rates for the channel protection volume (Cpv: 1 year 24-hour storm event), overbank flood (Qp:10-year storm event), 25-year storm event, 50-year storm event and extreme storm ((Qf)h: 100-year storm event) are summarized in the following table:

Table 2. Peak Off-site Discharge Rates

Location	1-year Storm Peak Discharge (ft <sup>3</sup> /s)	10-year Storm Peak Discharge (ft <sup>3</sup> /s)	25-year Storm Peak Discharge (ft <sup>3</sup> /s)	50-year Storm Peak Discharge (ft <sup>3</sup> /s)	100-year Storm Peak Discharge (ft <sup>3</sup> /s)

	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Design Point #1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.01
Design Point #2	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.0	0.7	0.0

Water Quality volumes (WQv) were established in accordance with the New York State Department of Environmental Conservation Stormwater Management Design Manual, January 2015, with a 90% recurrence interval storm event rainfall magnitude assumed to be 1.20-inches based on site locality. The following table summarizes the RRv and treated WQv values of the Green Infrastructure Practices and Standard Management Practices used to pre-treat a RRv min.= 6,987 cubic feet and a WQv = 13,397 cubic feet.:

Table 3. Green Infrastructure and Standard Management Practice Summary

Subcatchment	Green Infrastructure/SMP Provided	Total WQv (ft <sup>3</sup> )	Pretreatment Req'd (ft <sup>3</sup> )	Pretreatment Provided (ft <sup>3</sup> )	RRv Provided (ft <sup>3</sup> )	WQv Treated (ft <sup>3</sup> )
1S	Infiltration Basin	5743	5743	7240	5743	2591
2S	Infiltration Basin	4578	4578	5103	4124	459
3S	Infiltration Basin	2152	2152	4977	2034	1854

$RRv \text{ total} = 11,902 \text{ ft}^3 \geq \text{Min. RRv}; RRv + WQv_{\text{treated}} = 16,806 \text{ ft}^3 > WQv$

### SITE INSPECTIONS DURING CONSTRUCTION

A qualified inspector as defined in Appendix A of the New York State Department of Environmental Conservation SPDES General Permit for Stormwater Discharges from Construction Activity Permit No. GP-0-20-001 shall conduct construction inspections in accordance with Part IV.C of GP-0-20-001 and in accordance with requirements of the Town of Moreau Local Law 1, Chapter 120.

### MAINTENANCE OF STORMWATER MANAGEMENT SYSTEM

All vegetated swales (where applicable) shall maintain a grass height of 4 to 6 inches and shall be monitored for excessive sediment build-up within the bottom of the channel. Catch basin inlets, storm pipe inlets/outlets, overflow weirs, and culverts should be periodically checked for the accumulation of debris that may constrict runoff from flowing freely at the inlet/outlet invert elevations. In addition to the maintenance of the stormwater practices described, the lawns and landscaped areas shall be maintained in good condition to prevent erosion. Any deteriorated areas of lawn shall be re-seeded, and a stable turf reestablished. In accordance with Town requirements, the property owner shall provide arrangements for the future maintenance of the post-construction stormwater control measures in accordance with the *Sample Stormwater Control Facility Maintenance Agreement*, Appendix H, to be recorded in the office of the Town Clerk or its terms shall be incorporated into covenants appearing in the deed, declarations of covenants and restrictions or other such documents to ensure that record notice of its terms is provided to future owners of the site.



**RETENTION OF RECORDS**

The contractor shall maintain at the project site a copy of this Storm Water Pollution Prevention Plan (SWPPP). In addition, the contractor shall maintain a site logbook which will contain all storm water and erosion control inspection reports to be prepared by the qualified professional. A current copy of the construction drawings shall also be kept in the logbook with comments that may have been added by the qualified inspector.

SWPPP Report Prepared by:



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For  
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**APPENDIX A**  
**PROJECT LOCATION**

Figure 1. Project Location Map



**APPENDIX B**  
**USDA SOIL SURVEY**

# Custom Soil Resource Report Soil Map



## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

**Warning:** Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL: <http://websoilsurvey.sc.egov.usda.gov>  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Saratoga County, New York  
 Survey Area Data: Version 20, Jun 11, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 10, 2015—Mar 29, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## MAP LEGEND

- Area of Interest (AOI)
- Area of Interest (AOI)
- Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points
- Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features
- Water Features
- Streams and Canals
- Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads
- Background
- Aerial Photography

## Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres In AOI	Percent of AOI
WnB	Windsor loamy sand, 3 to 8 percent slopes	12.0	100.0%
<b>Totals for Area of Interest</b>		<b>12.0</b>	<b>100.0%</b>

## Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

## Custom Soil Resource Report

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.



## Saratoga County, New York

### WnB—Windsor loamy sand, 3 to 8 percent slopes

#### Map Unit Setting

National map unit symbol: 2svkf

Elevation: 0 to 1,210 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Farmland of statewide importance

#### Map Unit Composition

Windsor, loamy sand, and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

#### Description of Windsor, Loamy Sand

##### Setting

Landform: Outwash terraces, deltas, outwash plains, dunes

Landform position (three-dimensional): Tread, riser

Down-slope shape: Linear, convex

Across-slope shape: Linear, convex

Parent material: Loose sandy glaciofluvial deposits derived from granite and/or loose sandy glaciofluvial deposits derived from schist and/or loose sandy glaciofluvial deposits derived from gneiss

##### Typical profile

O - 0 to 1 inches: moderately decomposed plant material

A - 1 to 3 inches: loamy sand

Bw - 3 to 25 inches: loamy sand

C - 25 to 65 inches: sand

##### Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Excessively drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 4.5 inches)

##### Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2s

Hydrologic Soil Group: A

Ecological site: F144AY022MA - Dry Outwash

Hydric soil rating: No

## Custom Soil Resource Report

### Minor Components

#### **Hinckley, loamy sand**

*Percent of map unit: 10 percent*

*Landform: Outwash plains, eskers, kames, deltas*

*Landform position (two-dimensional): Summit, shoulder, backslope*

*Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise*

*Down-slope shape: Convex*

*Across-slope shape: Linear, convex*

*Hydric soil rating: No*

#### **Deerfield, loamy sand**

*Percent of map unit: 5 percent*

*Landform: Terraces, deltas, outwash plains*

*Landform position (two-dimensional): Footslope*

*Landform position (three-dimensional): Tread, tal*

*Down-slope shape: Linear*

*Across-slope shape: Linear*

*Hydric soil rating: No*

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- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

## Custom Soil Resource Report

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2\\_054242](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242)

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United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. [http://www.nrcs.usda.gov/Internet/FSE\\_DOCUMENTS/nrcs142p2\\_052290.pdf](http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf)

**APPENDIX C**  
**GEO TECHNICAL ENGINEERING REPORT**



# Geotechnical Engineering Report

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**Proposed Manufacturing Facility  
Farnan Road  
Moreau, New York  
July 21, 2021  
Terracon Project No. JB215105**

**Prepared for:  
Northeastern Biochar Solutions  
Saratoga Springs, New York**

**Prepared by:  
Terracon Consultants - NY, Inc.  
Albany, New York**

Environmental

Facilities

Geotechnical

Materials

July 21, 2021

Northeastern Biochar Solutions  
26F Congress Street, Suite No. 346  
Saratoga Springs, New York 12866



Attn: Mr. Raymond Apy  
p: (518) 391 0566  
e: rapy@northeasternbiochar.com

Re: Geotechnical Engineering Report  
Proposed Manufacturing Facility  
Faman Road  
Moreau, New York  
Terracon Project No. JB215105

Dear Mr. Apy:

We have completed the Geotechnical Engineering services for the referenced project. This study was performed in general accordance with Terracon proposal no. PJB215105, as authorized by Northeastern Biochar Solutions on June 15, 2021. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations, floor slabs and pavements for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us at your convenience.

Sincerely,  
Terracon Consultants-NY, Inc.

Jared Hall, G.I.T.  
Staff Engineer

Joseph Robichaud, Jr., P.E.  
Sr. Associate / Office Manager

Additional review by: John S. Hutchison, P.E.

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**Note:** This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the **GeoReport** logo will bring you back to this page. For more interactive features, please view your project online at [client.terracon.com](http://client.terracon.com).

## ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES  
SITE LOCATION AND EXPLORATION PLANS  
EXPLORATION RESULTS  
SUPPORTING INFORMATION

**Note:** Refer to each individual Attachment for a listing of contents



**Geotechnical Engineering Report**  
**Proposed Manufacturing Facility**  
**Farnan Road**  
**Moreau, New York**  
**Terracon Project No. JB215105**  
**July 21, 2021**

**INTRODUCTION**

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed manufacturing facility in the town of Moreau, New York. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Lateral earth pressures
- Temporary excavation support
- Foundation design and construction
- Floor slab design and construction
- Seismic site classification per NYSBC
- Pavement design and construction
- Frost considerations

The geotechnical engineering scope of services for this project included the advancement of nine test borings (B-1 thru B-9) and four infiltration test borings (I-1 thru I-4) to depths ranging from 8.0 to 52.0 feet below existing site grades. Additionally, our scope included infiltration testing, the visual classification and limited laboratory testing of recovered soil samples, and preparation of this summary report.

Maps indicating the site and test boring locations are included as the attached **Site Location** and **Exploration Plan**, respectively.

**SITE CONDITIONS**

Existing conditions at the site are summarized in the following table:

Item	Description
<b>Parcel Information</b>	The project is located west of Farnan Road, at the southwest corner of its intersection with Electric Drive (currently a paper street), in the town of Moreau, New York. Approximate geographic coordinates: 43.2831 N, -73.6049 W.
<b>Existing Improvements</b>	None. Site is currently undeveloped.

Responsive ■ Resourceful ■ Reliable

Item	Description
Current Ground Cover	Wooded within the western portion and grassy within the eastern portion of the site.
Existing Topography	Site slopes moderately downward toward the southeast from about elevation 286 to 276 feet.
Geology	On the Surficial Geologic Map of New York, soils in the area are mapped as alluvial sand and gravel along with glaciolacustrine silt and clay.

Based upon review of available historic aerial photography, the project site appears to have been largely undisturbed from 1946 onward, with the exception of some dirt trails traversing the parcel and occasional clearing of wooded areas.

## PROJECT DESCRIPTION

Our understanding of the project is summarized as follows:

Item	Description
Information Provided	<ul style="list-style-type: none"> <li>■ Topographic plan entitled "Grading, Drainage, Utilities Plan", no preparer or date indicated.</li> <li>■ Site layout concepts by Element Carbon dated April 30, 2021 (schematic plans)</li> <li>■ Telephone and email correspondence with project team</li> </ul>
General Description	Construction of a new manufacturing facility with associated paved and landscaped areas.
Proposed Structures	The facility will include a manufacturing building with an office, central processing area, and a receiving bay with deep pit. Also included will be a loadout area, overhead bins/hoppers, and a truck scale along the entrance roadway.
Building Construction	Assumed steel frame with metal cladding and cast-in-place concrete foundations.
Maximum Loads	No loading information provided – we assume the following: <ul style="list-style-type: none"> <li>■ Maximum column loads: 150 kips</li> <li>■ Maximum wall loads: 5 kips per lineal foot (klf)</li> <li>■ Maximum slab loads: 250 pounds per square foot (psf)</li> </ul>
Finished Floor Elevation	Not provided. Assumed to be at elevation 284 feet.
Grading/Slopes	It appears that any cuts and fills required to establish proposed grades will be minor, on the order of two feet or less within the proposed building footprint. However, fills upwards of about five feet may be required in the future expansion area.

Item	Description
<b>Below-Grade Structures</b>	The deep receiving pit structure will extend about 25 feet below finished floor elevation. The pit will be about 50 feet long by 25 feet wide and its sides will taper inward with depth at an inclination of 4V:1H such that the width of the pit bottom will be narrower, about 12.5 feet.
<b>Free-Standing Retaining Walls</b>	No site retaining walls are indicated on the plans provided to us. However, the receiving pit walls will retain earth, as may walls at the loadout area.
<b>Pavements</b>	We understand both asphalt and gravel-paved surfaces are being considered. The site will be subjected to routine daily tractor-trailer traffic with highway legal axle loads.

If any of the above information is incorrect, please let us know so we can review the conclusions and recommendations provided in this report for applicability to the actual design and update the report as appropriate.

As the design of the project progresses and site grading plans and building loads are fully developed, we should be retained to assess this site-specific information relative to the recommendations contained herein.

## SUBSURFACE CHARACTERIZATION

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical analysis and evaluation of site preparation and foundation options. Conditions encountered at each exploration point are indicated on the individual subsurface logs. The individual logs can be found in the **Exploration Results** and the GeoModel in the **Figures** sections of this report.

### Subsurface Profile

The following model layers were identified within the subsurface profile. For a more detailed view of the model layers with depths at each boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	<b>Native Sand</b>	Predominately sand with lesser amounts of silt, generally loose to medium dense
2	<b>Sandy Silt</b>	Silt with lesser amounts of sand, along with occasional clay seams or partings, medium stiff to very stiff
3	<b>Silt and Clay</b>	Banded silt and clay with lesser amounts of sand, generally very soft to stiff

### Subsurface Conditions

About 2 to 9 inches of topsoil was encountered at the ground surface at our test boring locations. The topsoil was underlain by granular native sands which in turn graded to cohesive silts and clays at depths of about 18 to 23 feet at most locations. A sandy silt deposit was encountered below the depth of about 12 feet in borehole B-3 and between the depths of about 38 and 48 feet at B-5. No soils readily identifiable as fill were found.

The native sands consisted predominately of fine to coarse sand with lesser amounts of silt and gravel. The silts and clays generally exhibited depositional banding and fine sand partings, while occasional clay seams or partings were noted in the sandy silt deposits. Based on the standard penetration N-values, the soils were generally loose to medium dense where essentially granular and very soft to stiff where essentially fine-grained.

Bedrock was not encountered within the depths explored for this study, 52 feet. For informational purposes, the Geologic Map of New York (New York State Education Department, 1970) maps bedrock underlying the project area as Canajoharie Shale. The mapping suggests that bedrock may be shallow west of the project area.

### Groundwater Conditions

Groundwater was encountered in borings B-1 thru B-6 and I-3 and I-4 at depths of about 4.3 to 10.3 feet below existing grade during our drilling procedure, as tabulated below. Groundwater was not immediately observed in the remaining borings; however, "wet" soil samples were generally recovered within this vicinity indicating the water table was likely within the range of about 273.5 to 274.5 feet throughout the site at the time of our explorations.

Exploration No.	Depth to Groundwater (feet)	Approximate Groundwater Elevation (ft)
B-1	10.3	274.7
B-2	9.4	274.6
B-3	9.6	274.4
B-4	9.4	273.6
B-5	9.3	274.7
B-6	4.3	274.7
I-3	4.6	273.4
I-4	4.3	273.7

Determined using ground surface elevations interpolated from the site-specific topographic survey plan provided for our use.

In addition, mottled soils were encountered throughout the site, generally at depths of about 4 to 9 feet; however, mottling was observed at B-7 near the ground surface (between 0 to 2 feet).

Mottling may be indicative of a seasonally high water table and/or temporarily perched water within the upper soils.

Groundwater conditions, and the extent of any perched water, should be expected to vary with seasonal fluctuations in precipitation and runoff. Additionally, grade adjustments on and around the site, as well as surrounding drainage improvements, may affect the water table. The possibility of groundwater level fluctuations should be considered when developing design and construction plans for the project.

### **Infiltration Testing**

Infiltration tests were performed adjacent to test borings I-1 through I-4 and numbered correspondingly. The testing was conducted in general accord with the guidelines in Appendix D of the NYS Stormwater Management Design Manual. Results of this testing are presented for your use in the **Exploration Results** section of this report and summarized in tabular form below.

Test No.	Approximate Test Depth (feet)	Soil Classification	Infiltration Rate (in/hr)
I-1	4.0	Poorly graded sand, trace silt, fine grained	>24
I-2	4.0	Poorly graded sand, trace silt, fine to medium grained	>24
I-3	2.5	Poorly graded sand, trace silt, fine to medium grained	>24
I-4	2.0	Poorly graded sand, trace silt, fine to medium grained	>24

1. Based on the final infiltration test trial.

## **GEOTECHNICAL OVERVIEW**

The project site is considered suitable for support of the proposed facility using conventional shallow spread foundations and slab-on-grade design, although the deep receiving pit and relatively shallow groundwater will impact on planning for design and construction. Based on the conditions disclosed by our investigation, the following general conclusions.

- New foundations and floor slabs may be supported on undisturbed native soils, or on imported structural fill which is placed over the native soils after all topsoil is removed, along with any existing fill or otherwise unsuitable material which may be found.
- The sandy soils excavated onsite should generally be suitable for reuse as fill and backfill, once cleansed of any oversize particles and unsuitable debris or organics, subject to the

approval of the Geotechnical Engineer and based upon the conditions encountered at the time of construction.

- The receiving pit invert elevation will be situated well below static groundwater level at the site, as shown on the building cross-section attached to this report. For this reason, it should be expected that appreciable dewatering effort will be necessary to allow construction to proceed in relative dryness and to promote stable excavation sidewall and bottom conditions. The pit must also be designed to resist hydrostatic uplift forces (buoyancy) when complete. These considerations are discussed further in the Temporary Excavations and Uplift sections herein.
- Elsewhere (i.e., outside the receiving pit area), groundwater is expected to be below foundation excavation depths and should not be a significant factor in planning for design and construction of the building. If perched water is encountered during construction, it is expected to be limited in volume and standard sump and pump methods should be sufficient for its removal. Dewatering is a means and methods consideration for the contractor.
- It is noted that grade increases upwards of five feet may be necessary in the future expansion area. Consideration should be given to placement of whatever fill may ultimately be required in the expansion area at the time of initial facility construction, so as to allow whatever consolidation settlement may occur in the soft clays at depth under the weight of the fill to occur in advance of future construction. Otherwise, the fill should be placed at least four to six weeks in advance of any future expansion so as to limit post-construction settlement.

The following sections of this report provide more detailed recommendations to assist in planning for the geotechnical aspects of the project. We should be provided with the opportunity to review plans and specifications prior to their release for bidding to confirm that our recommendations were properly understood and implemented, and to allow us to refine our recommendations, if warranted, based upon the final design. The **General Comments** section provides an understanding of the report limitations.

## **SEISMIC CONSIDERATIONS**

The seismic design requirements for buildings and other structures are based on Seismic Design Category. Site classification is required to determine the Seismic Design Category for a structure. The seismic Site Class is based on the upper 100 feet of the site profile defined by a weighted average value of either shear wave velocity, standard penetration resistance, or undrained shear strength in accordance with Section 20.4 of ASCE 7 and the International Building Code (IBC).

## **Seismic Site Classification**

In our estimation, the Seismic Site Class is D. This determination is made based upon the results of shear wave velocity testing completed in similar subsurface profiles at several sites in the general project area, where this testing has found that average shear wave velocities in the upper 100 feet consistently exceed 600 feet per second. Additional deeper borings or geophysical testing may be performed to confirm the conditions below the current boring depth, if desired.

## **Liquefaction**

Evaluation of the potential for soil liquefaction to occur was made using the computer software program Liquefy Pro by CivilTech Corporation. An earthquake magnitude of 6.0 was assumed, and a peak ground acceleration (PGA) of 0.10g for the project area was used, this representing a two percent probability of exceedance in 50 years (as obtained from USGS earthquake hazards mapping). Based on these parameters and site-specific conditions determined through the subsurface investigation, the calculated factor of safety against liquefaction is no less than 2. As such, liquefaction potential at the project site is considered low.

## **EARTHWORK**

Earthwork is anticipated to include clearing and grubbing, foundation excavation and associated site fill and backfill. It should be understood that excavation and dewatering considerations with respect to the receiving pit are substantial and out of the ordinary. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered suitable in our geotechnical engineering evaluation for foundations and floor slabs.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety or the contractor's activities; such responsibility is neither implied nor shall it be inferred.

## **Site Preparation**

Site preparation should begin with stripping of any existing topsoil, vegetation and/or root mat from the ground surface. Any existing fill or disturbed soils, if encountered, should be removed in its entirety from beneath the proposed building footprint, extending at least five feet beyond its perimeter.

Prior to placing fills to raise site grades and/or after cuts are made to the plan subgrade elevations, the subgrades should be proof-rolled using a steel drum roller with a static weight of at least 10

tons. The roller should operate in its vibratory mode, unless requested otherwise by the Geotechnical Engineer observing the work, and travel at a speed not exceeding three feet per second (two miles per hour). The roller should complete at least four passes over all subgrade surfaces in opposing directions. The method of proof-rolling may be modified by the Geotechnical Engineer based upon the conditions revealed at the time of construction.

Soft areas identified by the proof-rolling should be investigated to determine the cause and stabilized accordingly. These investigations may include the excavation of test pits. Where existing fills are found and determined by to be unsuitable by the Geotechnical Engineer, they should be removed and replaced as deemed necessary.

**Fill Material Types**

Imported Structural Fill should be used as fill/backfill within the proposed building area. The imported fill should consist of sand and gravel which meets the limits of gradation given below. Any imported materials should be free of recycled concrete, asphalt, bricks, glass, and pyritic shale rock.

IMPORTED STRUCTURAL FILL	
Sieve Size	Percent Finer
3"	100
¼"	30 to 75
No. 40	5 to 40
No. 200	0 to 10

The reuse of excavated site soils may be considered if approved by the Geotechnical Engineer and pending the conditions encountered at the time of construction. Reuse of the onsite soils would require that excessively silty material, organics, oversized particles or unsuitable foreign matter found therein be separated and reused in landscape areas only or wasted off-site as appropriate.

**Fill Compaction Requirements**

Fills beneath the building pad should be placed in uniform loose layers no more than about one-foot thick where heavy vibratory compaction equipment is used. Thinner lifts should be used where hand operated equipment is required for compaction. Each lift should be compacted to no less than 95 percent of its maximum dry density as determined by the Modified Proctor Compaction Test, ASTM D1557. In landscape areas, if any, the compaction requirement may be relaxed to 90 percent of maximum dry density.

**Grading and Drainage**

All grades should provide effective drainage away from the building during and after construction, with such drainage maintained throughout the life of the structure. Water retained next to buildings



can result in soil movements greater than those outlined in this report, which may in turn lead to unsatisfactory differential floor slab and/or foundation displacements, cracked slabs and walls, or roof leaks.

### Temporary Excavations

Excavations must be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P and its appendices, along with any state and local codes, as applicable. The contractor should be aware that slope height, slope inclination, and excavation depth should in no instance exceed OSHA regulations. Flatter slopes than those stipulated by the regulations or temporary shoring may be required depending upon the soil/groundwater conditions encountered and other external factors. OSHA regulations are strictly enforced and if they are not followed, the owner, contractor, and/or earthwork and utility subcontractor could be liable and subject to substantial penalties.

If temporary excavation bracing is required, it should be designed by a professional engineer experienced in such work. The parameters given in the **Excavation Support** section below may be assumed for the bracing design.

It should be understood the lower extents of the proposed receiving pit are situated well below static groundwater level, and dewatering will be required to complete the works in relatively dry conditions. Further, the sand deposit in which the receiving pit will for the most part be situated is highly permeable, and for this reason it may be necessary to dewater from closely spaced well points. Excavated grades will become unstable in the absence of adequate dewatering. Dewatering is a means and methods consideration for the contractor.

Also note that the lowest extent of the receiving pit at a depth of about 25 feet below grade will extend near or into wet, soft silt and clay soils. It should be understood these fine-grained soils are subject to weakening and softening through construction activity and foot traffic, especially when wet. Accordingly, the receiving pit subgrades should be improved/protected upon excavation with a gravel stabilization/drainage layer consisting of clean crushed stone 24 inches in thickness. The stone should be an ASTM C33 Blend 57 aggregate which is enveloped with a non-woven synthetic filter fabric meeting the requirements of NYSDOT standard specifications table 737-01C for drainage geotextile to inhibit migration of fines.

### Excavation Support

Where supported excavations are required to excavate to the planned grades for the proposed receiving pit or elsewhere, the type and design of the excavation support system must be compatible with the site geometry, subsurface conditions, the planned building foundation construction, and provide adequate support for adjacent structures or utilities. Any temporary support walls to be constructed at this site and components thereof should be designed for the maximum combination of loading that may occur in each stage of excavation and bracing, and

during construction. Recommended soil parameters for use in the design of excavation support at this site are presented below.

Excavation support can be designed and bid or left to the contractor and their consultant to design and install. If the design of temporary earth support is to be performed by the contractor, it should be submitted to the design team for review. Their submittal should include assumptions made regarding soil properties, geometry of the excavation, lateral pressure diagrams, base stability of the excavation with respect to hydrostatic head/dewatering, locations and magnitudes of all surcharge loads and wall design calculations, including deflection analyses and a proposed monitoring program for the construction period. The temporary earth support should be designed and stamped by a Professional Engineer licensed in the State of New York.

The following soil parameters may be assumed for design of temporary excavation support:

Material	Approx. Elevation Range (ft)	Total Moist Unit Weight (pcf)	Angle of Internal Friction (degrees)	Cohesion (psf)
Native sand (GeoModel Layer 1)	> 261	115	30	0
Native sandy silt (GeoModel Layer 2)	Varies	115	28	0
Native silt and clay (GeoModel Layer 3)	< 261	115	26	0

\* Long-term effective stress parameters as presented in the table are recommended for use

Groundwater may be assumed at a depth of 10 feet below existing grade (or at about elevation 275 feet) for the purposes of excavation support design in the proposed building area.

### Construction Observation and Testing

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of topsoil and any unsuitable fills, proof-rolling, and mitigation of any areas identified as needing improvement through proof-rolling. Each lift of new compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the Geotechnical Engineer prior to placement of additional lifts.

Foundation bearing grades and subgrades for floor slabs should be evaluated under the direction of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

It should be understood that subsurface conditions will be more fully known when the site is excavated. The continuation of the Geotechnical Engineer into the construction phase of the project will allow for validation of the subsurface conditions assumed to exist for this study and in

the development of the design recommendations in this report, along with assessing any variations, providing interim recommendations as necessary and reviewing associated design changes.

## SHALLOW FOUNDATIONS

If the site has been prepared in accordance with the requirements noted previously in the **Earthwork** section and below under the **Foundation Construction Considerations**, the following design parameters may be assumed.

### Design Parameters – Compressive Loads

Item	Description
<b>Maximum Net Allowable Bearing Pressure</b> <sup>1, 2</sup> Native Sand (GeoModel Layer 1) Native Silt and Clay (GeoModel Layer 3)	3,000 pounds per square foot (psf) 2,000 psf
<b>Required Bearing Stratum</b> <sup>3</sup>	Undisturbed native soils or structural fill placed over the native soils after removal of existing fill or otherwise unsuitable material that may be found
<b>Minimum Foundation Dimensions</b>	Columns: 36 inches Continuous: 24 inches
<b>Ultimate Coefficient of Sliding Friction</b> <sup>4</sup>	0.25 (concrete on native silt and clay) 0.45 (concrete on native sand or imported Structural Fill)
<b>Minimum Embedment below Finished Grade</b> <sup>5</sup>	Exterior footings: 48 inches Interior footings in heated areas: 24 inches Interior footings in unheated areas: 48 inches
<b>Estimated Total Settlement from Structural Loads</b> <sup>2</sup>	Less than about one (1) inch
<b>Estimated Differential Settlement</b> <sup>2, 6</sup>	About 75% of total settlement

- 1 The maximum net allowable bearing pressure is the pressure which exceeds the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied.
- 2 Values provided are for maximum loads noted in **Project Description**. The settlements should occur relatively quickly as construction proceeds and load increments are applied.
- 3 The bearing grades should be prepared per the recommendations presented below in the **Foundation Construction Considerations**.
- 4 Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Should be neglected for foundations subject to net uplift conditions.
- 5 Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure. Interior footings in heated area may be seated at the 24-inch depth if allowed by local building codes.
- 6 Differential settlements are as measured over a span of 50 feet.

As site soils are relatively free-draining, and groundwater is several feet below presumed (non-receiving pit) foundation grades, the provision of a standard perimeter foundation drain is considered unnecessary.

### **Foundation Construction Considerations**

The foundations may be seated directly on undisturbed native soils, or on imported structural fill placed over the native soils after removal of existing fill, remains of former structures or otherwise unsuitable materials that may be found. If over-excavation is required beneath the foundations to remove unsuitable material, the excavation should extend horizontally beyond each side of the foundation a distance equal to at least one-half the depth of the undercut below the final bearing grade elevation. Replacement material should meet the specification and compaction guidelines for Structural Fill as outlined herein.

Foundation bearing grades (other than those of the receiving pit, which are addressed below) should be proof-compacted using a mechanical or large reversible plate tamper to densify the soils loosened by the excavation process unless otherwise directed by the Geotechnical Engineer observing the grades. If groundwater seepage occurs, proof-compacting should be eliminated, and a minimum six-inch thick base of clean crushed stone placed over a geotextile fabric should be provided to establish a more uniform and stable base for construction and to assist in dewatering. The stone should be an ASTM C33 Blend 57 aggregate and the fabric a non-woven type meeting the requirements of NYSDOT standard specifications table 737-01C for drainage geotextile.

As previously indicated, the lowest extent of the receiving pit at a depth of about 25 feet below grade will extend near or into wet, soft silt and clay soils. It should be understood these fine-grained soils are subject to weakening and softening through construction activity and foot traffic, especially when wet. Accordingly, the receiving pit subgrades should be improved/protected upon excavation with an aggregate stabilization/drainage layer consisting of clean crushed stone 24 inches in thickness. The stone should be an ASTM C33 Blend 57 aggregate which is enveloped with a non-woven synthetic filter fabric as described above. As an alternative to over-excavation and placement of the crushed stone stabilization/drainage layer, consideration may be given to protection of the grades with a lean concrete mud mat (minimum 2 inches in thickness with  $f_c$  equal to or greater than 2,000 psi) placed immediately after their excavation and acceptance.

All final bearing grades should be relatively firm, stable, and free of loose soil, mud, water and frost. The Geotechnical Engineer should approve the condition of the foundation bearing grades immediately prior to placement of reinforcing steel and concrete.

## **UPLIFT**

The receiving pit will extend some 15 feet below the water table and will therefore be subject to uplift pressures (buoyancy). As such, the structure should be made sufficiently heavy to resist uplift pressure under the worst-case design conditions (i.e., when the pit is empty). Base extensions may be used to provide additional uplift resistance. Permanent drilled-in tiedown anchors or helical anchors could also be considered to provide uplift resistance, if necessary, but the underlying soft silt and clay soils will provide limited capacity. Assume water table elevation at about 275 feet for the purposes of uplift resistance design.

## **FLOOR SLABS**

### **Floor Slab Design Parameters**

The floor slabs should be constructed upon a minimum six-inch thick subbase course which conforms to the requirements for NYSDOT Type 2 Subbase or ASTM C33 Blend 57 aggregate. Consideration should be given to using a thicker subbase course in areas subject to heavier loads and/or use, or those exposed to freezing temperatures.

The use of a vapor retarder along with a base course of ASTM C33 Blend 57 aggregate should be considered beneath concrete slabs-on-grade to be covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding its use and placement.

Saw-cut control joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations refer to the ACI Design Manual.

Floor slab subgrades should be prepared as outlined in the Earthwork section herein. Under these conditions, a modulus of subgrade reaction equal to 200 pounds per cubic inch (psi/in) may be assumed at the top of the stone base layer for slab design purposes.

### **Floor Slab Construction Considerations**

Even with the base course recommended above, we caution that the subgrades may not support repeated heavy construction traffic or telehandlers without suffering rutting and weaving that may be especially severe during wet seasons. If the grades are to be repeatedly traversed by these types of equipment, they should be reinforced as necessary to support them. Areas which become disturbed should be excavated and stabilized accordingly.

The Geotechnical Engineer should approve the condition of the floor slab subgrades immediately prior to placement of the floor slab subbase course. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

## EARTH RETAINING WALL DESIGN

All permanent earth-retaining foundation walls or structures should be designed to resist the lateral pressures generated by earth backfill and any temporary or permanent surcharge loads. Active earth pressures may be assumed for walls that are free to deflect as the backfill is placed and surcharge loads applied. At-rest earth pressures should be assumed for walls that are braced prior to backfilling or applying surcharge loads. The following design parameters are provided to assist in determining the lateral wall loads, whichever apply, and to analyze the stability of unbraced walls by sliding and overturning.

- Soil angle of internal friction - 30 degrees
- Coefficient of At-Rest earth pressure ( $k_0$ ) - 0.50
- Coefficient of Active earth pressure ( $k_a$ ) - 0.33
- Coefficient of Passive earth pressure ( $k_p$ ) - 3.00
- Total unit weight of compacted soil - 130 pcf
- Coefficient of sliding friction - 0.25 (concrete on native silt and clay)  
0.45 (concrete on native sand or imported Structural Fill)

The recommended design parameters assume that backfill consists of imported Structural Fill as described in the **Earthwork** section herein, idealized non-sloping conditions on each side of the wall, and that the backfill remains permanently well-drained. Water must not be allowed to collect against the wall unless the wall is designed to accommodate the added hydrostatic pressure (as will evidently be the case with the receiving pit walls – assume water table elevation at about 275 feet in this instance). Drainage system recommendations are provided below.

### Subsurface Drainage for Earth-Retaining Walls

Earth retaining structures or foundation walls above the water table should be provided with a foundation level drain which may consist of a nominal 4-inch diameter perforated PVC or corrugated HDPE pipe embedded at the base of a minimum 12-inch wide column of clean crushed stone (e.g., NYSDOT no. 1 and no. 2 size aggregate or ASTM C33 Blend 57 stone). The stone should be enveloped in an appropriate non-woven filter fabric (meeting NYSDOT standard specifications section 737-01 for drainage geotextile) to inhibit siltation. Backfill soils behind the crushed stone drainage layer should consist of imported Structural Fill. The drain line should be sloped to provide positive gravity drainage to daylight, to a stormwater system, or to a sump pit and pump.

## PAVEMENTS

### Pavement Design

The asphalt pavement sections presented below were developed in general accord with AASHTO procedures using a reduced subgrade strength and local experience to account for frost, and to keep the anticipated pavement heave and cracking within generally tolerable limits. A subgrade resilient modulus ( $M_r$ ) equal to 5,000 psi has been assumed for design purposes.

Two conventional pavement sections were developed, a Light Duty section for automobile parking areas and a Heavy-Duty section for entrance drives or areas subject to routine truck traffic. For design purposes, it has been assumed that the pavement design life is 20 years, and that daily equivalent single axle loads (ESALs) are equal to 1 for the Light Duty section and 10 for the Heavy Duty section. If the traffic loads vary from these, we should be provided the opportunity to refine the pavement section accordingly.

All materials should meet the requirements specified in the latest edition of the New York State Department of Transportation (NYSDOT) Standard Specifications for Construction and Materials.

Flexible Pavement Design				
Layer	Material Description	NYSDOT Reference	Thickness (inches)	
			Light Duty	Heavy Duty
Top	Asphaltic Concrete	Item 402.127303	1.5	1.5
Binder	Asphaltic Concrete	Item 402.257903	2.0	3.0
Stone Subbase	Crusher-Run Stone	Section 733-04, Type 2	8	16
Geotextile	Stabilization Geotextile	Table 737-01E	Single Ply	Single Ply

Where surfaces will be gravel paved, we recommend a section consisting of a minimum 6 inches of gravel Surface Course and a minimum 16 inches of gravel Base Course as described in section 667 of the NYSDOT Standard Specifications (Local Road Gravel Surface, Base and Subbase Courses) for Heavy Duty use. A Light Duty section may consist of 4 inches of Surface Course and a minimum 8 inches of Base Course. A suitable stabilization geotextile as stipulated in the table above should be provided between the gravel base and the underlying subgrade in either case.

Where truck and equipment traffic or activity will be concentrated and/or where usage will be especially severe (e.g., areas subject to frequent stationary turning operations, heavy equipment, tracked vehicles, etc.) rigid concrete pavement may be a better alternative. Rigid pavements should be provided with a minimum eight-inch thick base of crusher-run stone (NYSDOT section 733-04, Type 2 material) placed over a suitable stabilization geotextile. The rigid pavements may

be designed assuming a modulus of subgrade reaction equal to 200 pounds per cubic inch at the top of the base layer.

### **Temporary Construction Access Roadways**

The recommended pavement sections are not designed to support heavy construction traffic which may require thicker sections. The contractor should construct temporary haul routes and construction roadways onsite as appropriate for the weather conditions and the equipment in use, with consideration to the soil conditions encountered in specific areas.

### **Pavement Drainage**

Accumulation of water on pavement subgrades should be avoided by grading the subgrade to a slope of at least two percent, and/or by providing underdrains. Failure to provide adequate drainage will shorten pavement life.

### **Pavement Maintenance**

All pavements require periodic care, and preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Maintenance consists of both localized maintenance (e.g., crack and joint sealing, patching, leveling, etc.) and global maintenance (e.g., surface sealing).

### **Frost Considerations**

Frost may penetrate beneath sidewalks and pavements and cause them to heave, and resulting displacements may be differential, particularly where sidewalks and pavements meet building doorways and along curbs. To limit the magnitude of heave and creation of such uneven joints to generally tolerable magnitudes for most winters, a 16-inch thick base of ASTM C33 Blend 57 crushed stone should be placed beneath sensitive sidewalk or pavement areas, along with an underdrain to relieve any collected waters. The crushed stone should be separated from the surrounding granular soils with a non-woven synthetic filter fabric meeting the requirements of NYSDOT standard specifications table 737-01C for drainage geotextile.

## **GENERAL COMMENTS**

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we



can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements and design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

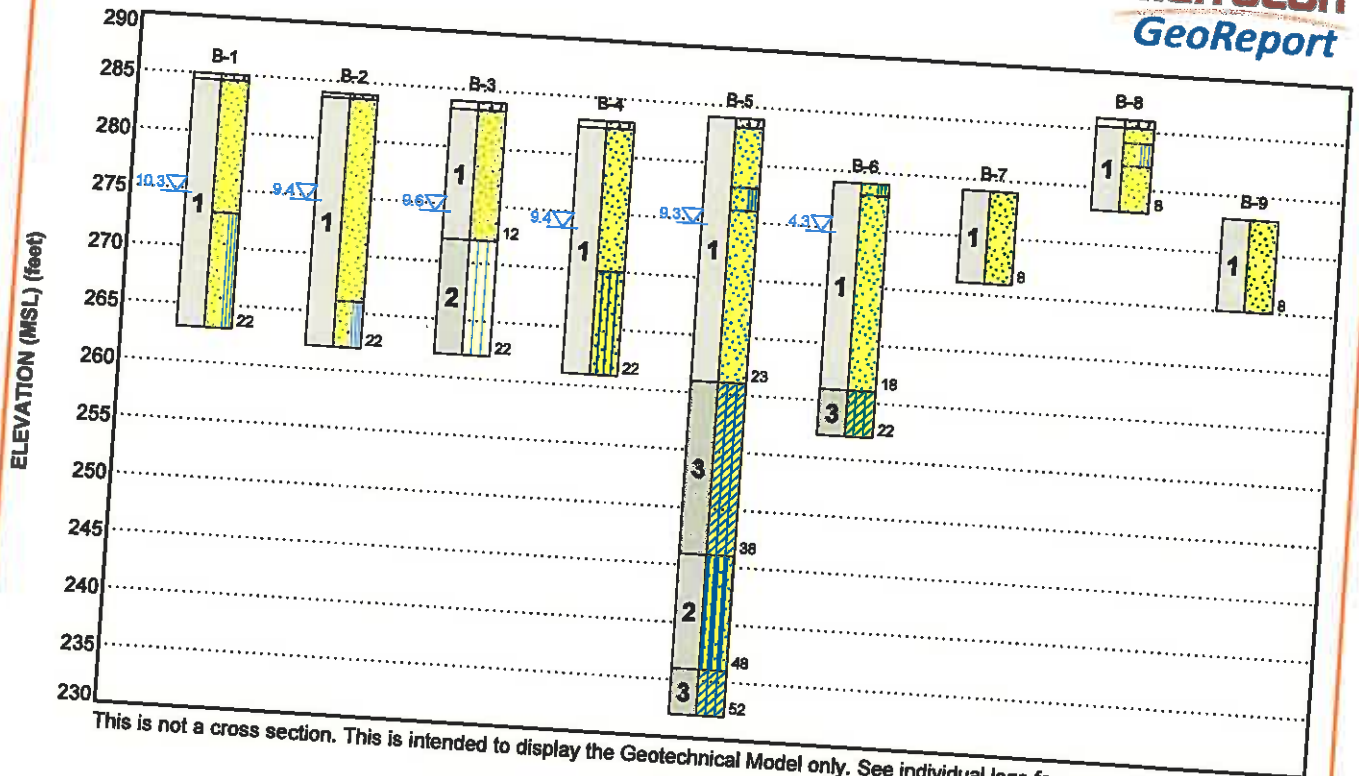
## FIGURES

### Contents:

GeoModel (2 Sheets)  
Building Cross Section (1 Sheet)

# GEOMODEL

Proposed Manufacturing Facility ■ Moreau, New York  
Terracon Project No. JB215105



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Native Sand	Predominately sand with lesser amounts of silt, generally loose to medium dense
2	Sandy Silt	Silt with lesser amounts of sand, along with occasional clay seams or partings, medium stiff to very stiff
3	Silt and Clay	Banded silt and clay with lesser amounts of sand, generally very soft to stiff

### LEGEND

- Topsoil
- Silt
- Sandy Silt
- Poorly-graded Sand
- Silty Sand
- Poorly-graded Sand with Silt
- Silty Clay

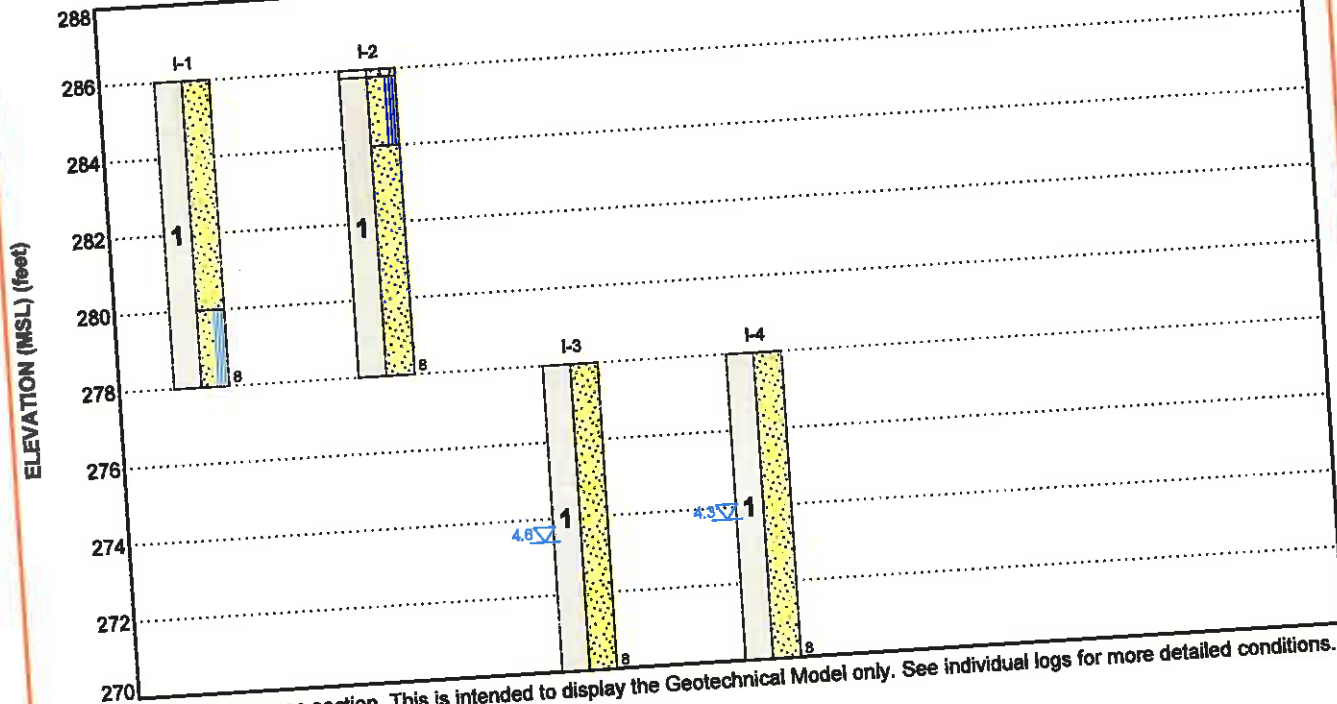
▽ First Water Observation

**NOTES:**  
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

**GEOMODEL**

Proposed Manufacturing Facility ■ Moreau, New York  
Terracon Project No. JB215105



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
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**LEGEND**

- Poorly-graded Sand
- Poorly-graded Sand with Silt
- Topsoil

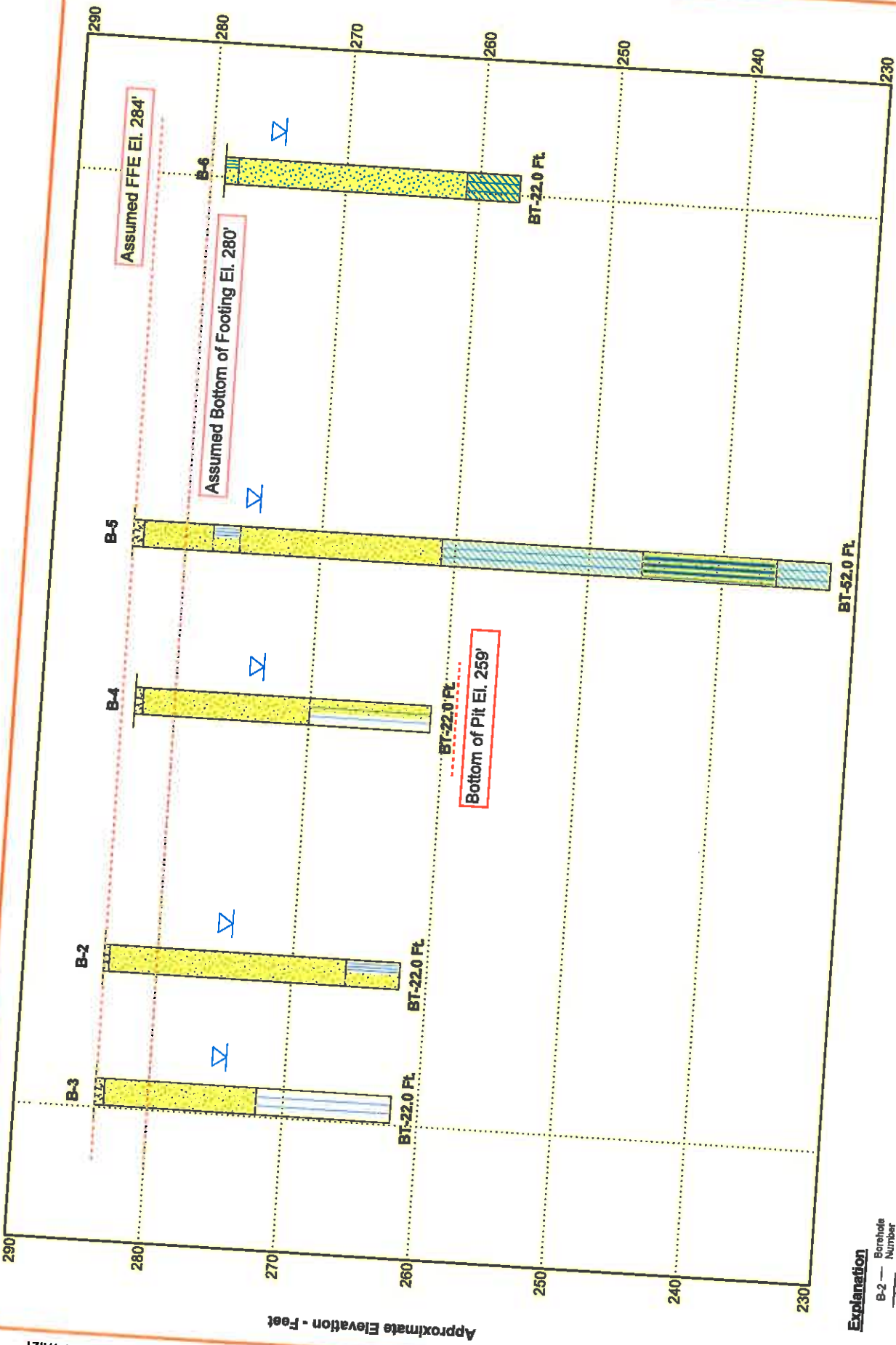
First Water Observation

**NOTES:**  
Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

West

East



THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. SMART FENCE-8.5 X 11 JB215105 PROPOSED MANUFACT. GPJ TERRACON\_DATA\TEMPLATE.GDT 7/1/21

**Explanation**

- B-2 — Borehole Number
- Borehole Lithology
- AR — Borehole Auger Refusal
- BT — Borehole Termination
- BT — Boring Termination
- Water Level Reading at time of drilling

See *Exploration Plan* for orientation of soil profile.  
 See General Notes in *Subsurface Investigation Report* for symbols and soil classifications.  
 Soil profile provided for illustration purposes only. Soils between borings may differ.  
 AR - Auger Refusal  
 BT - Boring Termination

Project Manager: JH  
 Drawn by: JCH  
 Approved by:  
 Date: 7/1/2021

Project No.: JB215105  
 Scale: N.T.S.  
 File Name: JB215105.1



30 Corporate Ct. Ste 201  
 Albany, NY  
 PH: 518-266-0370 FAX

**SUBSURFACE PROFILE**  
 BUILDING CROSS SECTION SCHEMATIC  
 PROPOSED MANUFACTURING  
 FACILITY FARNAN ROAD  
 MOREAU, NEW YORK

## ATTACHMENTS

## EXPLORATION AND TESTING PROCEDURES

### Field Exploration

Test ID	Depth (feet)	Location
B-1 thru B-6	22.0 to 52.0	Proposed building footprint
B-7 thru B-9	8.0	Proposed pavement areas
I-1 thru I-4	8.0	Infiltration test locations

**Test Boring Layout and Elevations:** The test locations were selected by Terracon and were established in the field using a hand-held GPS unit, taped measurements and/or visual reference from existing site features. The borehole locations were determined on the basis of the proposed building layout described to us, within the limitations of access, existing structures and utilities.

A number of schematic plant layout configurations were under consideration at the time of this report; the layout upon which the test boring locations were selected and upon which this report is based was mutually agreed upon between Terracon and the design team at the proposal stage.

Existing ground surface elevation at each borehole location was estimated based upon our interpolation between topographic contours shown on the site plan provided to us. If more precise locations and/or elevations are desired, the as-completed test locations should be surveyed.

**Subsurface Exploration Procedures:** The test borings were completed using a standard rotary drill rig equipped with hollow stem augers. As the augers were advanced, the soils were sampled at intervals of five feet or less in accordance with the Standard Method for Penetration Test and Split-Barrel Sampling of Soils, ASTM D1586. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon is driven into the ground by a 140-pound automatic hammer falling 30-inches. The number of blows required to advance the sampling spoon the middle 12-inches of a normal 24-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the corresponding test depths. Upon completion of drilling the boreholes were backfilled with auger cuttings, concrete cylinders and/or sand and the surface restored in kind.

Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. The sampling depths, penetration distances, and other sampling information were recorded on the field boring logs.

The samples were placed in appropriate containers and taken to our laboratory for visual classification by a Geologist or Geotechnical Engineer. The soils were described based on the material's color, texture, plasticity and moisture Soil classifications are in general accordance with

the Unified Soil Classification System (USCS) as summarized herein. Final boring logs were prepared, and they represent the Geotechnical Engineer's interpretation based on the field logs and visual classifications, along with any laboratory testing performed.

### **Laboratory Testing**

Selected samples recovered from the test borings were submitted for laboratory testing as part of the subsurface investigation, to confirm the visual classifications and to provide quantitative index properties for use in the geotechnical evaluation. This testing was performed in general accordance with the following standard methods:

- ASTM D2216 - Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil - and Rock by Mass (6 samples tested)
- ASTM D422 - Standard Test Method for Particle-Size Analysis of Soils (2 samples tested w/ hydrometer, 3 samples tested w/o hydrometer)
- ASTM D4318 - Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils (1 sample tested)



## **SITE LOCATION AND EXPLORATION PLANS**

### **Contents:**

Site Location Plan  
Exploration Plan

**Note:** All attachments are one page unless noted above

**SITE LOCATION**  
 Proposed Manufacturing Facility ■ Moreau, New York  
 July 21, 2021 ■ Terracon Project No. JB215105

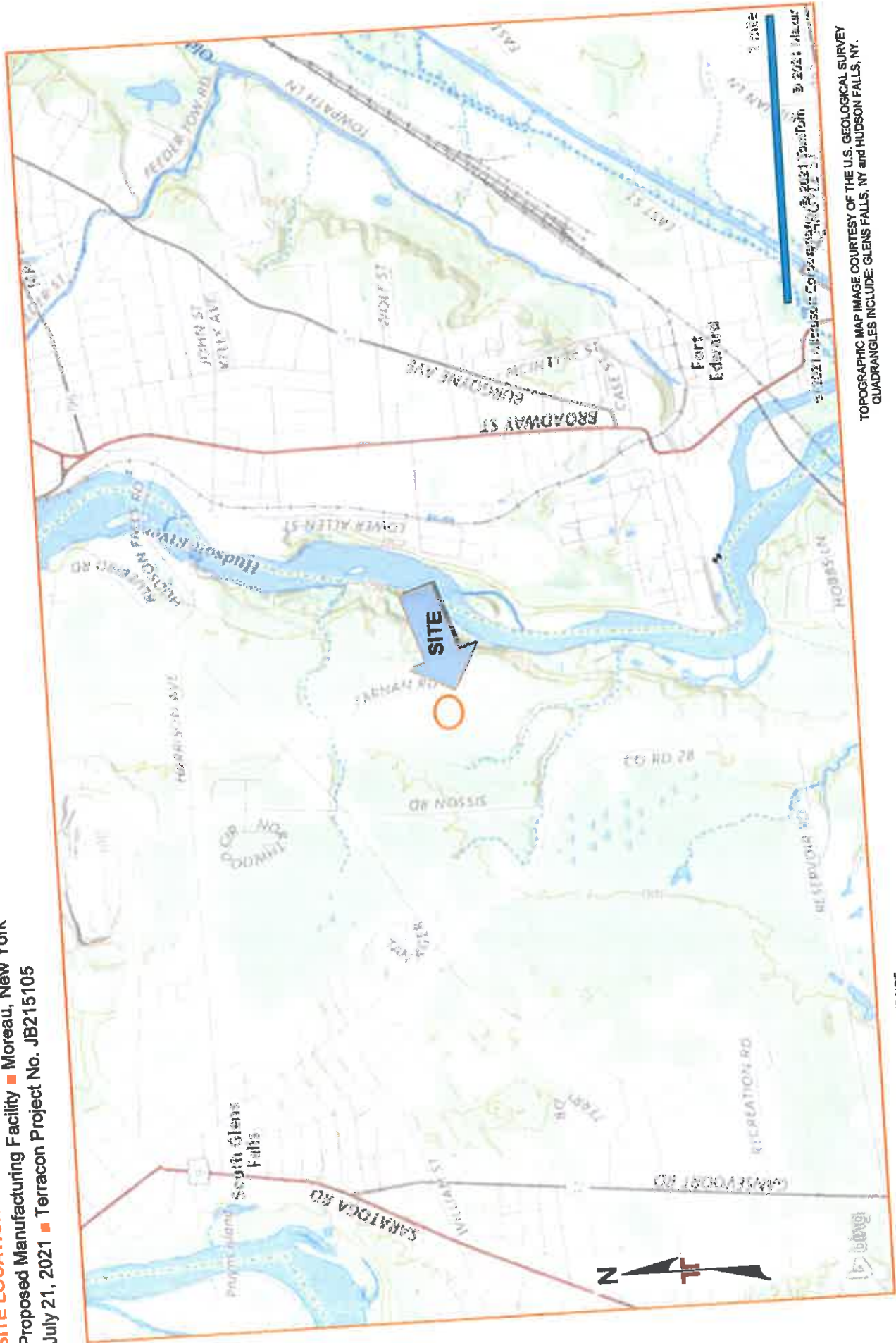


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT  
 INTENDED FOR CONSTRUCTION PURPOSES

**EXPLORATION PLAN**

Proposed Manufacturing Facility ■ Moreau, New York  
July 21, 2021 ■ Terracon Project No. JB215105

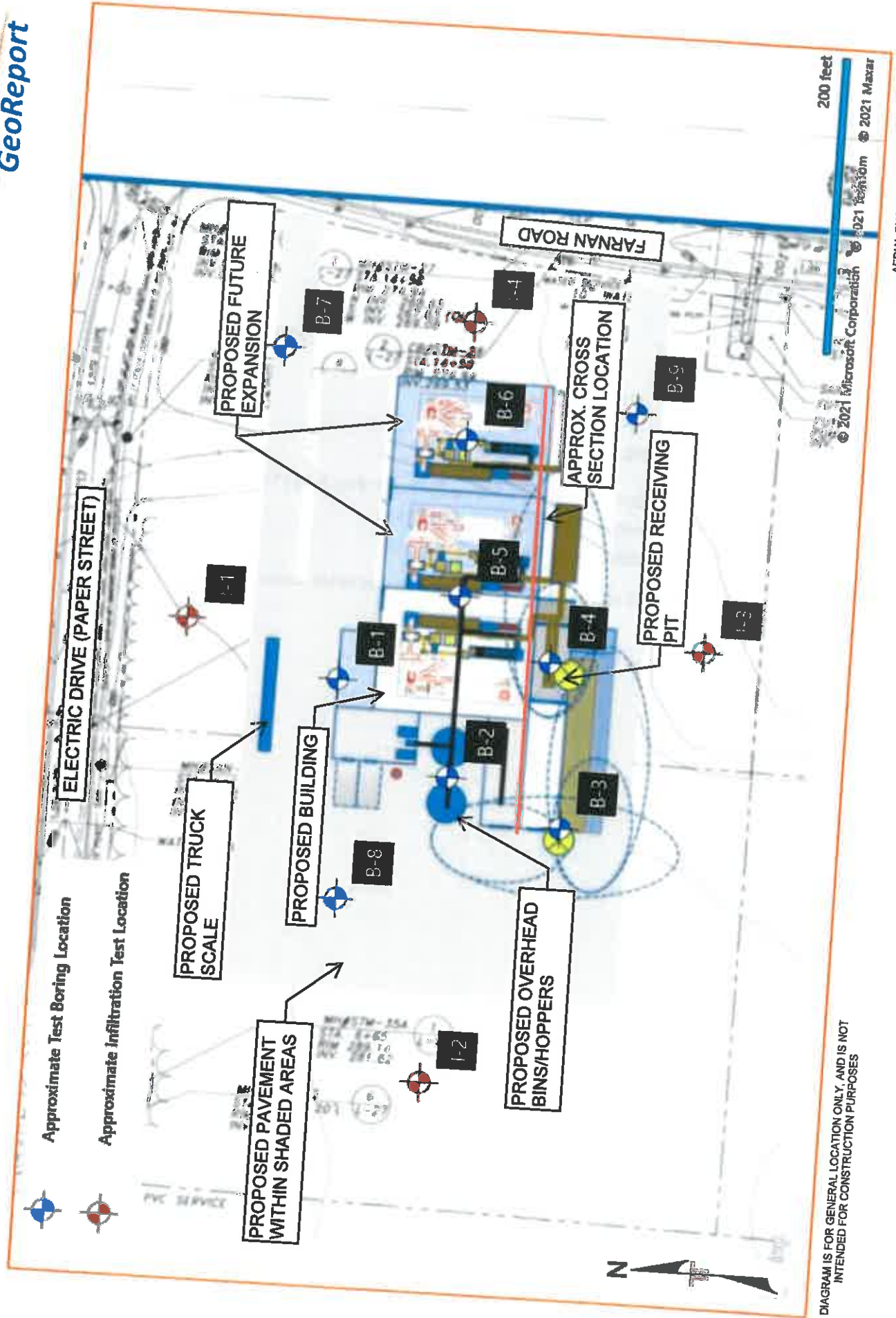


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

## **EXPLORATION RESULTS**

### **Contents:**

Test Boring Logs (B-1 thru B-9, I-1 thru I-4) (14 pages)

Laboratory Test Results (6 pages)

Infiltration Test Results (2 Pages)

Note: All attachments are one page unless noted above

# BORING LOG NO. B-1

**PROJECT:** Proposed Manufacturing Facility

**CLIENT:** Northeastern Biochar Solutions LLC  
Saratoga Springs, New York

**SITE:** Farnan Road  
Moreau, New York

MODEL LAYER	GRAPHIC LOG	LOCATION See <span style="color: red;">Exploration Plan</span> Latitude: 43.2834° Longitude: -73.6052°	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	WATER CONTENT (%)
		Approximate Surface Elev.: 285 (Ft.) +/- ELEVATION (Ft.) 284.5 +/-							
		<b>TOPSOIL</b> POORLY GRADED SAND (SP), trace silt and gravel, fine to coarse grained, brown to orange, very loose to loose		0.5				1-2-1-2 N=3	
		Trace rootlets noted from about 5 to 9 feet						3-3-4-4 N=7	
								2-3-2-3 N=5	
								2-2-2-3 N=4	6.9
				12.0	▽			4-3-4-5 N=7	
		<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , fine grained, brown, loose to medium dense						3-3-3-3 N=6	
								WH-6-7-4 N=13	
		<b>Boring Terminated at 22 Feet</b>		22.0					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
4 1/4" ID HSA

Abandonment Method:  
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (if any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan

Notes:

Logged by: ORB  
WH = Weight of Hammer

**WATER LEVEL OBSERVATIONS**

10.3' after 10-12' sample



30 Corporate Cir. Ste 204  
Albany, NY

Boring Started: 06-17-2021

Boring Completed: 06-17-2021

Drill Rig: Diedrich D-50

Driller: S. Morey

Project No.: JB215105

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-WELL. JB215105 PROPOSED MANUFACT. GPJ TERRACON\_DATATEMPLATE.GDT 7/21/21

# BORING LOG NO. B-2

**PROJECT:** Proposed Manufacturing Facility

**CLIENT:** Northeastern Biochar Solutions LLC  
Saratoga Springs, New York

**SITE:** Farman Road  
Moreau, New York

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 43.2831° Longitude: -73.6054° Approximate Surface Elev.: 284 (Fl.) +/- ELEVATION (Fl.) 283.5 +/-	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	WATER CONTENT (%)
		DEPTH 0.4					20	1-2-2-2 N=4	
		<b>TOPSOIL</b>					0	3-4-6-6 N=10	
		<b>POORLY GRADED SAND (SP)</b> , trace silt, fine grained, orange to brown, very loose to medium dense No recovery at the 2-4' sample		5			20	2-3-5-5 N=8	6.8
							19	3-4-5-5 N=9	
				10			24	1-1-2-4 N=3	
				15			20	4-4-5-9 N=9	
		18.0		20			22	4-6-7-7 N=13	
		<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , fine grained, brown, medium dense							
		22.0							
		<b>Boring Terminated at 22 Feet</b>							

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-WELL JB215105 PROPOSED MANUFACT. GPJ TERRACON\_DATATEMPLATE.GDT 7/21/21

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
4 1/4" ID HSA

Abandonment Method:  
Boring backfilled with soil cuttings upon completion.

See **Exploration and Testing Procedures** for a description of field and laboratory procedures used and additional data (if any).

See **Supporting Information** for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:  
Logged by: ORB

**WATER LEVEL OBSERVATIONS**

9.4' after 6-8' sample



Boring Started: 06-17-2021

Drill Rig: Diedrich D-50

Project No.: JB215105

Boring Completed: 06-17-2021

Driller: S. Morey

# BORING LOG NO. B-3

**PROJECT:** Proposed Manufacturing Facility

**CLIENT:** Northeastern Biochar Solutions LLC  
Saratoga Springs, New York

**SITE:** Faman Road  
Moreau, New York

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 43.2829° Longitude: -73.6055°	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
		Approximate Surface Elev.: 284 (Ft.) +/- ELEVATION (Ft.) 283.5 +/-							
1		<b>TOPSOIL</b> <b>POORLY GRADED SAND (SP)</b> , trace silt and rootlets, fine grained, orange to brown, very loose to medium dense  Slight mottling observed between 5 to 9'		0.7					
				5			19	1-1-1-3 N=2	
							19	3-3-4-5 N=7	
							24	4-6-6-6 N=12	
							20	4-4-4-4 N=8	
				10					
							22	2-3-3-4 N=6	
2		<b>SILT WITH SAND (ML)</b> , with fine sand partings, brown, medium stiff to very stiff  Grades to clay partings and seams between 15 to 17'		12.0					
				15			24	4-2-3-3 N=5	33.2
				20			22	6-7-10-10 N=17	
		<b>Boring Terminated at 22 Feet</b>		22.0					

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
4 1/4" ID HSA

Abandonment Method:  
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (if any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation Interpolated from a topographic site plan

Notes:  
Logged by: ORB

**WATER LEVEL OBSERVATIONS**

9.6' after 10-12' sample



Boring Started: 06-18-2021

Boring Completed: 06-18-2021

Drill Rig: Diedrich D-50

Driller: S. Morey

Project No.: JB215105

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-WELL. JB215105 PROPOSED MANUFACT.GPJ TERRACON\_DATATEMPLATE.GDT 7/21/21

# BORING LOG NO. B-4

**PROJECT:** Proposed Manufacturing Facility

**CLIENT:** Northeastern Biochar Solutions LLC  
Saratoga Springs, New York

**SITE:** Farnan Road  
Moreau, New York

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	WATER CONTENT (%)
		Latitude: 43.2890° Longitude: -73.6051° Approximate Surface Elev.: 283 (Ft.) +/- ELEVATION (Ft.) 282.5+/-							
		DEPTH 0.6 <b>TOPSOIL</b>					19	1-1-1-1 N=2	
		<b>POORLY GRADED SAND (SP)</b> , trace silt, fine to medium grained, brown to orange, very loose to loose					20	2-3-2-3 N=5	
				5			20	2-3-3-4 N=6	
							19	4-4-4-4 N=8	
		Grades to fine to coarse grained		10	▽		22	1-1-3-5 N=4	
		DEPTH 13.0 <b>SILTY SAND (SM)</b> , fine grained, brown, stiff to very stiff					22	8-10-4-4 N=14	
		Clay partings noted from about 15 to 17'		15					
				20			13	4-10-10-9 N=20	27.1
		DEPTH 22.0 <b>Boring Terminated at 22 Feet</b>							

Hammer Type: Automatic

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:  
4 1/4" ID HSA

Abandonment Method:  
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (if any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan

Notes:

Logged by: ORB

**WATER LEVEL OBSERVATIONS**

▽ 9.4' after 10-12' sample

Boring Started: 06-17-2021

Drill Rig: Diedrich D-50

Project No.: JB215105

Boring Completed: 06-17-2021

Driller: S. Morey



THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-WELL .JB215105 PROPOSED MANUFACT. GPJ TERRACON\_DATA TEMPLATE.GDT 7/21/21



# BORING LOG NO. B-5

**PROJECT:** Proposed Manufacturing Facility

**CLIENT:** Northeastern Biochar Solutions LLC  
Saratoga Springs, New York

**SITE:** Farnan Road  
Moreau, New York

MODEL LAYER	GRAPHIC LOG	LOCATION See <a href="#">Exploration Plan</a> <small>Latitude: 43.2831° Longitude: -73.6050°</small>	INSTALLATION DETAILS	DEPTH (FL)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
		<b>TOPSOIL</b>		0.8					
		<b>POORLY GRADED SAND (SP)</b> , trace silt and rootlets, fine to coarse grained, brown to orange, very loose to loose		6.0				1-1-2-1 N=3	
		Grades to fine grained		8.0				2-2-2-3 N=4	
		<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , trace rootlets, some mottling, fine grained, brown, loose		8.0				2-3-4-4 N=7	
		<b>POORLY GRADED SAND (SP)</b> , trace to with silt, fine to medium grained, brown, loose to medium dense		23.0				3-3-3-4 N=6	
		<b>BANDED SILT AND CLAY (CL)</b> , with fine sand parings, gray, very soft to soft		23.0	9.3'			4-4-3-4 N=7	
				23.0				5-6-8-11 N=14	
				23.0				6-8-7-8 N=15	
				23.0				WH/24"	

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
4 1/4" ID HSA

Abandonment Method:  
Boring backfilled with soil cuttings upon completion.

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:  
Logged by: ORB

**WATER LEVEL OBSERVATIONS**

9.3' after 10-12' sample



Boring Started: 06-15-2021

Boring Completed: 06-15-2021

Drill Rig: Diedrich D-50

Driller: S. Morey

Project No.: JB215105

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT: GEO SMART LOG-WELL JB215105 PROPOSED MANUFACT.GPJ TERRACON\_DATATEMPLATE.GDT 7/21/21

# BORING LOG NO. B-5

**PROJECT:** Proposed Manufacturing Facility

**CLIENT:** Northeastern Biochar Solutions LLC  
Saratoga Springs, New York

**SITE:** Farnan Road  
Moreau, New York

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 43.2831° Longitude: -73.8050° Approximate Surface Elev.: 284 (FL) +/- ELEVATION (FL)	DEPTH (FL)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	WATER CONTENT (%)
3		<b>BANDED SILT AND CLAY (CL)</b> , with fine sand partings, gray, very soft to soft (continued)	30.0		24		WH/12"-1/12"	47.0
2		<b>SANDY SILT (ML)</b> , with clay seams, fine grained, gray, medium stiff to stiff	38.0		24		WH-2-1-2 N=3	
2		<b>SANDY SILT (ML)</b> , with clay seams, fine grained, gray, medium stiff to stiff	48.0		24		3-6-7-10 N=13	
3		<b>BANDED SILT AND CLAY (CL-ML)</b> , gray, stiff	52.0		24		3-3-6-9 N=9	
		<b>Boring Terminated at 52 Feet</b>	52.0		24		3-5-6-6 N=11	

Stratification lines are approximate. in-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
4 1/4" ID HSA

Abandonment Method:  
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (if any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:

WH = Weight of Hammer

**WATER LEVEL OBSERVATIONS**

9.3' after 10-12' sample

Boring Started: 06-15-2021

Boring Completed: 06-15-2021

Drill Rig: Diedrich D-50

Driller: S. Morey

Project No.: JB215105



THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-MELL JB215105 PROPOSED MANUFACT.GPJ TERRACON\_DATATEMPLATE.GDT 7/21/21

# BORING LOG NO. B-6

**PROJECT:** Proposed Manufacturing Facility

**CLIENT:** Northeastern Biochar Solutions LLC  
Saratoga Springs, New York

**SITE:** Farnan Road  
Moreau, New York

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 43.2831° Longitude: -73.6046°	INSTALLATION DETAILS	DEPTH (FL)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
		Approximate Surface Elev.: 279 (FL) +/- ELEVATION (FL)							
		DEPTH 1.0 <b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , fine to medium grained, dark brown, medium dense <b>POORLY GRADED SAND (SP)</b> , trace silt, fine to medium grained, brown, loose to medium dense No recovery at the 2-4' sample  Mottling observed from 4 to 9'							
				5	▽		22	3-7-10-13 N=17	
							0	14-14-14-14 N=28	
							20	3-3-4-5 N=7	
							24	3-3-5-10 N=8	25.7
				10			22	4-4-7-7 N=11	
				15			22	4-6-7-7 N=13	
		18.0 <b>BANDED SILT AND CLAY (CL-ML)</b> , gray, medium stiff		20			24	2-3-2-2 N=5	
		22.0 Boring Terminated at 22 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
4 1/4" ID HSA

Abandonment Method:  
Boring backfilled with soil cuttings upon completion.

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (if any).

See Supporting Information for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:  
Logged by: ORB

**WATER LEVEL OBSERVATIONS**

4.3' after 6-8' sample



30 Corporate Dr Ste 201  
Albany, NY

Boring Started: 06-18-2021

Boring Completed: 06-18-2021

Drill Rig: Diedrich D-50

Driller: S. Morey

Project No.: JB215105


THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-WELL JB215105 PROPOSED MANUFACT.GPJ TERRACON\_DATATEMPLATE.GDT 7/21/21

# BORING LOG NO. B-7

**PROJECT:** Proposed Manufacturing Facility

**CLIENT:** Northeastern Biochar Solutions LLC  
Saratoga Springs, New York

**SITE:** Farnan Road  
Moreau, New York

MODEL LAYER	GRAPHIC LOG	LOCATION See <i>Exploration Plan</i> Latitude: 43.2835° Longitude: -73.6044° Approximate Surface Elev.: 279 (FL) +/- ELEVATION (FL)	INSTALLATION DETAILS	DEPTH (FL)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	WATER CONTENT (%)
1		<b>POORLY GRADED SAND (SP)</b> , trace silt, fine grained, loose to medium dense <b>Mottled observed from 0 to 2'</b>		5			22	1-5-8-9 N=13	
							20	8-10-12-10 N=22	
							22	6-7-7-6 N=14	
							24	2-2-2-3 N=4	
		8.0 <b>Boring Terminated at 8 Feet</b>							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
4 1/4" ID HSA

See *Exploration and Testing Procedures* for a description of field and laboratory procedures used and additional data (if any).

Notes:  
Logged by: ORB

Abandonment Method:  
Boring backfilled with soil cuttings upon completion.

See *Supporting Information* for explanation of symbols and abbreviations.  
Elevation Interpolated from a topographic site plan.

Boring Started: 06-21-2021

Boring Completed: 06-21-2021

**WATER LEVEL OBSERVATIONS**  
No free water observed



Drill Rig: Diedrich D-50

Driller: S. Morey

Project No.: JB215105

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-WELL JB215105 PROPOSED MANUFACT.GPJ TERRACON\_DATATEMPLATE.GDT 7/21/21

# BORING LOG NO. B-8

**PROJECT:** Proposed Manufacturing Facility

**CLIENT:** Northeastern Biochar Solutions LLC  
Saratoga Springs, New York

**SITE:** Faman Road  
Moreau, New York

MODEL LAYER	GRAPHIC LOG	LOCATION See <a href="#">Exploration Plan</a> Latitude: 43.2833° Longitude: -73.6058°	INSTALLATION DETAILS	DEPTH (FT.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
		Approximate Surface Elev.: 286 (Fl.) +/-							
		<b>DEPTH</b>	<b>ELEVATION (Fl.)</b>						
		0.7 <b>TOPSOIL</b>	285.5+/-						
		2.0 <b>POORLY GRADED SAND (SP)</b> , trace silt, fine to coarse grained, brown to orange, very loose	284+/-				20	2-1-2-2 N=3	
		4.0 <b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , fine grained, brown, loose	282+/-				22	3-3-3-4 N=6	
1		8.0 <b>POORLY GRADED SAND (SP)</b> , trace silt, fine to medium grained, brown, loose	278+/-	5			22	4-4-5-5 N=9	
		<b>Boring Terminated at 8 Feet</b>					20	4-4-5-6 N=9	

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
4 1/4" ID HSA

Abandonment Method:  
Boring backfilled with soil cuttings upon completion.

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:

Logged by: ORB

**WATER LEVEL OBSERVATIONS**

No free water observed



30 Corporate Ct. Ste 201  
Athens, NY

Boring Started: 06-17-2021

Boring Completed: 06-17-2021

Drill Rig: Diedrich D-50

Driller: S. Morey

Project No.: JB215105

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-WELL JB215105 PROPOSED MANUFACT.GPJ TERRACON\_DATA TEMPLATE.GDT 7/21/21

# BORING LOG NO. B-9

**PROJECT:** Proposed Manufacturing Facility

**CLIENT:** Northeastern Biochar Solutions LLC  
Saratoga Springs, New York

**SITE:** Faman Road  
Moreau, New York

MODEL LAYER	GRAPHIC LOG	LOCATION See <i>Exploration Plan</i> Latitude: 43.2828° Longitude: -73.6045°	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
		Approximate Surface Elev.: 278 (Ft.) +/- ELEVATION (Ft.)							
		<b>POORLY GRADED SAND (SP)</b> , trace silt, fine to medium grained, brown, loose					22	1-2-3-3 N=5	
							19	3-4-4-5 N=8	
				5			24	3-3-3-3 N=6	
		Mottling observed from about 6 to 8'					24	2-2-3-8 N=5	
		8.0 <b>Boring Terminated at 8 Feet</b>							

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-WELL. JB215105 PROPOSED MANUFACT. GP J TERRACON\_DATATEMPLATE.GDT 7/21/21

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
4 1/4" ID HSA

See *Exploration and Testing Procedures* for a description of field and laboratory procedures used and additional data (if any).

Notes:  
Logged by: ORB

Abandonment Method:  
Boring backfilled with soil cuttings upon completion.

See *Supporting Information* for explanation of symbols and abbreviations.

Elevation Interpolated from a topographic site plan.

**WATER LEVEL OBSERVATIONS**  
No free water observed



Boring Started: 06-21-2021

Boring Completed: 06-21-2021

Drill Rig: Diedrich D-50

Driller: S. Morey

Project No.: JB215105

# BORING LOG NO. I-1

**PROJECT:** Proposed Manufacturing Facility

**CLIENT:** Northeastern Biochar Solutions LLC  
Saratoga Springs, New York

**SITE:** Faman Road  
Moreau, New York

MODEL LAYER	GRAPHIC LOG	LOCATION See <a href="#">Exploration Plan</a> Latitude: 43.2836° Longitude: -73.6051°	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (In.)	FIELD TEST RESULTS	WATER CONTENT (%)
		Approximate Surface Elev.: 286 (Ft.) +/- ELEVATION (Ft.)							
	1	<b>POORLY GRADED SAND (SP)</b> , trace silt, gravel, and roots, fine to coarse grained, brown to orange, very loose to loose  Grades to fine grained	4" ID PVC Installed to 4'	5			18	1-1-2-1 N=3	
				22			22	2-1-2-2 N=3	
	8.0	<b>POORLY GRADED SAND WITH SILT (SP-SM)</b> , trace roots, fine grained, brown to orange, loose		20			20	3-3-3-3 N=6	
	8.0	<b>Boring Terminated at 8 Feet</b>		22			22	3-3-3-4 N=6	

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
4 1/4" ID HSA

Abandonment Method:  
Boring backfilled with soil cuttings upon completion.

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevation Interpolated from a topographic site plan.

Notes:  
Logged by: ORB

**WATER LEVEL OBSERVATIONS**

No free water observed



Boring Started: 06-18-2021

Boring Completed: 06-18-2021

Drill Rig: Diedrich D-50

Driller: S. Morey

Project No.: JB215105

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-WELL. JB215105 PROPOSED MANUFACT.GPJ TERRACON\_DATATEMPLATE.GDT 7/21/21

# BORING LOG NO. I-2

**PROJECT:** Proposed Manufacturing Facility

**CLIENT:** Northeastern Biochar Solutions LLC  
Saratoga Springs, New York

**SITE:** Faman Road  
Moreau, New York

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 43.2832° Longitude: -73.6062°	INSTALLATION DETAILS	DEPTH (FL.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	WATER CONTENT (%)
		Approximate Surface Elev.: 288 (FL) +/- ELEVATION (FL.) 286+/-							
		0.2' TOPSOIL					18	1-1-2-2 N=3	
		2.0' POORLY GRADED SAND WITH SILT (SP-SM), trace silt, fine grained, brown to orange, very loose ELEVATION (FL.) 284+/-	4" ID PVC installed to 4'				22	2-3-4-4 N=7	
		POORLY GRADED SAND (SP), trace silt, fine to coarse grained, brown, loose					22	3-4-4-4 N=8	
							20	3-3-2-2 N=5	
		8.0' Boring Terminated at 8 Feet ELEVATION (FL.) 278+/-							

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
4 1/4" ID HSA

See **Exploration and Testing Procedures** for a description of field and laboratory procedures used and additional data (if any).

Notes:  
Logged by: ORB

Abandonment Method:  
Boring backfilled with soil cuttings upon completion.

See **Supporting Information** for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Boring Started: 06-17-2021

Boring Completed: 06-17-2021

**WATER LEVEL OBSERVATIONS**

No free water observed

Drill Rig: Diedrich D-50

Driller: S. Morey

Project No.: JB215105



THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-WELL JB215105 PROPOSED MANUFACT.GPJ TERRACON\_DATATEMPLATE.GDT 7/21/21



# BORING LOG NO. I-3

**PROJECT:** Proposed Manufacturing Facility

**CLIENT:** Northeastern Biochar Solutions LLC  
Saratoga Springs, New York

**SITE:** Farman Road  
Moreau, New York

MODEL LAYER	GRAPHIC LOG	LOCATION See <a href="#">Exploration Plan</a> Latitude: 43.2827° Longitude: -73.6051°	INSTALLATION DETAILS	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (ft.)	FIELD TEST RESULTS	WATER CONTENT (%)
		Approximate Surface Elev.: 278 (Ft.) +/- ELEVATION (Ft.)							
	1	<b>POORLY GRADED SAND (SP)</b> , trace silt, fine to coarse grained, dark brown to brown, medium dense	4" ID PVC installed to 2.5'	5	▽		24	3-6-8-11 N=14	
		Grades to trace gravel, silt partings					19	8-12-15-12 N=27	
							24	10-8-6-8 N=14	
	8.0	<b>Boring Terminated at 8 Feet</b>					24	4-6-4-9 N=10	

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: Automatic

Advancement Method:  
4 1/4" ID HSA

Abandonment Method:  
Boring backfilled with soil cuttings upon completion.

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (if any).

See [Supporting Information](#) for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Notes:

Logged by: ORB

**WATER LEVEL OBSERVATIONS**

4.6' after boring completion



Boring Started: 06-18-2021

Boring Completed: 06-18-2021

Drill Rig: Diedrich D-50

Driller: S. Morey

Project No.: JB215105

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-WELL JB215105 PROPOSED MANUFACT.GPJ TERRACON\_DATATEMPLATE.GDT 7/2/21

# BORING LOG NO. I-4

**PROJECT:** Proposed Manufacturing Facility

**CLIENT:** Northeastern Biochar Solutions LLC  
Saratoga Springs, New York

**SITE:** Faman Road  
Moreau, New York

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 43.2831° Longitude: -73.6043° Approximate Surface Elev.: 278 (FL) +/-	INSTALLATION DETAILS	DEPTH (FL)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	RECOVERY (in.)	FIELD TEST RESULTS	WATER CONTENT (%)
1		<b>POORLY GRADED SAND (SP)</b> , trace silt, fine to medium grained, brown/gray, loose and medium dense	4" ID PVC installed to 2'	5	▽		22	2-3-5-7 N=8	
							22	6-7-6-6 N=13	
							20	4-4-4-4 N=8	
							24	2-2-4-4 N=6	
		8.0 Boring Terminated at 8 Feet							

270+/-

Hammer Type: Automatic

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:  
4 1/4" ID HSA

See **Exploration and Testing Procedures** for a description of field and laboratory procedures used and additional data (if any).

Notes:  
Logged by: ORB

Abandonment Method:  
Boring backfilled with soil cuttings upon completion.

See **Supporting Information** for explanation of symbols and abbreviations.

Elevation interpolated from a topographic site plan.

Boring Started: 08-18-2021

Boring Completed: 06-18-2021

**WATER LEVEL OBSERVATIONS**

▽ 4.3' after boring completion

Drill Rig: Diedrich D-50

Driller: S. Morey

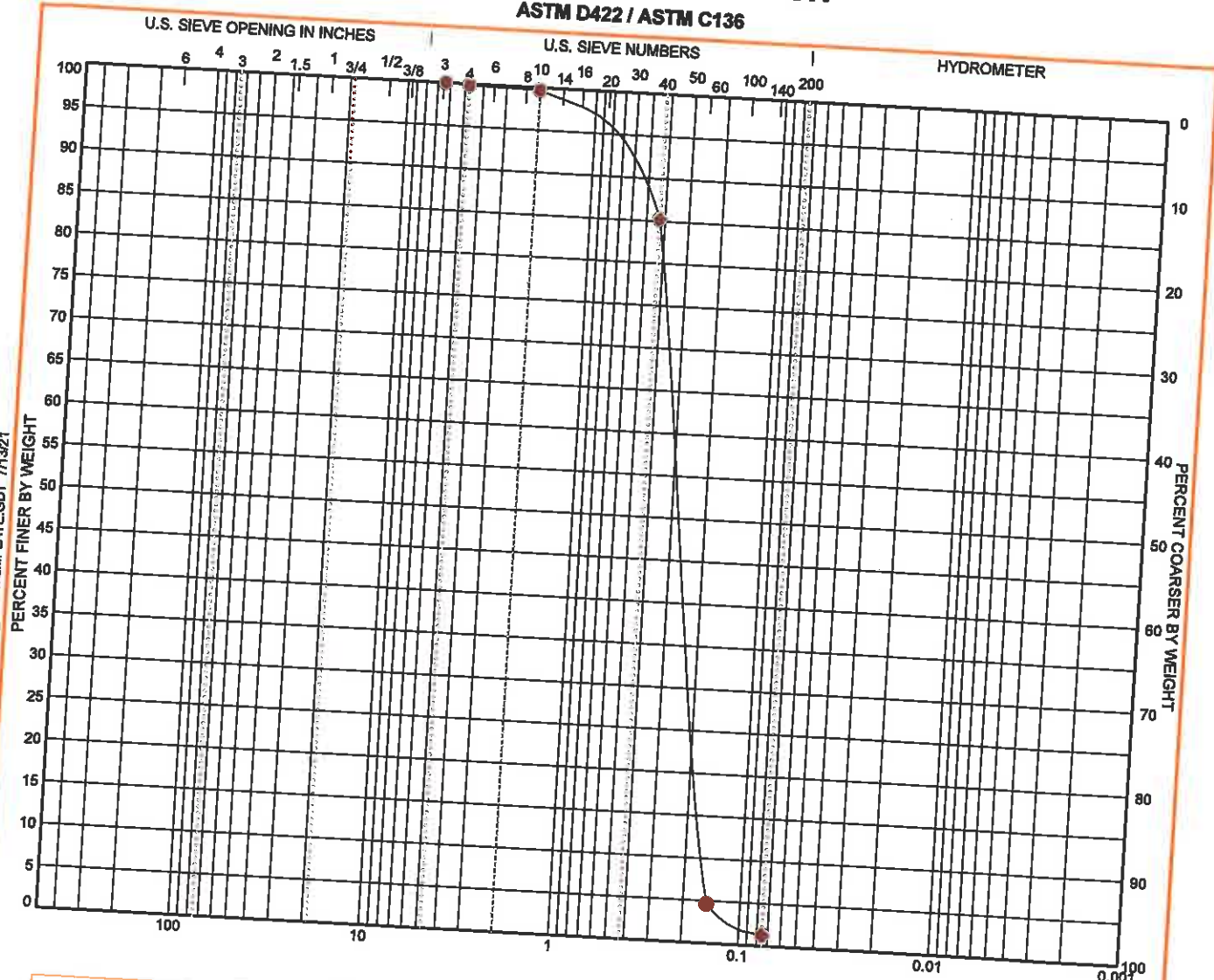
Project No.: JB215105



THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-WELL JB215105 PROPOSED MANUFACT.GPJ TERRACON\_DATATEMPLATE.GDT 7/2/21

# GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



COBBLES	GRAVEL		SAND			SILT OR CLAY		
	coarse	fine	coarse	medium	fine			

BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
B-1	6 - 8	0.0	0.1	98.6		1.3		SP

GRAIN SIZE	
D <sub>60</sub>	0.307
D <sub>30</sub>	0.208
D <sub>10</sub>	0.161

Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
1/4"	100.0				
#4	99.87				
#10	99.74				
#40	85.22				
#100	4.72				
#200	1.28				

**SOIL DESCRIPTION**  
 POORLY GRADED SAND (SP)

COEFFICIENTS	
C <sub>c</sub>	0.88
C <sub>u</sub>	1.91

**REMARKS**

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 JB215105 PROPOSED MANUFACT.GPJ TERRACON\_DATATEMPLATE.GDT 7/13/21

PROJECT: Proposed Manufacturing Facility  
 SITE: Faman Road  
 Moreau, New York



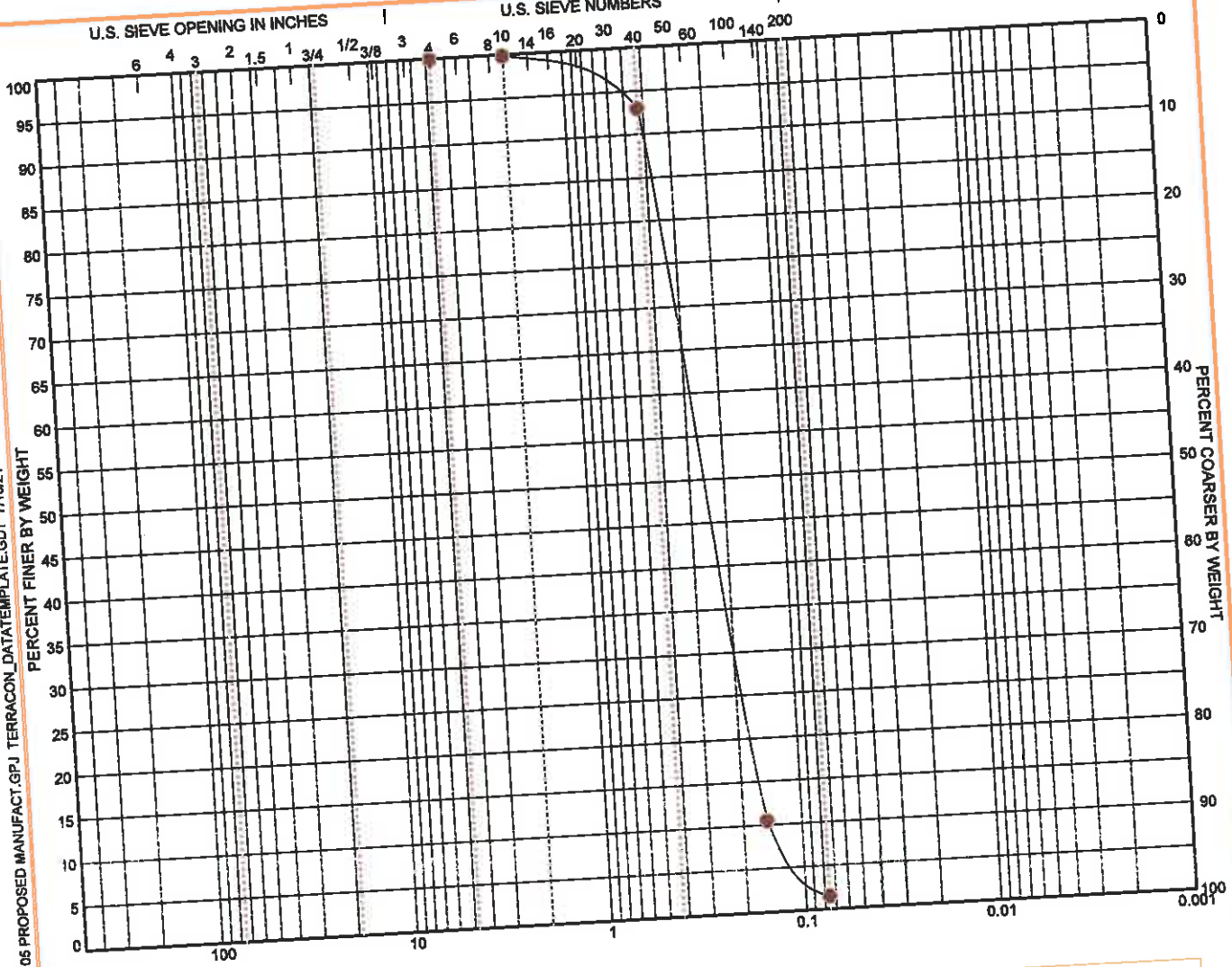
PROJECT NUMBER: JB215105

CLIENT: Northeastern Biochar Solutions LLC  
 Saratoga Springs, New York

# GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136

HYDROMETER



GRAIN SIZE: USCS 1 JB215105 PROPOSED MANUFACT.GPJ TERRACON\_DATATEMPLATE.GDT 7/13/21

BORING ID	DEPTH	GRAVEL		SAND			SILT OR CLAY		USCS
		coarse	fine	coarse	medium	fine	% SILT	% FINES	
B-2	4 - 6	0.0	0.0	98.5			1.5		SP

GRAIN SIZE	
D <sub>60</sub>	0.28
D <sub>30</sub>	0.192
D <sub>10</sub>	0.144

COEFFICIENTS	
C <sub>c</sub>	0.91
C <sub>u</sub>	1.94

Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
#4	100.0				
#10	99.92				
#40	98.5				
#100	10.49				
#200	1.48				

**SOIL DESCRIPTION**  
 POORLY GRADED SAND (SP)

**REMARKS**

PROJECT: Proposed Manufacturing Facility

SITE: Farnan Road  
Moreau, New York



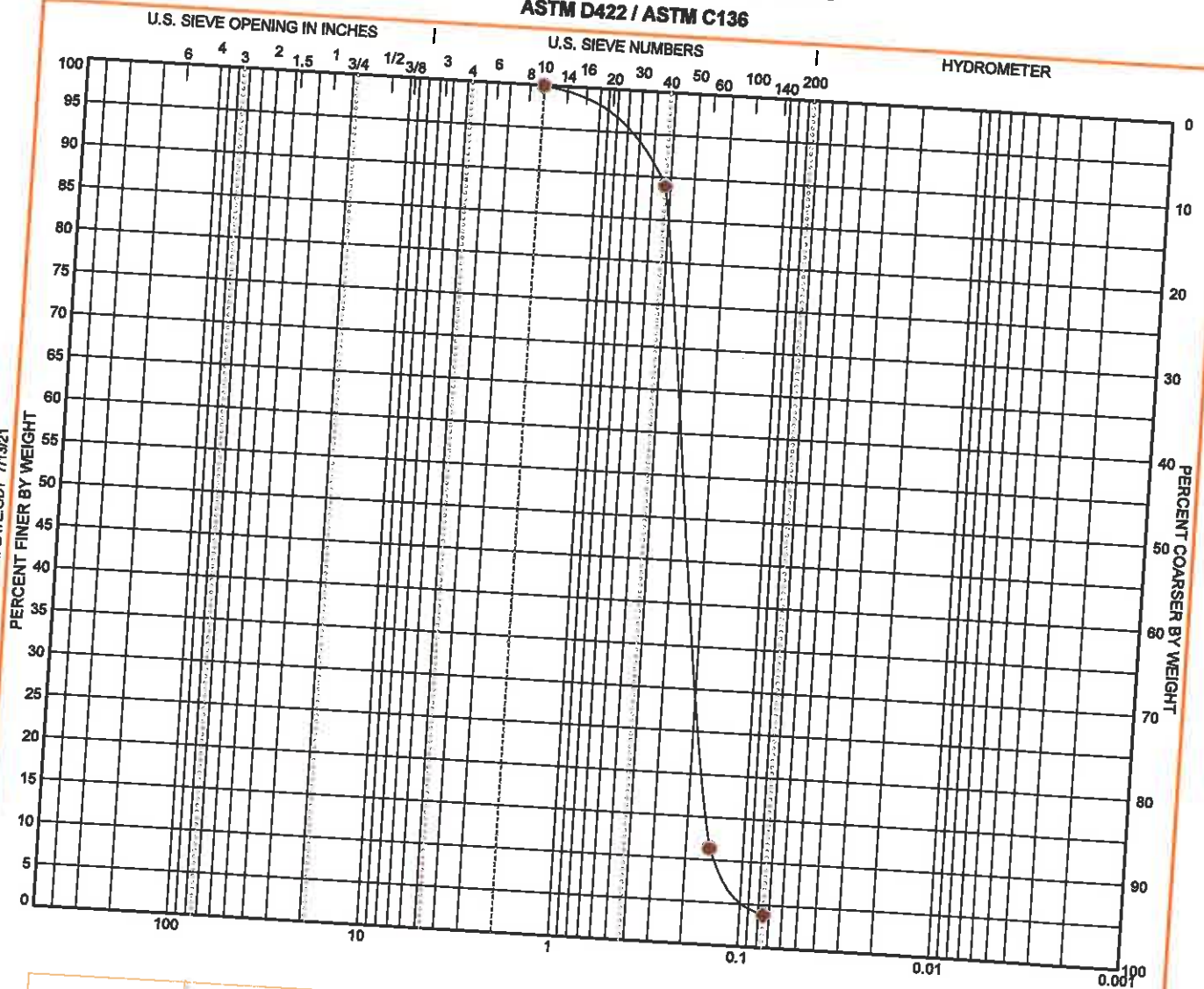
PROJECT NUMBER: JB215105

CLIENT: Northeastern Biochar Solutions LLC  
Saratoga Springs, New York

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT.

# GRAIN SIZE DISTRIBUTION

ASTM D422 / ASTM C136



BORING ID	DEPTH	GRAVEL		SAND			SILT OR CLAY		
		coarse	fine	coarse	medium	fine	% SILT	% FINES	% CLAY
B-6	6 - 8	0.0	0.0	96.1			3.9		

BORING ID	DEPTH	% COBBLES	% GRAVEL	% SAND	% SILT	% FINES	% CLAY	USCS
B-6	6 - 8	0.0	0.0	96.1		3.9		SP

GRAIN SIZE	
D <sub>85</sub>	0.288
D <sub>60</sub>	0.192
D <sub>30</sub>	0.131

COEFFICIENTS	
C <sub>u</sub>	0.98
C <sub>c</sub>	2.19

Sieve	% Finer	Sieve	% Finer	Sieve	% Finer
#10	100.0				
#40	89.07				
#100	11.44				
#200	3.92				

SOIL DESCRIPTION
POORLY GRADED SAND (SP)

REMARKS

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS 1 JB215105 PROPOSED MANUFACT.GPJ TERRACON\_DATATEMPLATE.GDT 7/13/21

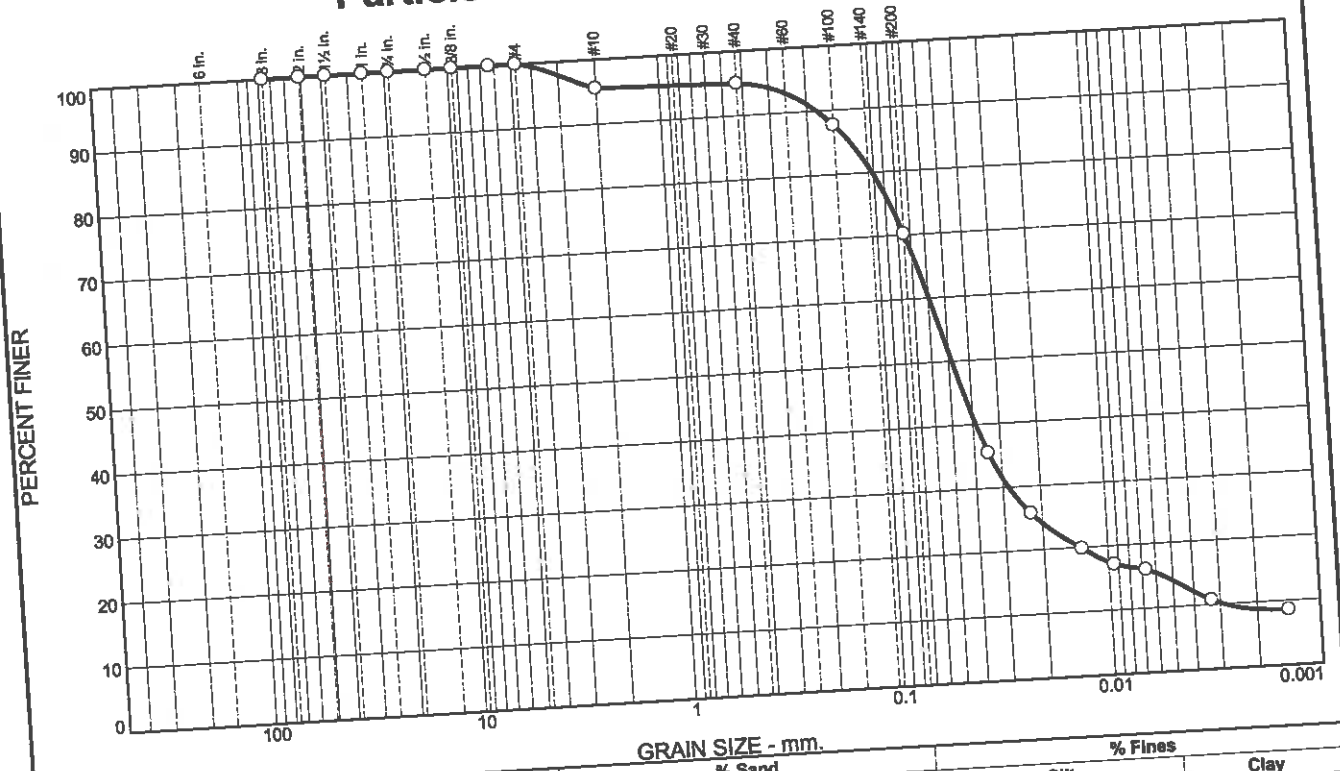
PROJECT: Proposed Manufacturing Facility  
 SITE: Faman Road  
 Moreau, New York



PROJECT NUMBER: JB215105

CLIENT: Northeastern Biochar Solutions LLC  
 Saratoga Springs, New York

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	Clay
	Coarse	Fine	Coarse	Medium	Fine	Silt	
0.0	0.0	0.0	4.4	0.6	24.9	56.0	14.1

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	100.0		
1.5"	100.0		
1"	100.0		
0.75"	100.0		
0.5"	100.0		
0.375"	100.0		
0.25"	100.0		
#4	100.0		
#10	95.6		
#40	95.0		
#100	87.6		
#200	70.1		

**Material Description**  
Silt with sand

PL= NP      **Atterberg Limits**      PI= NP  
LL= NP

**Coefficients**  
D<sub>90</sub>= 0.1792      D<sub>85</sub>= 0.1279      D<sub>60</sub>= 0.0596  
D<sub>50</sub>= 0.0484      D<sub>30</sub>= 0.0283      D<sub>15</sub>= 0.0056  
D<sub>10</sub>= 0.0029      C<sub>u</sub>= 20.56      C<sub>c</sub>= 4.64

**Classification**  
USCS= ML      AASHTO= A-4(0)

**Remarks**  
Per ASTM D422

\* (no specification provided)

Source of Sample: B-3 15'-17' Date: 7-7-21

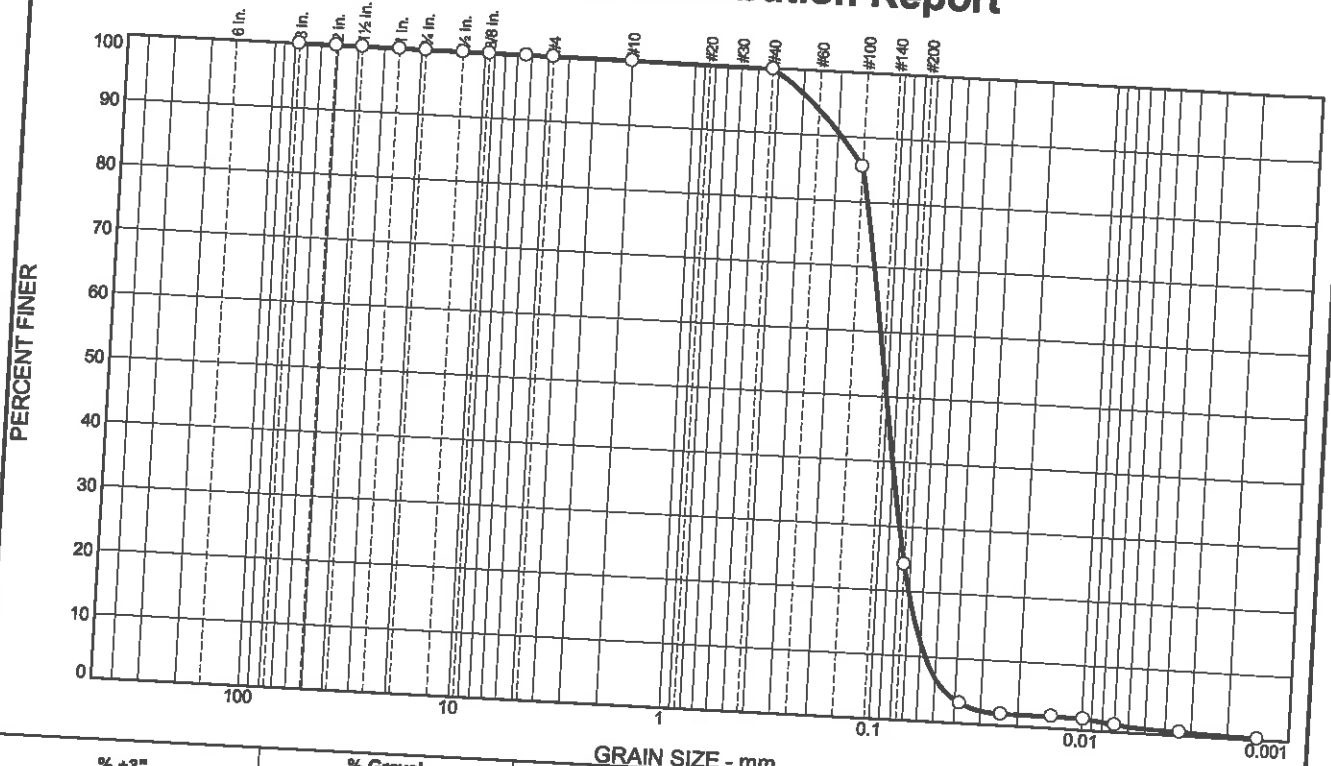
**Terracon Consultants-NY, Inc.**  
**Albany, NY**

Client: Northeastern Biochar Solutions LLC  
Project: Proposed Manufacturing Facility  
Moreau, NY  
Project No: JB215105

Figure B-3 15'-17'

Tested By: AB Checked By: JH

# Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	0.0	0.0	0.1	75.7	23.5	0.7

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3"	100.0		
2"	100.0		
1.5"	100.0		
1"	100.0		
0.75"	100.0		
0.5"	100.0		
0.375"	100.0		
0.25"	100.0		
#4	100.0		
#10	100.0		
#40	99.9		
#100	85.5		
#200	24.2		

\* (no specification provided)

**Material Description**

Silty sand

PL= NP      **Atterberg Limits**      LL= NP      PI= NP

D<sub>90</sub>= 0.1927      **Coefficients**      D<sub>85</sub>= 0.1489      D<sub>60</sub>= 0.1116

D<sub>50</sub>= 0.1008      D<sub>30</sub>= 0.0810      D<sub>15</sub>= 0.0641

D<sub>10</sub>= 0.0566      C<sub>u</sub>= 1.97      C<sub>c</sub>= 1.04

USCS= SM      **Classification**      AASHTO= A-2-4(0)

**Remarks**

Per ASTM D422

Source of Sample: B-4 20'-22'

**Terracon Consultants-NY, Inc.**  
Albany, NY

Client: Northeastern Biochar Solutions LLC  
Project: Proposed Manufacturing Facility  
Moreau, NY  
Project No: JB215105

Date: 7-7-21

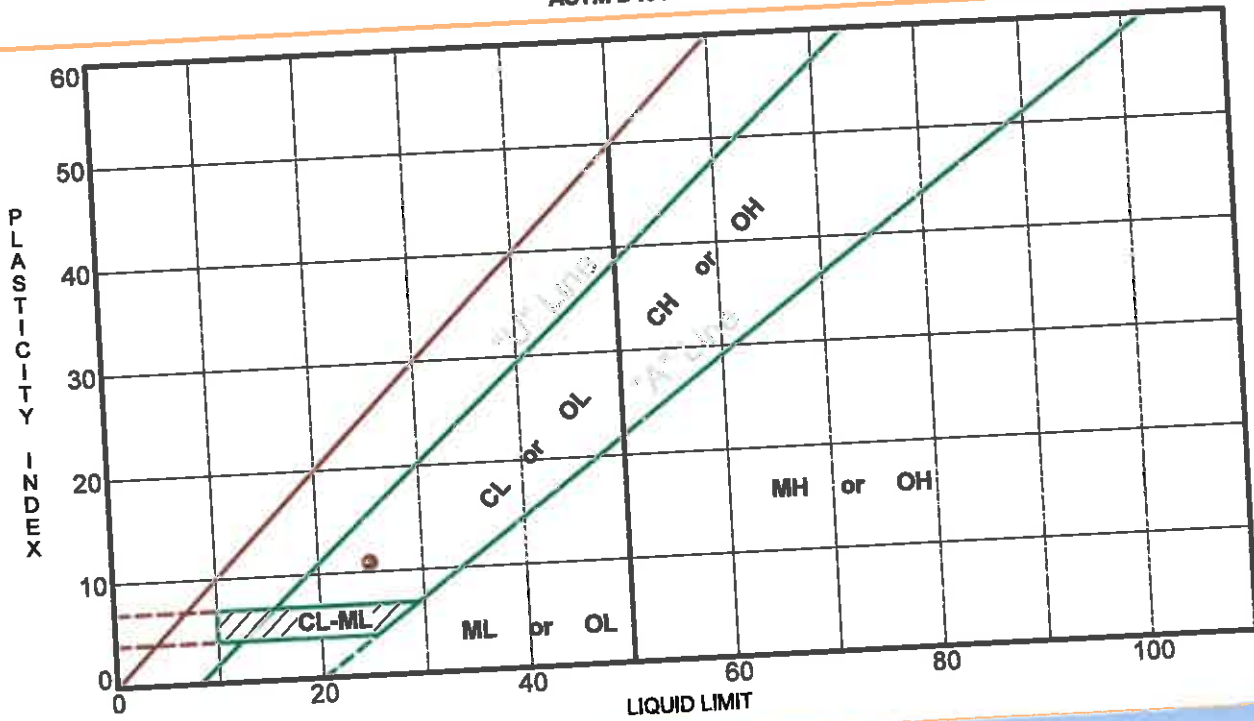
Figure B-4 20'-22'

Tested By: AB

Checked By: JH

# ATTERBERG LIMITS RESULTS

ASTM D4318



LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS JB215105 PROPOSED MANUFACT.GPJ TERRACON DATATEMPLATE.GDT 7/13/21

Boring ID	Depth	LL	PL	PI	Fines	USCS	Description
-----------	-------	----	----	----	-------	------	-------------

B-5	30 - 32	25	14	11		CL	Lean Clay
-----	---------	----	----	----	--	----	-----------

PROJECT: Proposed Manufacturing Facility

SITE: Faman Road  
Moreau, New York



PROJECT NUMBER: JB215105

CLIENT: Northeastern Biochar Solutions LLC  
Saratoga Springs, New York



INFILTRATION TEST RESULTS					
PROJECT: Proposed Manufacturing Facility			PROJECT NO. JB215105		
PROJECT LOCATION: Moreau, New York			TEST DATE: 6/21/21		
WEATHER: Hot, humid, 90 degrees			TESTER: SM & SL		
Test Location	Test Depth (feet)	Trial No.	Water Drop (in)	Elapsed Time (min)	Infiltration Rate (inches/hour)
I-1	4.0	1	24	11	>24
		2	24	14	>24
		3	24	23	>24
		4	24	32	>24
		Infiltration rate for trial no. 4 = >24 inches per hour			
I-2	4.0	1	24	18	>24
		2	24	20	>24
		3	24	22	>24
		4	24	25	>24
		Infiltration rate for trial no. 4 = >24 inches per hour			

Notes:

- (1) Testing was conducted in general accord with the "Infiltration Testing Requirements" outlined in Appendix D of the New York State Stormwater Management Design Manual.
- (2) Infiltration tests were located alongside companion test borings numbered correspondingly.

**SOIL CLASSIFICATION AT TEST DEPTH**

Test Location I-1: Poorly graded sand, trace silt, fine grained

Test Location I-2: Poorly graded sand, trace silt, fine to medium grained

INFILTRATION TEST RESULTS					
PROJECT: Proposed Manufacturing Facility				PROJECT NO. JB215105	
PROJECT LOCATION: Moreau, New York				TEST DATE: 6/21/21	
WEATHER: Hot, humid, 90 degrees				TESTER: SM & SL	
Test Location	Test Depth (feet)	Trial No.	Water Drop (in)	Elapsed Time (min)	Infiltration Rate (inches/hour)
I-3	2.5	1	24	4	>24
		2	24	4	>24
		3	24	5	>24
		4	24	5	>24
		Infiltration rate for trial no. 4 = >24 inches per hour			
I-4	2.0	1	24	7	>24
		2	24	9	>24
		3	24	10	>24
		4	24	10	>24
		Infiltration rate for trial no. 4 = >24 inches per hour			

**Notes:**

- (1) Testing was conducted in general accord with the "Infiltration Testing Requirements" outlined in Appendix D of the New York State Stormwater Management Design Manual.
- (2) Infiltration tests were located alongside companion test borings numbered correspondingly.

**SOIL CLASSIFICATION AT TEST DEPTH**

Test Location I-3: Poorly graded sand, trace silt, fine to medium grained

Test Location I-4: Poorly graded sand, trace silt, fine to medium grained

## **SUPPORTING INFORMATION**

### **Contents:**

**General Notes**  
**Unified Soil Classification System**

**Note: All attachments are one page unless noted above**

# GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS  
 Proposed Manufacturing Facility ■ Moreau, New York  
 Terracon Project No. JB215105

SAMPLING	WATER LEVEL	FIELD TESTS
Split Spoon	Water Initially Encountered Water Level After a Specified Period of Time Water Level After a Specified Period of Time Cave In Encountered  Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	N Standard Penetration Test Resistance (Blows/Ft.) (HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer UC Unconfined Compressive Strength (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer

## DESCRIPTIVE SOIL CLASSIFICATION

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

## LOCATION AND ELEVATION NOTES

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See **Exploration and Testing Procedures** in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

## STRENGTH TERMS

RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve) Density determined by Standard Penetration Resistance		CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve) Consistency determined by laboratory shear strength testing field visual-manual procedures or standard penetration resistance		
Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength Qu, (tsf)	Standard Penetration or N-Value Blows/Ft.
Very Loose	0 - 3	Very Soft	less than 0.25	0 - 1
Loose	4 - 9	Soft	0.25 to 0.50	2 - 4
Medium Dense	10 - 29	Medium Stiff	0.50 to 1.00	4 - 8
Dense	30 - 50	Stiff	1.00 to 2.00	8 - 15
Very Dense	> 50	Very Stiff	2.00 to 4.00	15 - 30
		Hard	> 4.00	> 30

## RELEVANCE OF SOIL BORING LOG

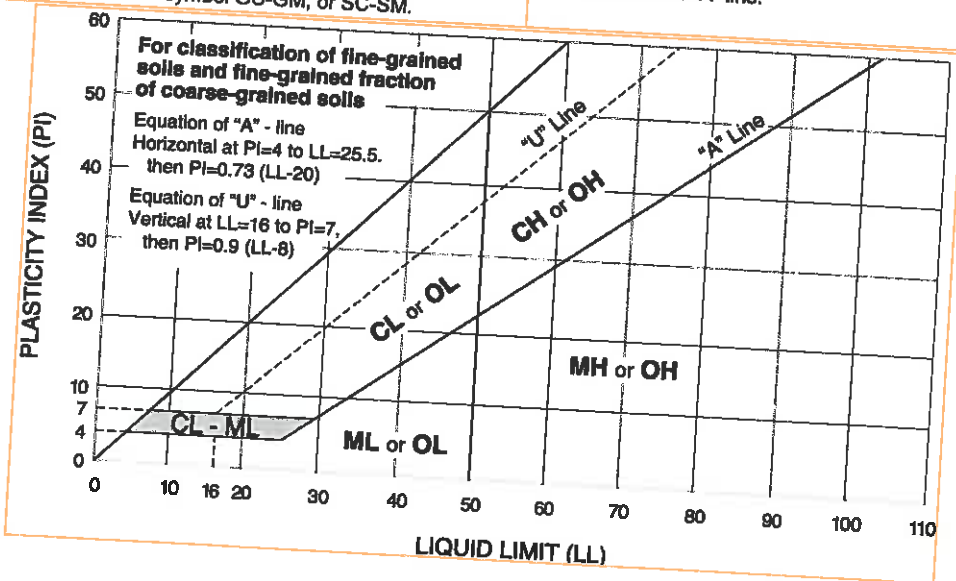
The soil boring logs contained within this document are intended for application to the project as described in this document. Use of these soil boring logs for any other purpose may not be appropriate.

## Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests

		Soil Classification				
		Group Symbol	Group Name			
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines <sup>C</sup>	$Cu \geq 4$ and $1 \leq Cc \leq 3$ <sup>E</sup>	GW	Well-graded gravel <sup>F</sup>	
		Gravels with Fines: More than 12% fines <sup>C</sup>	$Cu < 4$ and/or [ $Cc < 1$ or $Cc > 3.0$ ] <sup>E</sup>	GP	Poorly graded gravel <sup>F</sup>	
			Fines classify as ML or MH	GM	Silty gravel <sup>F, G, H</sup>	
		Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines <sup>D</sup>	$Cu \geq 6$ and $1 \leq Cc \leq 3$ <sup>E</sup>	SW	Well-graded sand <sup>I</sup>
			Sands with Fines: More than 12% fines <sup>D</sup>	$Cu < 6$ and/or [ $Cc < 1$ or $Cc > 3.0$ ] <sup>E</sup>	SP	Poorly graded sand <sup>I</sup>
	Fines classify as ML or MH	SM		Silty sand <sup>G, H, I</sup>		
	Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silt and Clays: Liquid limit less than 50	Inorganic:	$PI > 7$ and plots on or above "A" line	CL	Lean clay <sup>K, L, M</sup>
			Organic:	$PI < 4$ or plots below "A" line <sup>J</sup>	ML	Silt <sup>K, L, M</sup>
				Liquid limit - oven dried	$< 0.75$	OL
			Liquid limit - not dried	OH		Organic silt <sup>K, L, M, O</sup>
Silt and Clays: Liquid limit 50 or more			Inorganic:	$PI$ plots on or above "A" line	CH	Fat clay <sup>K, L, M</sup>
		Organic:	$PI$ plots below "A" line	MH	Elastic Silt <sup>K, L, M</sup>	
			Liquid limit - oven dried	$< 0.75$	OH	Organic clay <sup>K, L, M, P</sup>
		Liquid limit - not dried	PT		Peat	
		Highly organic soils:		Primarily organic matter, dark in color, and organic odor		

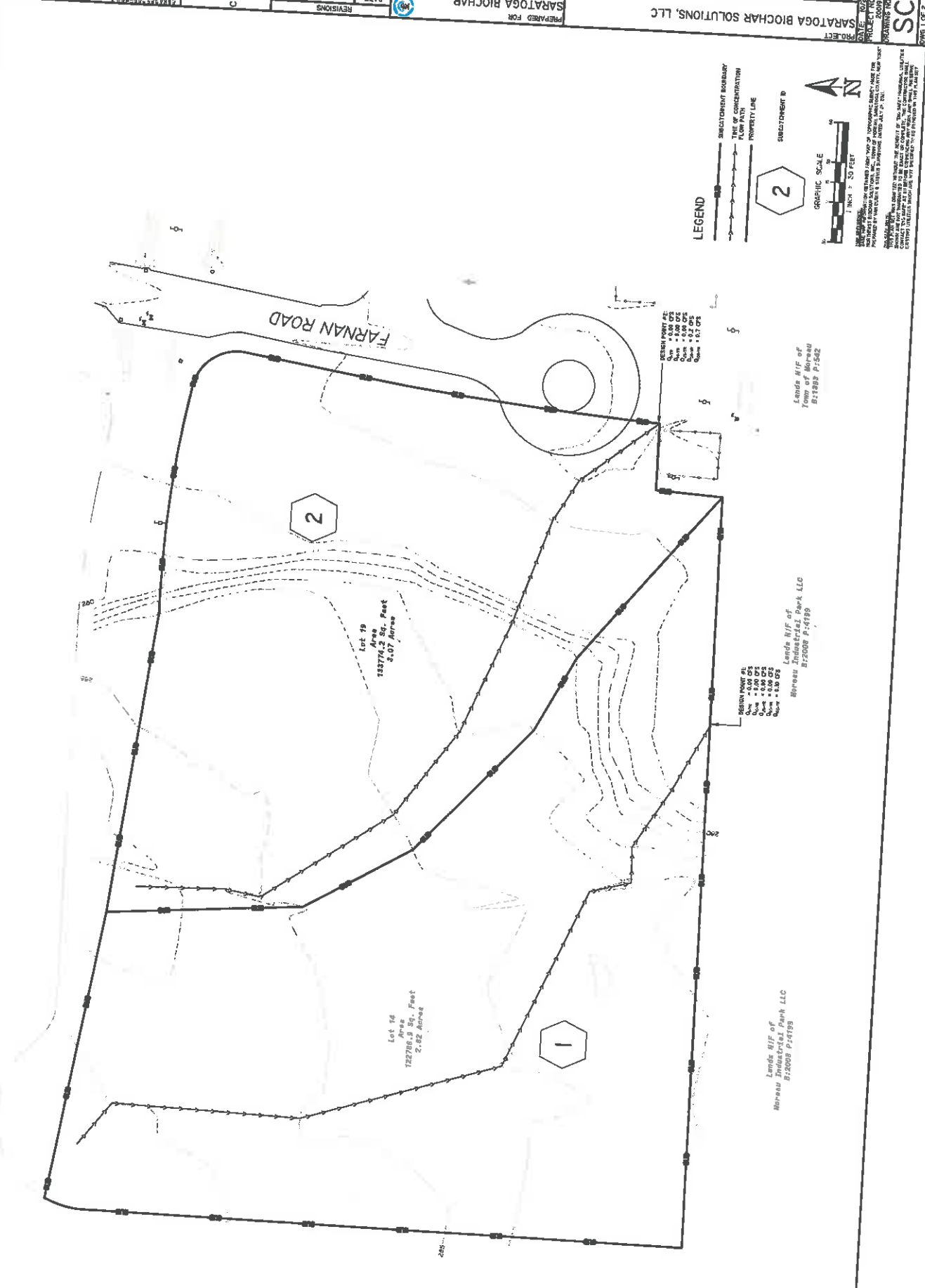
- <sup>A</sup> Based on the material passing the 3-inch (75-mm) sieve.
- <sup>B</sup> If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
- <sup>C</sup> Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
- <sup>D</sup> Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
- <sup>E</sup>  $Cu = D_{60}/D_{10}$      $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
- <sup>F</sup> If soil contains  $\geq 15\%$  sand, add "with sand" to group name.
- <sup>G</sup> If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

- <sup>H</sup> If fines are organic, add "with organic fines" to group name.
- <sup>I</sup> If soil contains  $\geq 15\%$  gravel, add "with gravel" to group name.
- <sup>J</sup> If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
- <sup>K</sup> If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
- <sup>L</sup> If soil contains  $\geq 30\%$  plus No. 200 predominantly sand, add "sandy" to group name.
- <sup>M</sup> If soil contains  $\geq 30\%$  plus No. 200, predominantly gravel, add "gravelly" to group name.
- <sup>N</sup>  $PI \geq 4$  and plots on or above "A" line.
- <sup>O</sup>  $PI < 4$  or plots below "A" line.
- <sup>P</sup>  $PI$  plots on or above "A" line.
- <sup>Q</sup>  $PI$  plots below "A" line.



**APPENDIX D**  
**SUBCATCHMENT PLANS**

NO.	DATE	DESCRIPTION







**APPENDIX E**  
**STORMWATER CALCULATIONS**

**PRE-DEVELOPMENT**



SC-1



SC-2



**20019\_EXIST**

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RAIN DATA 24-hr SOP 1-yr Rainfall=2.22"

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Page 2

**Summary for Subcatchment 1S: SC-1**

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 1-yr Rainfall=2.22"

Area (sf)	CN	Description
151,171	30	Woods, Good, HSG A
151,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	75	0.0133	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.58"
16.8	467	0.0086	0.46		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.6	111	0.0540	1.16		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
40.8	653	Total			

**Summary for Subcatchment 2S: SC-2**

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 1-yr Rainfall=2.22"

Area (sf)	CN	Description
69,302	30	Woods, Good, HSG A
2,340	98	Paved parking, HSG A
50,593	49	50-75% Grass cover, Fair, HSG A
122,235	39	Weighted Average
119,895		98.09% Pervious Area
2,340		1.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	13	0.0105	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.58"
12.0	368	0.0105	0.51		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.1	16	0.1875	2.17		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.2	177	0.0170	0.91		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
21.4	574	Total			

**20019\_EXIST**

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RAIN DATA 24-hr SOP 25-yr Rainfall=4.54"

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Page 3

**Summary for Subcatchment 1S: SC-1**

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 25-yr Rainfall=4.54"

Area (sf)	CN	Description
151,171	30	Woods, Good, HSG A
151,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	75	0.0133	0.06		Sheet Flow,
16.8	467	0.0086	0.46		Woods: Light underbrush n= 0.400 P2= 2.58"
1.6	111	0.0540	1.16		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
40.8	653	Total			Shallow Concentrated Flow, Woodland Kv= 5.0 fps

**Summary for Subcatchment 2S: SC-2**

Runoff = 0.1 cfs @ 13.62 hrs, Volume= 0.027 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 25-yr Rainfall=4.54"

Area (sf)	CN	Description
69,302	30	Woods, Good, HSG A
2,340	98	Paved parking, HSG A
50,593	49	50-75% Grass cover, Fair, HSG A
122,235	39	Weighted Average
119,895		98.09% Pervious Area
2,340		1.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	13	0.0105	0.04		Sheet Flow,
12.0	368	0.0105	0.51		Woods: Light underbrush n= 0.400 P2= 2.58"
0.1	16	0.1875	2.17		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.2	177	0.0170	0.91		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
21.4	574	Total			Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps

**20019\_EXIST**

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RAIN DATA 24-hr SOP 50-yr Rainfall=5.30"

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Page 4

**Summary for Subcatchment 1S: SC-1**

Runoff = 0.0 cfs @ 23.98 hrs. Volume= 0.005 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 50-yr Rainfall=5.30"

Area (sf)	CN	Description
151,171	30	Woods, Good, HSG A
151,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	75	0.0133	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.58"
16.8	467	0.0086	0.46		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.6	111	0.0540	1.16		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
40.8	653	Total			

**Summary for Subcatchment 2S: SC-2**

Runoff = 0.2 cfs @ 12.72 hrs. Volume= 0.062 af, Depth= 0.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 50-yr Rainfall=5.30"

Area (sf)	CN	Description
69,302	30	Woods, Good, HSG A
2,340	98	Paved parking, HSG A
50,593	49	50-75% Grass cover, Fair, HSG A
122,235	39	Weighted Average
119,895		98.09% Pervious Area
2,340		1.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	13	0.0105	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.58"
12.0	368	0.0105	0.51		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.1	16	0.1875	2.17		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.2	177	0.0170	0.91		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
21.4	574	Total			

**20019\_EXIST**

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RAIN DATA 24-hr SOP 10-YR 10-YR-DS Rainfall=3.75"

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**Summary for Subcatchment 1S: SC-1**

Runoff = 0.0 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 10-YR 10-YR-DS Rainfall=3.75"

Area (sf)	CN	Description
151,171	30	Woods, Good, HSG A
151,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	75	0.0133	0.06		Sheet Flow,
16.8	467	0.0086	0.46		Woods: Light underbrush n= 0.400 P2= 2.58"
1.6	111	0.0540	1.16		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
40.8	653	Total			Shallow Concentrated Flow, Woodland Kv= 5.0 fps

**Summary for Subcatchment 2S: SC-2**

Runoff = 0.0 cfs @ 21.52 hrs, Volume= 0.006 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 10-YR 10-YR-DS Rainfall=3.75"

Area (sf)	CN	Description
69,302	30	Woods, Good, HSG A
2,340	98	Paved parking, HSG A
50,593	49	50-75% Grass cover, Fair, HSG A
122,235	39	Weighted Average
119,895		98.09% Pervious Area
2,340		1.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	13	0.0105	0.04		Sheet Flow,
12.0	368	0.0105	0.51		Woods: Light underbrush n= 0.400 P2= 2.58"
0.1	16	0.1875	2.17		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.2	177	0.0170	0.91		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
21.4	574	Total			Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps

**20019\_EXIST**

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RAIN DATA 24-hr S0P 100-YR 100-YR-DES Rainfall=6.50"

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**Summary for Subcatchment 1S: SC-1**

Runoff = 0.1 cfs @ 13.92 hrs, Volume= 0.039 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr S0P 100-YR 100-YR-DES Rainfall=6.50"

Area (sf)	CN	Description
151,171	30	Woods, Good, HSG A
151,171		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
22.4	75	0.0133	0.06		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.58"
16.8	467	0.0086	0.46		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
1.6	111	0.0540	1.16		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
40.8	653	Total			

**Summary for Subcatchment 2S: SC-2**

Runoff = 0.7 cfs @ 12.48 hrs, Volume= 0.140 af, Depth= 0.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr S0P 100-YR 100-YR-DES Rainfall=6.50"

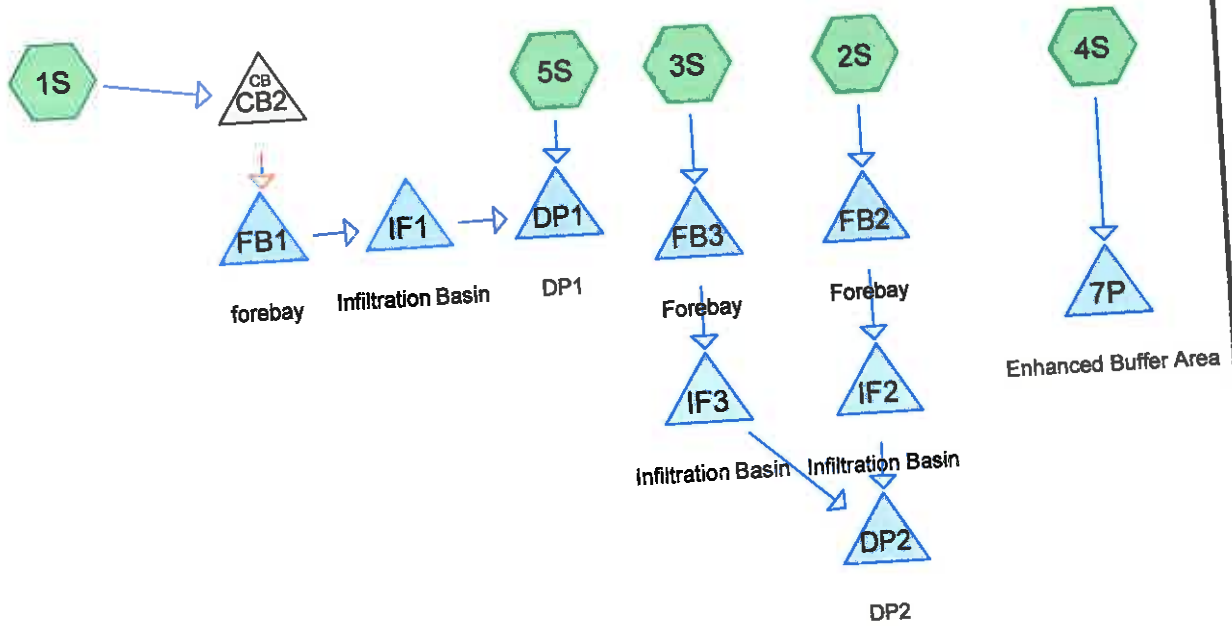
Area (sf)	CN	Description
69,302	30	Woods, Good, HSG A
2,340	98	Paved parking, HSG A
50,593	49	50-75% Grass cover, Fair, HSG A
122,235	39	Weighted Average
119,895		98.09% Pervious Area
2,340		1.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	13	0.0105	0.04		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.58"
12.0	368	0.0105	0.51		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
0.1	16	0.1875	2.17		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
3.2	177	0.0170	0.91		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
21.4	574	Total			



**POST-CONSTRUCTION**



**Routing Diagram for 20019\_POST**  
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RAIN DATA 24-hr SOP 1-yr Rainfall=2.22"

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**Summary for Subcatchment 1S:**

Runoff = 0.65 cfs @ 12.01 hrs, Volume= 0.055 af, Depth= 0.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 1-yr Rainfall=2.22"

Area (sf)	CN	Description
* 46,880	98	PAVEMENT
27,367	30	Woods, Good, HSG A
20,575	32	Woods/grass comb., Good, HSG A
* 11,190	98	ROOF
106,012	68	Weighted Average
47,942		45.22% Pervious Area
58,070		54.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0200	1.24		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.58" Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.2	33	0.0200	2.87		
1.5	133	Total			

**Summary for Subcatchment 2S:**

Runoff = 2.02 cfs @ 12.00 hrs, Volume= 0.100 af, Depth= 0.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 1-yr Rainfall=2.22"

Area (sf)	CN	Description
26,469	98	Roofs, HSG A
20,819	98	Paved parking, HSG A
14,328	32	Woods/grass comb., Good, HSG A
61,616	83	Weighted Average
14,328		23.25% Pervious Area
47,288		76.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	60	0.0200	1.12		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.58" Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.1	43	0.0100	4.91	3.86	
0.1	76	0.0300	8.51	6.69	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
1.1	179	Total			

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RAIN DATA 24-hr SOP 1-yr Rainfall=2.22"

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### Summary for Subcatchment 3S:

Runoff = 0.03 cfs @ 12.22 hrs, Volume= 0.011 af, Depth= 0.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 1-yr Rainfall=2.22"

Area (sf)	CN	Description
* 11,640	98	ROOF
* 8,476	98	paving
26,422	32	Woods/grass comb., Good, HSG A
46,538	61	Weighted Average
26,422		56.78% Pervious Area
20,116		43.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	76	0.0200	1.17		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.58"
1.6	137	0.0440	1.47		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0150	6.02	4.73	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
2.8	253	Total			

### Summary for Subcatchment 4S:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 1-yr Rainfall=2.22"

Area (sf)	CN	Description
* 8,210	98	paving
37,122	32	Woods/grass comb., Good, HSG A
45,332	44	Weighted Average
37,122		81.89% Pervious Area
8,210		18.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0750	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.58"
0.1	24	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.6	150	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
17.8	274	Total			

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RAIN DATA 24-hr S0P 1-yr Rainfall=2.22"

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**Summary for Subcatchment 5S:**

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr S0P 1-yr Rainfall=2.22"

Area (sf)	CN	Description
13,908	30	Woods, Good, HSG A
13,908		100.00% Pervious Area

**Summary for Pond 7P: Enhanced Buffer Area**

Inflow Area = 1.041 ac, 18.11% Impervious, Inflow Depth = 0.00" for 1-yr event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 277.00' @ 0.00 hrs Surf.Area= 1,653 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)  
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description	
#1	277.00'	7 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
277.00	1,653	0.0	0	0
277.01	1,653	40.0	7	7

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.00'	45.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=277.00' (Free Discharge)  
 1=Exfiltration (Passes 0.00 cfs of 1.72 cfs potential flow)

**Summary for Pond CB2:**

Inflow Area = 2.434 ac, 54.78% Impervious, Inflow Depth = 0.27" for 1-yr event  
 Inflow = 0.65 cfs @ 12.01 hrs, Volume= 0.055 af  
 Outflow = 0.65 cfs @ 12.01 hrs, Volume= 0.055 af, Atten= 0%, Lag= 0.0 min  
 Primary = 0.65 cfs @ 12.01 hrs, Volume= 0.055 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 280.87' @ 12.01 hrs

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Device	Routing	Invert	Outlet Devices
#1	Primary	280.50'	<b>24.0" Round Culvert</b> L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 280.50' / 280.00' S= 0.0116 ' S= 0.0116 ' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Secondary	283.50'	<b>30.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.65 cfs @ 12.01 hrs HW=280.87' (Free Discharge)  
↑1=Culvert (Inlet Controls 0.65 cfs @ 1.63 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=280.50' (Free Discharge)  
↑2=Orifice/Grate ( Controls 0.00 cfs)

**Summary for Pond DP1: DP1**

Inflow Area = 2.753 ac, 48.42% Impervious, Inflow Depth = 0.00" for 1-yr event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Pond DP2: DP2**

Inflow Area = 2.483 ac, 62.32% Impervious, Inflow Depth = 0.00" for 1-yr event  
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Pond FB1: forebay**

Inflow Area = 2.434 ac, 54.78% Impervious, Inflow Depth = 0.27" for 1-yr event  
Inflow = 0.65 cfs @ 12.01 hrs, Volume= 0.055 af  
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Peak Elev= 281.90' @ 24.09 hrs Surf.Area= 2,191 sf Storage= 2,414 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)  
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	279.50'	7,240 cf	Custom Stage Data (Irregular) Listed below (Recalc)

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
279.50	30	41.0	0	0	30
280.00	358	306.0	82	82	7,348
281.00	1,304	325.0	782	864	8,353
282.00	2,307	344.0	1,782	2,646	9,418
283.00	3,367	363.0	2,820	5,466	10,544
283.50	3,733	369.0	1,774	7,240	10,939

Device	Routing	Invert	Outlet Devices
#1	Primary	282.00'	<b>6.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	282.00'	<b>6.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=279.50' (Free Discharge)  
 1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)  
 2=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Summary for Pond FB2: Forebay**

Inflow Area = 1.415 ac, 76.75% Impervious, Inflow Depth = 0.85" for 1-yr event  
 Inflow = 2.02 cfs @ 12.00 hrs, Volume= 0.100 af  
 Outflow = 0.04 cfs @ 18.22 hrs, Volume= 0.019 af, Atten= 98%, Lag= 373.5 min  
 Primary = 0.04 cfs @ 18.22 hrs, Volume= 0.019 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 281.77' @ 18.22 hrs Surf.Area= 1,907 sf Storage= 3,569 cf

Plug-Flow detention time= 537.0 min calculated for 0.019 af (19% of inflow)  
 Center-of-Mass det. time= 376.6 min ( 1,238.0 - 861.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	278.00'	5,103 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.00	208	91.0	0	0	208
279.00	530	118.0	357	357	669
280.00	943	148.0	727	1,083	1,318
281.00	1,462	183.0	1,193	2,276	2,255
282.00	2,052	205.0	1,749	4,025	2,961
282.50	2,260	212.0	1,078	5,103	3,216

Device	Routing	Invert	Outlet Devices
#1	Primary	281.75'	5.0' long x 3.0' breadth Broad-Crested Rectangular Weir

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Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00
	2.50	3.00	3.50	4.00	4.50					
Coef. (English)	2.44	2.58	2.68	2.67	2.65	2.64	2.64	2.68	2.68	
	2.72	2.81	2.92	2.97	3.07	3.32				

Primary OutFlow Max=0.03 cfs @ 18.22 hrs HW=281.77' (Free Discharge)  
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 0.03 cfs @ 0.34 fps)

**Summary for Pond FB3: Forebay**

Inflow Area = 1.068 ac, 43.22% Impervious, Inflow Depth = 0.12" for 1-yr event  
 Inflow = 0.03 cfs @ 12.22 hrs, Volume= 0.011 af  
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 276.60' @ 24.17 hrs Surf.Area= 1,093 sf Storage= 468 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)  
 Center-of-Mass det. time= (not calculated: no outflow)

Volume #1	Invert	Avail.Storage	Storage Description			
	276.00'	4,977 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
276.00	513	345.0	0	0	513	
277.00	1,608	372.0	1,010	1,010	2,095	
278.00	3,069	535.0	2,299	3,309	13,868	
278.50	3,608	542.0	1,667	4,977	14,526	

Device	Routing	Invert	Outlet Devices										
#1	Primary	277.75'	5.0' long x 3.0' breadth Broad-Crested Rectangular Weir										
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00
				2.50	3.00	3.50	4.00	4.50					
			Coef. (English)	2.44	2.58	2.68	2.67	2.65	2.64	2.64	2.68	2.68	
				2.72	2.81	2.92	2.97	3.07	3.32				

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=276.00' (Free Discharge)  
 ↑1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Summary for Pond IF1: Infiltration Basin**

Inflow Area = 2.434 ac, 54.78% Impervious, Inflow Depth = 0.00" for 1-yr event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs



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Peak Elev= 280.00' @ 0.00 hrs Surf.Area= 2,382 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)  
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description			
#1	280.00'	15,076 cf	<b>Custom Stage Data (Irregular) Listed below (Recalc)</b>			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
280.00	2,382	343.0	0	0	2,382	
281.00	3,452	367.0	2,901	2,901	3,784	
282.00	4,589	388.0	4,007	6,908	5,101	
283.00	5,783	407.0	5,175	12,082	6,367	
283.50	6,194	414.0	2,994	15,076	6,868	

Device	Routing	Invert	Outlet Devices									
#1	Primary	282.50'	<b>6.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b>									
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00									
			2.50 3.00 3.50									
			Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88									
#2	Discarded	280.00'	2.85 3.07 3.20 3.32									
			<b>45.000 in/hr Exfiltration over Wetted area</b>									

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=280.00' (Free Discharge)  
 ↳ 2=Exfiltration (Passes 0.00 cfs of 2.48 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=280.00' (Free Discharge)  
 ↳ 1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Summary for Pond IF2: Infiltration Basin**

Inflow Area = 1.415 ac, 76.75% Impervious, Inflow Depth = 0.16" for 1-yr event  
 Inflow = 0.04 cfs @ 18.22 hrs, Volume= 0.019 af  
 Outflow = 0.04 cfs @ 18.23 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.5 min  
 Discarded = 0.04 cfs @ 18.23 hrs, Volume= 0.019 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 278.00' @ 18.23 hrs Surf.Area= 1,833 sf Storage= 1 cf

Plug-Flow detention time= 0.4 min calculated for 0.019 af (100% of inflow)  
 Center-of-Mass det. time= 0.4 min ( 1,238.4 - 1,238.0 )

Volume	Invert	Avail.Storage	Storage Description			
#1	278.00'	6,812 cf	<b>Custom Stage Data (Irregular) Listed below (Recalc)</b>			

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.00	1,833	207.0	0	0	1,833
279.00	2,535	241.0	2,175	2,175	3,066
280.00	3,312	265.0	2,915	5,089	4,065
280.50	3,580	271.0	1,723	6,812	4,353

Device	Routing	Invert	Outlet Devices
#1	Primary	279.50'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	278.00'	45.000 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=1.91 cfs @ 18.23 hrs HW=278.00' (Free Discharge)  
 ↳2=Exfiltration (Exfiltration Controls 1.91 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=278.00' (Free Discharge)  
 ↳1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

Summary for Pond IF3: Infiltration Basin

Inflow Area = 1.068 ac, 43.22% Impervious, Inflow Depth = 0.00" for 1-yr event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 277.00' @ 0.00 hrs Surf.Area= 1,555 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)  
 Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	2,915 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	1,555	171.0	0	0	1,555
278.00	2,097	190.0	1,819	1,819	2,130
278.50	2,289	196.0	1,096	2,915	2,338

Device	Routing	Invert	Outlet Devices
#1	Primary	277.75'	5.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	277.00'	45.000 in/hr Exfiltration over Wetted area

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Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=277.00' (Free Discharge)  
↑  
↳2=Exfiltration (Passes 0.00 cfs of 1.62 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=277.00' (Free Discharge)  
↑  
↳1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

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RAIN DATA 24-hr SOP 25-yr Rainfall=4.54"

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### Summary for Subcatchment 1S:

Runoff = 5.70 cfs @ 12.00 hrs, Volume= 0.316 af, Depth= 1.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 25-yr Rainfall=4.54"

Area (sf)	CN	Description
* 46,880	98	PAVEMENT
27,367	30	Woods, Good, HSG A
20,575	32	Woods/grass comb., Good, HSG A
* 11,190	98	ROOF
106,012	68	Weighted Average
47,942		45.22% Pervious Area
58,070		54.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0200	1.24		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.58"
0.2	33	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.5	133	Total			

### Summary for Subcatchment 2S:

Runoff = 6.11 cfs @ 12.00 hrs, Volume= 0.325 af, Depth= 2.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 25-yr Rainfall=4.54"

Area (sf)	CN	Description
26,469	98	Roofs, HSG A
20,819	98	Paved parking, HSG A
14,328	32	Woods/grass comb., Good, HSG A
61,616	83	Weighted Average
14,328		23.25% Pervious Area
47,288		76.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	60	0.0200	1.12		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.58"
0.1	43	0.0100	4.91	3.86	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.1	76	0.0300	8.51	6.69	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
1.1	179	Total			

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RAIN DATA 24-hr SOP 25-yr Rainfall=4.54"

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**Summary for Subcatchment 3S:**

Runoff = 1.55 cfs @ 12.02 hrs, Volume= 0.098 af, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 25-yr Rainfall=4.54"

Area (sf)	CN	Description
* 11,640	98	ROOF
* 8,476	98	paving
26,422	32	Woods/grass comb., Good, HSG A
46,538	61	Weighted Average
26,422		56.78% Pervious Area
20,116		43.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	76	0.0200	1.17		Sheet Flow,
1.6	137	0.0440	1.47		Smooth surfaces n= 0.011 P2= 2.58"
0.1	40	0.0150	6.02	4.73	Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
					Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
2.8	253	Total			

**Summary for Subcatchment 4S:**

Runoff = 0.08 cfs @ 12.60 hrs, Volume= 0.023 af, Depth= 0.27"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 25-yr Rainfall=4.54"

Area (sf)	CN	Description
* 8,210	98	paving
37,122	32	Woods/grass comb., Good, HSG A
45,332	44	Weighted Average
37,122		81.89% Pervious Area
8,210		18.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0750	0.12		Sheet Flow,
0.1	24	0.0200	2.87		Woods: Light underbrush n= 0.400 P2= 2.58"
3.6	150	0.0100	0.70		Shallow Concentrated Flow, Paved Kv= 20.3 fps
					Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
17.8	274	Total			

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RAIN DATA 24-hr SOP 25-yr Rainfall=4.54"

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**Summary for Subcatchment 5S:**

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 25-yr Rainfall=4.54"

Area (sf)	CN	Description
13,908	30	Woods, Good, HSG A
13,908		100.00% Pervious Area

**Summary for Pond 7P: Enhanced Buffer Area**

Inflow Area = 1.041 ac, 18.11% Impervious, Inflow Depth = 0.27" for 25-yr event  
 Inflow = 0.08 cfs @ 12.60 hrs, Volume= 0.023 af  
 Outflow = 0.08 cfs @ 12.60 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.08 cfs @ 12.60 hrs, Volume= 0.023 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 277.00' @ 12.60 hrs Surf.Area= 1,653 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.023 af (100% of inflow)  
 Center-of-Mass det. time= 0.0 min ( 979.4 - 979.4 )

Volume	Invert	Avail.Storage	Storage Description	
#1	277.00'	7 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
277.00	1,653	0.0	0	0
277.01	1,653	40.0	7	7

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.00'	45.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=1.72 cfs @ 12.60 hrs HW=277.00' (Free Discharge)  
 ←1=Exfiltration (Exfiltration Controls 1.72 cfs)

**Summary for Pond CB2:**

Inflow Area = 2.434 ac, 54.78% Impervious, Inflow Depth = 1.56" for 25-yr event  
 Inflow = 5.70 cfs @ 12.00 hrs, Volume= 0.316 af  
 Outflow = 5.70 cfs @ 12.00 hrs, Volume= 0.316 af, Atten= 0%, Lag= 0.0 min  
 Primary = 5.70 cfs @ 12.00 hrs, Volume= 0.316 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 281.69' @ 12.00 hrs

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RAIN DATA 24-hr S0P 25-yr Rainfall=4.54"

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Device	Routing	Invert	Outlet Devices
#1	Primary	280.50'	<b>24.0" Round Culvert</b> L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 280.50' / 280.00' S= 0.0116 1/8" Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Secondary	283.50'	<b>30.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow Max=5.68 cfs @ 12.00 hrs HW=281.69' (Free Discharge)**  
 ↳1=Culvert (Inlet Controls 5.68 cfs @ 2.93 fps)

**Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=280.50' (Free Discharge)**  
 ↳2=Orifice/Grate ( Controls 0.00 cfs)

**Summary for Pond DP1: DP1**

Inflow Area = 2.753 ac, 48.42% Impervious, Inflow Depth = 0.00" for 25-yr event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Pond DP2: DP2**

Inflow Area = 2.483 ac, 62.32% Impervious, Inflow Depth = 0.00" for 25-yr event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Pond FB1: forebay**

Inflow Area = 2.434 ac, 54.78% Impervious, Inflow Depth = 1.56" for 25-yr event  
 Inflow = 5.70 cfs @ 12.00 hrs, Volume= 0.316 af  
 Outflow = 3.73 cfs @ 12.11 hrs, Volume= 0.256 af, Atten= 35%, Lag= 6.3 min  
 Primary = 3.73 cfs @ 12.11 hrs, Volume= 0.256 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 282.25' @ 12.11 hrs Surf.Area= 2,548 sf Storage= 3,240 cf

Plug-Flow detention time= 118.5 min calculated for 0.256 af (81% of inflow)  
 Center-of-Mass det. time= 38.4 min ( 886.7 - 848.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	279.50'	7,240 cf	<b>Custom Stage Data (Irregular) Listed below (Recalc)</b>

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
279.50	30	41.0	0	0	30
280.00	358	306.0	82	82	7,348
281.00	1,304	325.0	782	864	8,353
282.00	2,307	344.0	1,782	2,646	9,418
283.00	3,367	363.0	2,820	5,466	10,544
283.50	3,733	369.0	1,774	7,240	10,939

Device	Routing	Invert	Outlet Devices
#1	Primary	282.00'	6.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	282.00'	6.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=3.71 cfs @ 12.11 hrs HW=282.24' (Free Discharge)  
 1=Broad-Crested Rectangular Weir (Weir Controls 1.85 cfs @ 1.26 fps)  
 2=Broad-Crested Rectangular Weir (Weir Controls 1.85 cfs @ 1.26 fps)

**Summary for Pond FB2: Forebay**

Inflow Area = 1.415 ac, 76.75% Impervious, Inflow Depth = 2.76" for 25-yr event  
 Inflow = 6.11 cfs @ 12.00 hrs, Volume= 0.325 af  
 Outflow = 4.46 cfs @ 12.02 hrs, Volume= 0.244 af, Atten= 27%, Lag= 1.5 min  
 Primary = 4.46 cfs @ 12.02 hrs, Volume= 0.244 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 282.24' @ 12.02 hrs Surf.Area= 2,149 sf Storage= 4,523 cf

Plug-Flow detention time= 136.9 min calculated for 0.244 af (75% of inflow)  
 Center-of-Mass det. time= 51.4 min ( 860.5 - 809.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	278.00'	5,103 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.00	208	91.0	0	0	208
279.00	530	118.0	357	357	669
280.00	943	148.0	727	1,083	1,318
281.00	1,462	183.0	1,193	2,276	2,255
282.00	2,052	205.0	1,749	4,025	2,961
282.50	2,260	212.0	1,078	5,103	3,216

Device	Routing	Invert	Outlet Devices
#1	Primary	281.75'	5.0' long x 3.0' breadth Broad-Crested Rectangular Weir



Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00
	2.50	3.00	3.50	4.00	4.50					
Coef. (English)	2.44	2.58	2.68	2.67	2.65	2.64	2.64	2.64	2.68	2.68
	2.72	2.81	2.92	2.97	3.07	3.32				

Primary OutFlow Max=4.45 cfs @ 12.02 hrs HW=282.24' (Free Discharge)  
 ↳1=Broad-Crested Rectangular Weir (Weir Controls 4.45 cfs @ 1.83 fps)

**Summary for Pond FB3: Forebay**

Inflow Area = 1.068 ac, 43.22% Impervious, Inflow Depth = 1.10" for 25-yr event  
 Inflow = 1.55 cfs @ 12.02 hrs, Volume= 0.098 af  
 Outflow = 0.09 cfs @ 14.54 hrs, Volume= 0.039 af, Atten= 94%, Lag= 151.7 min  
 Primary = 0.09 cfs @ 14.54 hrs, Volume= 0.039 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 277.79' @ 14.54 hrs Surf.Area= 2,717 sf Storage= 2,690 cf

Plug-Flow detention time= 357.8 min calculated for 0.039 af (39% of inflow)  
 Center-of-Mass det. time= 213.9 min ( 1,083.8 - 869.9 )

Volume #1	Invert	Avail.Storage	Storage Description
	276.00'	4,977 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
276.00	513	345.0	0	0	513
277.00	1,608	372.0	1,010	1,010	2,095
278.00	3,069	535.0	2,299	3,309	13,868
278.50	3,608	542.0	1,667	4,977	14,526

Device #1	Routing	Invert	Outlet Devices
	Primary	277.75'	5.0' long x 3.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.08 cfs @ 14.54 hrs HW=277.79' (Free Discharge)  
 ↳1=Broad-Crested Rectangular Weir (Weir Controls 0.08 cfs @ 0.46 fps)

**Summary for Pond IF1: Infiltration Basin**

Inflow Area = 2.434 ac, 54.78% Impervious, Inflow Depth = 1.26" for 25-yr event  
 Inflow = 3.73 cfs @ 12.11 hrs, Volume= 0.256 af  
 Outflow = 2.72 cfs @ 12.15 hrs, Volume= 0.256 af, Atten= 27%, Lag= 2.8 min  
 Discarded = 2.72 cfs @ 12.15 hrs, Volume= 0.256 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

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RAIN DATA 24-hr SOP 25-yr Rainfall=4.54"

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Peak Elev= 280.17' @ 12.15 hrs Surf.Area= 2,546 sf Storage= 410 cf

Plug-Flow detention time= 0.8 min calculated for 0.256 af (100% of inflow)  
Center-of-Mass det. time= 0.8 min ( 887.5 - 886.7 )

Volume #1	Invert 280.00'	Avail.Storage 15,076 cf	Storage Description Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
280.00	2,382	343.0	0	0	2,382	
281.00	3,452	367.0	2,901	2,901	3,784	
282.00	4,589	388.0	4,007	6,908	5,101	
283.00	5,783	407.0	5,175	12,082	6,367	
283.50	6,194	414.0	2,994	15,076	6,868	

Device #1	Routing Primary	Invert 282.50'	Outlet Devices 6.0' long x 2.0' breadth Broad-Crested Rectangular Weir													
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	2.50	3.00	3.50
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88	2.85	3.07	3.20	3.32
#2	Discarded	280.00'	45.000 in/hr Exfiltration over Wetted area													

Discarded OutFlow Max=2.72 cfs @ 12.15 hrs HW=280.17' (Free Discharge)  
 ↳ 2=Exfiltration (Exfiltration Controls 2.72 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=280.00' (Free Discharge)  
 ↳ 1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Summary for Pond IF2: Infiltration Basin**

Inflow Area = 1.415 ac, 76.75% Impervious, Inflow Depth = 2.07" for 25-yr event  
 Inflow = 4.46 cfs @ 12.02 hrs, Volume= 0.244 af  
 Outflow = 2.53 cfs @ 12.17 hrs, Volume= 0.244 af, Atten= 43%, Lag= 8.6 min  
 Discarded = 2.53 cfs @ 12.17 hrs, Volume= 0.244 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 278.50' @ 12.17 hrs Surf.Area= 2,170 sf Storage= 999 cf

Plug-Flow detention time= 2.0 min calculated for 0.244 af (100% of inflow)  
 Center-of-Mass det. time= 2.0 min ( 862.5 - 860.5 )

Volume #1	Invert 278.00'	Avail.Storage 6,812 cf	Storage Description Custom Stage Data (Irregular) Listed below (Recalc)			
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RAIN DATA 24-hr SOP 25-yr Rainfall=4.54"

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.00	1,833	207.0	0	0	1,833
279.00	2,535	241.0	2,175	2,175	3,066
280.00	3,312	265.0	2,915	5,089	4,065
280.50	3,580	271.0	1,723	6,812	4,353

Device	Routing	Invert	Outlet Devices
#1	Primary	279.50'	<b>4.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32 <b>45.000 in/hr Exfiltration over Wetted area</b>
#2	Discarded	278.00'	

Discarded OutFlow Max=2.53 cfs @ 12.17 hrs HW=278.50' (Free Discharge)  
 ↳2=Exfiltration (Exfiltration Controls 2.53 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=278.00' (Free Discharge)  
 ↳1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Summary for Pond IF3: Infiltration Basin**

Inflow Area = 1.068 ac, 43.22% Impervious, Inflow Depth = 0.43" for 25-yr event  
 Inflow = 0.09 cfs @ 14.54 hrs, Volume= 0.039 af  
 Outflow = 0.09 cfs @ 14.55 hrs, Volume= 0.039 af, Atten= 0%, Lag= 0.3 min  
 Discarded = 0.09 cfs @ 14.55 hrs, Volume= 0.039 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 277.00' @ 14.55 hrs Surf.Area= 1,555 sf Storage= 1 cf

Plug-Flow detention time= 0.2 min calculated for 0.039 af (100% of inflow)  
 Center-of-Mass det. time= 0.2 min ( 1,084.0 - 1,083.8 )

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	2,915 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	1,555	171.0	0	0	1,555
278.00	2,097	190.0	1,819	1,819	2,130
278.50	2,289	196.0	1,096	2,915	2,338

Device	Routing	Invert	Outlet Devices
#1	Primary	277.75'	<b>5.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32 <b>45.000 in/hr Exfiltration over Wetted area</b>
#2	Discarded	277.00'	

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Discarded OutFlow Max=1.62 cfs @ 14.55 hrs HW=277.00' (Free Discharge)  
↳2=Exfiltration (Exfiltration Controls 1.62 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=277.00' (Free Discharge)  
↳1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

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RAIN DATA 24-hr SOP 50-yr Rainfall=5.30"

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**Summary for Subcatchment 1S:**

Runoff = 7.60 cfs @ 12.00 hrs, Volume= 0.425 af, Depth= 2.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 50-yr Rainfall=5.30"

Area (sf)	CN	Description
* 46,880	98	PAVEMENT
27,367	30	Woods, Good, HSG A
20,575	32	Woods/grass comb., Good, HSG A
* 11,190	98	ROOF
106,012	68	Weighted Average
47,942		45.22% Pervious Area
58,070		54.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0200	1.24		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.58" Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.2	33	0.0200	2.87		
1.5	133	Total			

**Summary for Subcatchment 2S:**

Runoff = 7.37 cfs @ 12.00 hrs, Volume= 0.406 af, Depth= 3.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 50-yr Rainfall=5.30"

Area (sf)	CN	Description
26,469	98	Roofs, HSG A
20,819	98	Paved parking, HSG A
14,328	32	Woods/grass comb., Good, HSG A
61,616	83	Weighted Average
14,328		23.25% Pervious Area
47,288		76.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	60	0.0200	1.12		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.58" Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.1	43	0.0100	4.91	3.86	
0.1	76	0.0300	8.51	6.69	
1.1	179	Total			

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RAIN DATA 24-hr SOP 50-yr Rainfall=5.30"  
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**Summary for Subcatchment 3S:**

Runoff = 2.26 cfs @ 12.02 hrs, Volume= 0.138 af, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 RAIN DATA 24-hr SOP 50-yr Rainfall=5.30"

Area (sf)	CN	Description
* 11,640	98	ROOF
* 8,476	98	paving
26,422	32	Woods/grass comb., Good, HSG A
46,538	61	Weighted Average
26,422		56.78% Pervious Area
20,116		43.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	76	0.0200	1.17		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 2.58"
1.6	137	0.0440	1.47		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0150	6.02	4.73	<b>Pipe Channel,</b> 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
2.8	253	Total			

**Summary for Subcatchment 4S:**

Runoff = 0.21 cfs @ 12.38 hrs, Volume= 0.043 af, Depth= 0.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 RAIN DATA 24-hr SOP 50-yr Rainfall=5.30"

Area (sf)	CN	Description
* 8,210	98	paving
37,122	32	Woods/grass comb., Good, HSG A
45,332	44	Weighted Average
37,122		81.89% Pervious Area
8,210		18.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0750	0.12		<b>Sheet Flow,</b> Woods: Light underbrush n= 0.400 P2= 2.58"
0.1	24	0.0200	2.87		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
3.6	150	0.0100	0.70		<b>Shallow Concentrated Flow,</b> Short Grass Pasture Kv= 7.0 fps
17.8	274	Total			

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RAIN DATA 24-hr SOP 50-yr Rainfall=5.30"

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**Summary for Subcatchment 5S:**

Runoff = 0.00 cfs @ 23.99 hrs, Volume= 0.000 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 50-yr Rainfall=5.30"

Area (sf)	CN	Description
13,908	30	Woods, Good, HSG A
13,908		100.00% Pervious Area

**Summary for Pond 7P: Enhanced Buffer Area**

Inflow Area = 1.041 ac, 18.11% Impervious, Inflow Depth = 0.49" for 50-yr event  
 Inflow = 0.21 cfs @ 12.38 hrs, Volume= 0.043 af  
 Outflow = 0.21 cfs @ 12.38 hrs, Volume= 0.043 af, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.21 cfs @ 12.38 hrs, Volume= 0.043 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 277.00' @ 12.38 hrs Surf.Area= 1,653 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.042 af (100% of inflow)  
 Center-of-Mass det. time= 0.0 min ( 938.2 - 938.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	7 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
277.00	1,653	0.0	0	0
277.01	1,653	40.0	7	7

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.00'	45.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=1.72 cfs @ 12.38 hrs HW=277.00' (Free Discharge)  
 ↳ 1=Exfiltration (Exfiltration Controls 1.72 cfs)

**Summary for Pond CB2:**

Inflow Area = 2.434 ac, 54.78% Impervious, Inflow Depth = 2.10" for 50-yr event  
 Inflow = 7.60 cfs @ 12.00 hrs, Volume= 0.425 af  
 Outflow = 7.60 cfs @ 12.00 hrs, Volume= 0.425 af, Atten= 0%, Lag= 0.0 min  
 Primary = 7.60 cfs @ 12.00 hrs, Volume= 0.425 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 281.91' @ 12.00 hrs

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RAIN DATA 24-hr SOP 50-yr Rainfall=5.30"  
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Device	Routing	Invert	Outlet Devices
#1	Primary	280.50'	<b>24.0" Round Culvert</b> L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 280.50' / 280.00' S= 0.0116 ' S= 0.0116 ' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Secondary	283.50'	<b>30.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow** Max=7.58 cfs @ 12.00 hrs HW=281.91' (Free Discharge)  
 ↑**1=Culvert** (Inlet Controls 7.58 cfs @ 3.20 fps)

**Secondary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=280.50' (Free Discharge)  
 ↑**2=Orifice/Grate** ( Controls 0.00 cfs)

**Summary for Pond DP1: DP1**

Inflow Area = 2.753 ac, 48.42% Impervious, Inflow Depth = 0.00" for 50-yr event  
 Inflow = 0.00 cfs @ 23.99 hrs, Volume= 0.000 af  
 Primary = 0.00 cfs @ 23.99 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Pond DP2: DP2**

Inflow Area = 2.483 ac, 62.32% Impervious, Inflow Depth = 0.00" for 50-yr event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Pond FB1: forebay**

Inflow Area = 2.434 ac, 54.78% Impervious, Inflow Depth = 2.10" for 50-yr event  
 Inflow = 7.60 cfs @ 12.00 hrs, Volume= 0.425 af  
 Outflow = 6.74 cfs @ 12.02 hrs, Volume= 0.364 af, Atten= 11%, Lag= 1.0 min  
 Primary = 6.74 cfs @ 12.02 hrs, Volume= 0.364 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 282.36' @ 12.02 hrs Surf.Area= 2,666 sf Storage= 3,540 cf

Plug-Flow detention time= 90.6 min calculated for 0.364 af (86% of inflow)  
 Center-of-Mass det. time= 27.2 min ( 862.5 - 835.3 )

Volume	Invert	Avail.Storage	Storage Description
#1	279.50'	7,240 cf	<b>Custom Stage Data (Irregular)</b> Listed below (Recalc)



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RAIN DATA 24-hr SOP 50-yr Rainfall=5.30"

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
279.50	30	41.0	0	0	30
280.00	358	306.0	82	82	7,348
281.00	1,304	325.0	782	864	8,353
282.00	2,307	344.0	1,782	2,646	9,418
283.00	3,367	363.0	2,820	5,466	10,544
283.50	3,733	369.0	1,774	7,240	10,939

Device	Routing	Invert	Outlet Devices
#1	Primary	282.00'	<b>6.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	282.00'	<b>6.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=6.70 cfs @ 12.02 hrs HW=282.36' (Free Discharge)  
 1=Broad-Crested Rectangular Weir (Weir Controls 3.35 cfs @ 1.56 fps)  
 2=Broad-Crested Rectangular Weir (Weir Controls 3.35 cfs @ 1.56 fps)

**Summary for Pond FB2: Forebay**

Inflow Area = 1.415 ac, 76.75% Impervious, Inflow Depth = 3.45" for 50-yr event  
 Inflow = 7.37 cfs @ 12.00 hrs, Volume= 0.406 af  
 Outflow = 6.55 cfs @ 12.01 hrs, Volume= 0.325 af, Atten= 11%, Lag= 0.9 min  
 Primary = 6.55 cfs @ 12.01 hrs, Volume= 0.325 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 282.37' @ 12.01 hrs Surf.Area= 2,205 sf Storage= 4,814 cf

Plug-Flow detention time= 115.0 min calculated for 0.325 af (80% of inflow)  
 Center-of-Mass det. time= 41.5 min ( 841.7 - 800.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	278.00'	5,103 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.00	208	91.0	0	0	208
279.00	530	118.0	357	357	669
280.00	943	148.0	727	1,083	1,318
281.00	1,462	183.0	1,193	2,276	2,255
282.00	2,052	205.0	1,749	4,025	2,961
282.50	2,260	212.0	1,078	5,103	3,216

Device	Routing	Invert	Outlet Devices
#1	Primary	281.75'	5.0' long x 3.0' breadth Broad-Crested Rectangular Weir

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Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00
2.50	3.00	3.50	4.00	4.50						
Coef. (English)	2.44	2.58	2.68	2.67	2.65	2.64	2.64	2.68	2.68	
2.72	2.81	2.92	2.97	3.07	3.32					

Primary OutFlow Max=6.55 cfs @ 12.01 hrs HW=282.37' (Free Discharge)  
 ↳1=Broad-Crested Rectangular Weir (Weir Controls 6.55 cfs @ 2.11 fps)

### Summary for Pond FB3: Forebay

Inflow Area = 1.068 ac, 43.22% Impervious, Inflow Depth = 1.55" for 50-yr event  
 Inflow = 2.26 cfs @ 12.02 hrs, Volume= 0.138 af  
 Outflow = 0.30 cfs @ 12.85 hrs, Volume= 0.079 af, Atten= 87%, Lag= 49.8 min  
 Primary = 0.30 cfs @ 12.85 hrs, Volume= 0.079 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 277.83' @ 12.85 hrs Surf.Area= 2,795 sf Storage= 2,825 cf

Plug-Flow detention time= 235.3 min calculated for 0.079 af (57% of inflow)  
 Center-of-Mass det. time= 116.0 min ( 969.8 - 853.7 )

Volume Invert Avail.Storage Storage Description  
 #1 276.00' 4,977 cf Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
276.00	513	345.0	0	0	513
277.00	1,608	372.0	1,010	1,010	2,095
278.00	3,069	535.0	2,299	3,309	13,868
278.50	3,608	542.0	1,667	4,977	14,526

Device Routing Invert Outlet Devices  
 #1 Primary 277.75' 5.0' long x 3.0' breadth Broad-Crested Rectangular Weir  
 Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00  
 2.50 3.00 3.50 4.00 4.50  
 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68  
 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.30 cfs @ 12.85 hrs HW=277.83' (Free Discharge)  
 ↳1=Broad-Crested Rectangular Weir (Weir Controls 0.30 cfs @ 0.71 fps)

### Summary for Pond IF1: Infiltration Basin

Inflow Area = 2.434 ac, 54.78% Impervious, Inflow Depth = 1.80" for 50-yr event  
 Inflow = 6.74 cfs @ 12.02 hrs, Volume= 0.364 af  
 Outflow = 3.35 cfs @ 12.16 hrs, Volume= 0.364 af, Atten= 50%, Lag= 8.8 min  
 Discarded = 3.35 cfs @ 12.16 hrs, Volume= 0.364 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

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RAIN DATA 24-hr S0P 50-yr Rainfall=5.30"

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Peak Elev= 280.60' @ 12.16 hrs Surf.Area= 3,003 sf Storage= 1,619 cf

Plug-Flow detention time= 2.6 min calculated for 0.364 af (100% of inflow)  
Center-of-Mass det. time= 2.6 min ( 865.1 - 862.5 )

Volume	Invert	Avail.Storage	Storage Description			
#1	280.00'	15,076 cf	<b>Custom Stage Data (Irregular) Listed below (Recalc)</b>			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
280.00	2,382	343.0	0	0	2,382	
281.00	3,452	367.0	2,901	2,901	3,784	
282.00	4,589	388.0	4,007	6,908	5,101	
283.00	5,783	407.0	5,175	12,082	6,367	
283.50	6,194	414.0	2,994	15,076	6,868	

Device	Routing	Invert	Outlet Devices											
#1	Primary	282.50'	<b>6.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b>											
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00											
			2.50 3.00 3.50											
			Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88											
#2	Discarded	280.00'	<b>45.000 in/hr Exfiltration over Wetted area</b>											

Discarded OutFlow Max=3.35 cfs @ 12.16 hrs HW=280.60' (Free Discharge)  
↳2=Exfiltration (Exfiltration Controls 3.35 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=280.00' (Free Discharge)  
↳1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Summary for Pond IF2: Infiltration Basin**

Inflow Area = 1.415 ac, 76.75% Impervious, Inflow Depth = 2.76" for 50-yr event  
Inflow = 6.55 cfs @ 12.01 hrs, Volume= 0.325 af  
Outflow = 3.10 cfs @ 12.17 hrs, Volume= 0.325 af, Atten= 53%, Lag= 9.3 min  
Discarded = 3.10 cfs @ 12.17 hrs, Volume= 0.325 af  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Peak Elev= 278.93' @ 12.17 hrs Surf.Area= 2,481 sf Storage= 1,997 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
Center-of-Mass det. time= 3.9 min ( 845.6 - 841.7 )

Volume	Invert	Avail.Storage	Storage Description			
#1	278.00'	6,812 cf	<b>Custom Stage Data (Irregular) Listed below (Recalc)</b>			

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
			0	0	1,833
278.00	1,833	207.0	2,175	2,175	3,066
279.00	2,535	241.0	2,915	5,089	4,065
280.00	3,312	265.0	1,723	6,812	4,353
280.50	3,580	271.0			

Device	Routing	Invert	Outlet Devices
#1	Primary	279.50'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	278.00'	45.000 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=3.10 cfs @ 12.17 hrs HW=278.93' (Free Discharge)  
↳2=Exfiltration (Exfiltration Controls 3.10 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=278.00' (Free Discharge)  
↳1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Summary for Pond IF3: Infiltration Basin**

Inflow Area = 1.068 ac, 43.22% Impervious, Inflow Depth = 0.88" for 50-yr event  
Inflow = 0.30 cfs @ 12.85 hrs, Volume= 0.079 af  
Outflow = 0.30 cfs @ 12.85 hrs, Volume= 0.079 af, Atten= 0%, Lag= 0.3 min  
Discarded = 0.30 cfs @ 12.85 hrs, Volume= 0.079 af  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Peak Elev= 277.00' @ 12.85 hrs Surf.Area= 1,556 sf Storage= 4 cf

Plug-Flow detention time= 0.2 min calculated for 0.079 af (100% of inflow)  
Center-of-Mass det. time= 0.2 min ( 970.0 - 969.8 )

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	2,915 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
			0	0	1,555
277.00	1,555	171.0	1,819	1,819	2,130
278.00	2,097	190.0	1,096	2,915	2,338
278.50	2,289	196.0			

Device	Routing	Invert	Outlet Devices
#1	Primary	277.75'	5.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	277.00'	45.000 in/hr Exfiltration over Wetted area

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**Discarded OutFlow Max=1.62 cfs @ 12.85 hrs HW=277.00' (Free Discharge)**  
↳ **2=Exfiltration (Exfiltration Controls 1.62 cfs)**

**Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=277.00' (Free Discharge)**  
↳ **1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)**

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RAIN DATA 24-hr SOP 10-YR 10-YR -DS Rainfall=3.75"

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### Summary for Subcatchment 1S:

Runoff = 3.83 cfs @ 12.00 hrs, Volume= 0.213 af, Depth= 1.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 10-YR 10-YR -DS Rainfall=3.75"

Area (sf)	CN	Description
* 46,880	98	PAVEMENT
27,367	30	Woods, Good, HSG A
20,575	32	Woods/grass comb., Good, HSG A
* 11,190	98	ROOF
106,012	68	Weighted Average
47,942		45.22% Pervious Area
58,070		54.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0200	1.24		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.58"
0.2	33	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.5	133	Total			

### Summary for Subcatchment 2S:

Runoff = 4.77 cfs @ 12.00 hrs, Volume= 0.244 af, Depth= 2.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 10-YR 10-YR -DS Rainfall=3.75"

Area (sf)	CN	Description
26,469	98	Roofs, HSG A
20,819	98	Paved parking, HSG A
14,328	32	Woods/grass comb., Good, HSG A
61,616	83	Weighted Average
14,328		23.25% Pervious Area
47,288		76.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	60	0.0200	1.12		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.58"
0.1	43	0.0100	4.91	3.86	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
0.1	76	0.0300	8.51	6.69	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
1.1	179	Total			

**Summary for Subcatchment 3S:**

Runoff = 0.88 cfs @ 12.02 hrs, Volume= 0.061 af, Depth= 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 10-YR 10-YR -DS Rainfall=3.75"

Area (sf)	CN	Description
* 11,640	98	ROOF
* 8,476	98	paving
26,422	32	Woods/grass comb., Good, HSG A
46,538	61	Weighted Average
26,422		56.78% Pervious Area
20,116		43.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	76	0.0200	1.17		Sheet Flow,
1.6	137	0.0440	1.47		Smooth surfaces n= 0.011 P2= 2.58"
0.1	40	0.0150	6.02	4.73	Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
					Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
2.8	253	Total			

**Summary for Subcatchment 4S:**

Runoff = 0.02 cfs @ 13.59 hrs, Volume= 0.009 af, Depth= 0.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 10-YR 10-YR -DS Rainfall=3.75"

Area (sf)	CN	Description
* 8,210	98	paving
37,122	32	Woods/grass comb., Good, HSG A
45,332	44	Weighted Average
37,122		81.89% Pervious Area
8,210		18.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0750	0.12		Sheet Flow,
0.1	24	0.0200	2.87		Woods: Light underbrush n= 0.400 P2= 2.58"
3.6	150	0.0100	0.70		Shallow Concentrated Flow, Paved Kv= 20.3 fps
					Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
17.8	274	Total			

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RAIN DATA 24-hr SOP 10-YR 10-YR -DS Rainfall=3.75"

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### Summary for Subcatchment 5S:

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 10-YR 10-YR -DS Rainfall=3.75"

Area (sf)	CN	Description
13,908	30	Woods, Good, HSG A
13,908		100.00% Pervious Area

### Summary for Pond 7P: Enhanced Buffer Area

Inflow Area = 1.041 ac, 18.11% Impervious, Inflow Depth = 0.10" for 10-YR -DS event  
 Inflow = 0.02 cfs @ 13.59 hrs, Volume= 0.009 af  
 Outflow = 0.02 cfs @ 13.59 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.02 cfs @ 13.59 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 277.00' @ 13.59 hrs Surf.Area= 1,653 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.009 af (100% of inflow)  
 Center-of-Mass det. time= 0.0 min ( 1,053.8 - 1,053.8 )

Volume	Invert	Avail.Storage	Storage Description	
#1	277.00'	7 cf	Custom Stage Data (Prismatic) Listed below (Recalc)	
Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
277.00	1,653	0.0	0	0
277.01	1,653	40.0	7	7

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.00'	45.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=1.72 cfs @ 13.59 hrs HW=277.00' (Free Discharge)  
 ←1=Exfiltration (Exfiltration Controls 1.72 cfs)

### Summary for Pond CB2:

Inflow Area = 2.434 ac, 54.78% Impervious, Inflow Depth = 1.05" for 10-YR -DS event  
 Inflow = 3.83 cfs @ 12.00 hrs, Volume= 0.213 af  
 Outflow = 3.83 cfs @ 12.00 hrs, Volume= 0.213 af, Atten= 0%, Lag= 0.0 min  
 Primary = 3.83 cfs @ 12.00 hrs, Volume= 0.213 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 281.45' @ 12.00 hrs



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RAIN DATA 24-hr SOP 10-YR 10-YR -DS Rainfall=3.75"

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Device	Routing	Invert	Outlet Devices
#1	Primary	280.50'	<b>24.0" Round Culvert</b> L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 280.50' / 280.00' S= 0.0116 '/ Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Secondary	283.50'	<b>30.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=3.81 cfs @ 12.00 hrs HW=281.44' (Free Discharge)  
 ↳1=Culvert (Inlet Controls 3.81 cfs @ 2.61 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=280.50' (Free Discharge)  
 ↳2=Orifice/Grate ( Controls 0.00 cfs)

**Summary for Pond DP1: DP1**

Inflow Area = 2.753 ac, 48.42% Impervious, Inflow Depth = 0.00" for 10-YR -DS event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Pond DP2: DP2**

Inflow Area = 2.483 ac, 62.32% Impervious, Inflow Depth = 0.00" for 10-YR -DS event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Pond FB1: forebay**

Inflow Area = 2.434 ac, 54.78% Impervious, Inflow Depth = 1.05" for 10-YR -DS event  
 Inflow = 3.83 cfs @ 12.00 hrs, Volume= 0.213 af  
 Outflow = 1.14 cfs @ 12.22 hrs, Volume= 0.152 af, Atten= 70%, Lag= 13.0 min  
 Primary = 1.14 cfs @ 12.22 hrs, Volume= 0.152 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 282.11' @ 12.22 hrs Surf.Area= 2,415 sf Storage= 2,908 cf

Plug-Flow detention time= 171.5 min calculated for 0.152 af (71% of inflow)  
 Center-of-Mass det. time= 65.2 min ( 929.8 - 864.6 )

Volume	Invert	Avail.Storage	Storage Description
#1	279.50'	7,240 cf	Custom Stage Data (Irregular) Listed below (Recalc)

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RAIN DATA 24-hr SOP 10-YR 10-YR -DS Rainfall=3.75"

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
279.50	30	41.0	0	0	30
280.00	358	306.0	82	82	7,348
281.00	1,304	325.0	782	864	8,353
282.00	2,307	344.0	1,782	2,646	9,418
283.00	3,367	363.0	2,820	5,466	10,544
283.50	3,733	369.0	1,774	7,240	10,939

Device	Routing	Invert	Outlet Devices
#1	Primary	282.00'	6.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	282.00'	6.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=1.13 cfs @ 12.22 hrs HW=282.11' (Free Discharge)  
 1=Broad-Crested Rectangular Weir (Weir Controls 0.57 cfs @ 0.85 fps)  
 2=Broad-Crested Rectangular Weir (Weir Controls 0.57 cfs @ 0.85 fps)

**Summary for Pond FB2: Forebay**

Inflow Area = 1.415 ac, 76.75% Impervious, Inflow Depth = 2.07" for 10-YR -DS event  
 Inflow = 4.77 cfs @ 12.00 hrs, Volume= 0.244 af  
 Outflow = 2.24 cfs @ 12.11 hrs, Volume= 0.163 af, Atten= 53%, Lag= 7.1 min  
 Primary = 2.24 cfs @ 12.11 hrs, Volume= 0.163 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 282.07' @ 12.11 hrs Surf.Area= 2,079 sf Storage= 4,160 cf

Plug-Flow detention time= 172.8 min calculated for 0.163 af (67% of inflow)  
 Center-of-Mass det. time= 71.7 min ( 891.4 - 819.7 )

Volume	Invert	Avail.Storage	Storage Description
#1	278.00'	5,103 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.00	208	91.0	0	0	208
279.00	530	118.0	357	357	669
280.00	943	148.0	727	1,083	1,318
281.00	1,462	183.0	1,193	2,276	2,255
282.00	2,052	205.0	1,749	4,025	2,961
282.50	2,260	212.0	1,078	5,103	3,216

Device	Routing	Invert	Outlet Devices
#1	Primary	281.75'	5.0' long x 3.0' breadth Broad-Crested Rectangular Weir

Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00
	2.50	3.00	3.50	4.00	4.50					
Coef. (English)	2.44	2.58	2.68	2.67	2.65	2.64	2.64	2.64	2.68	2.68
	2.72	2.81	2.92	2.97	3.07	3.32				

Primary OutFlow Max=2.22 cfs @ 12.11 hrs HW=282.06' (Free Discharge)  
 ↳1=Broad-Crested Rectangular Weir (Weir Controls 2.22 cfs @ 1.41 fps)

**Summary for Pond FB3: Forebay**

Inflow Area = 1.068 ac, 43.22% Impervious, Inflow Depth = 0.69" for 10-YR -DS event  
 Inflow = 0.88 cfs @ 12.02 hrs, Volume= 0.061 af  
 Outflow = 0.02 cfs @ 24.01 hrs, Volume= 0.002 af, Atten= 98%, Lag= 719.7 min  
 Primary = 0.02 cfs @ 24.01 hrs, Volume= 0.002 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 277.76' @ 24.01 hrs Surf.Area= 2,675 sf Storage= 2,619 cf

Plug-Flow detention time= 716.7 min calculated for 0.002 af (3% of inflow)  
 Center-of-Mass det. time= 540.4 min ( 1,431.8 - 891.4 )

Volume #1	Invert	Avail.Storage	Storage Description
	276.00'	4,977 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
276.00	513	345.0	0	0	513
277.00	1,608	372.0	1,010	1,010	2,095
278.00	3,069	535.0	2,299	3,309	13,868
278.50	3,608	542.0	1,667	4,977	14,526

Device #1	Routing	Invert	Outlet Devices
	Primary	277.75'	5.0' long x 3.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68 2.72 2.81 2.92 2.97 3.07 3.32

Primary OutFlow Max=0.01 cfs @ 24.01 hrs HW=277.76' (Free Discharge)  
 ↳1=Broad-Crested Rectangular Weir (Weir Controls 0.01 cfs @ 0.24 fps)

**Summary for Pond IF1: Infiltration Basin**

Inflow Area = 2.434 ac, 54.78% Impervious, Inflow Depth = 0.75" for 10-YR -DS event  
 Inflow = 1.14 cfs @ 12.22 hrs, Volume= 0.152 af  
 Outflow = 1.13 cfs @ 12.23 hrs, Volume= 0.152 af, Atten= 1%, Lag= 0.6 min  
 Discarded = 1.13 cfs @ 12.23 hrs, Volume= 0.152 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

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Peak Elev= 280.02' @ 12.23 hrs Surf.Area= 2,397 sf Storage= 37 cf

Plug-Flow detention time= 0.6 min calculated for 0.152 af (100% of inflow)  
 Center-of-Mass det. time= 0.6 min ( 930.3 - 929.8 )

Volume #1	Invert 280.00'	Avail.Storage 15,076 cf	Storage Description Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
280.00	2,382	343.0	0	0	2,382	
281.00	3,452	367.0	2,901	2,901	3,784	
282.00	4,589	388.0	4,007	6,908	5,101	
283.00	5,783	407.0	5,175	12,082	6,367	
283.50	6,194	414.0	2,994	15,076	6,868	

Device #1	Routing Primary	Invert 282.50'	Outlet Devices 6.0' long x 2.0' breadth Broad-Crested Rectangular Weir											
			Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00	
			2.50	3.00	3.50									
			Coef. (English)	2.54	2.61	2.61	2.60	2.66	2.70	2.77	2.89	2.88		
			2.85	3.07	3.20	3.32								
#2	Discarded	280.00'	45.000 in/hr Exfiltration over Wetted area											

Discarded OutFlow Max=2.50 cfs @ 12.23 hrs HW=280.02' (Free Discharge)  
 ↳2=Exfiltration (Exfiltration Controls 2.50 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=280.00' (Free Discharge)  
 ↳1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Summary for Pond IF2: Infiltration Basin**

Inflow Area = 1.415 ac, 76.75% Impervious, Inflow Depth = 1.38" for 10-YR -DS event  
 Inflow = 2.24 cfs @ 12.11 hrs, Volume= 0.163 af  
 Outflow = 1.96 cfs @ 12.14 hrs, Volume= 0.163 af, Atten= 12%, Lag= 1.8 min  
 Discarded = 1.96 cfs @ 12.14 hrs, Volume= 0.163 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 278.04' @ 12.14 hrs Surf.Area= 1,861 sf Storage= 79 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 0.4 min ( 891.8 - 891.4 )

Volume #1	Invert 278.00'	Avail.Storage 6,812 cf	Storage Description Custom Stage Data (Irregular) Listed below (Recalc)			
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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.00	1,833	207.0	0	0	1,833
279.00	2,535	241.0	2,175	2,175	3,066
280.00	3,312	265.0	2,915	5,089	4,065
280.50	3,580	271.0	1,723	6,812	4,353

Device	Routing	Invert	Outlet Devices
#1	Primary	279.50'	<b>4.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	278.00'	<b>45.000 in/hr Exfiltration over Wetted area</b>

Discarded OutFlow Max=1.96 cfs @ 12.14 hrs HW=278.04' (Free Discharge)  
 ↳2=Exfiltration (Exfiltration Controls 1.96 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=278.00' (Free Discharge)  
 ↳1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Summary for Pond IF3: Infiltration Basin**

Inflow Area = 1.068 ac, 43.22% Impervious, Inflow Depth = 0.02" for 10-YR -DS event  
 Inflow = 0.02 cfs @ 24.01 hrs, Volume= 0.002 af  
 Outflow = 0.02 cfs @ 24.02 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.2 min  
 Discarded = 0.02 cfs @ 24.02 hrs, Volume= 0.002 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 277.00' @ 24.02 hrs Surf.Area= 1,555 sf Storage= 0 cf

Plug-Flow detention time= 0.2 min calculated for 0.002 af (100% of inflow)  
 Center-of-Mass det. time= 0.2 min ( 1,432.1 - 1,431.8 )

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	2,915 cf	<b>Custom Stage Data (Irregular) Listed below (Recalc)</b>

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	1,555	171.0	0	0	1,555
278.00	2,097	190.0	1,819	1,819	2,130
278.50	2,289	196.0	1,096	2,915	2,338

Device	Routing	Invert	Outlet Devices
#1	Primary	277.75'	<b>5.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	277.00'	<b>45.000 in/hr Exfiltration over Wetted area</b>

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*RAIN DATA 24-hr SOP 10-YR 10-YR -DS Rainfall=3.75"*

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**Discarded OutFlow Max=1.62 cfs @ 24.02 hrs HW=277.00' (Free Discharge)**  
↳ **2=Exfiltration (Exfiltration Controls 1.62 cfs)**

**Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=277.00' (Free Discharge)**  
↳ **1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)**

**Summary for Subcatchment 1S:**

Runoff = 10.76 cfs @ 12.00 hrs, Volume= 0.611 af, Depth= 3.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 RAIN DATA 24-hr SOP 100-YR 100-YR-DS Rainfall=6.50"

Area (sf)	CN	Description
* 46,880	98	PAVEMENT
27,367	30	Woods, Good, HSG A
20,575	32	Woods/grass comb., Good, HSG A
* 11,190	98	ROOF
106,012	68	Weighted Average
47,942		45.22% Pervious Area
58,070		54.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.3	100	0.0200	1.24		Sheet Flow,
0.2	33	0.0200	2.87		Smooth surfaces n= 0.011 P2= 2.58"
					Shallow Concentrated Flow,
					Paved Kv= 20.3 fps
1.5	133	Total			

**Summary for Subcatchment 2S:**

Runoff = 9.32 cfs @ 12.00 hrs, Volume= 0.537 af, Depth= 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 RAIN DATA 24-hr SOP 100-YR 100-YR-DS Rainfall=6.50"

Area (sf)	CN	Description
26,469	98	Roofs, HSG A
20,819	98	Paved parking, HSG A
14,328	32	Woods/grass comb., Good, HSG A
61,616	83	Weighted Average
14,328		23.25% Pervious Area
47,288		76.75% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	60	0.0200	1.12		Sheet Flow,
0.1	43	0.0100	4.91	3.86	Smooth surfaces n= 0.011 P2= 2.58"
					Pipe Channel,
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.012
0.1	76	0.0300	8.51	6.69	Pipe Channel,
					12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25'
					n= 0.012
1.1	179	Total			

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RAIN DATA 24-hr SOP 100-YR 100-YR-DS Rainfall=6.50"

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**Summary for Subcatchment 3S:**

Runoff = 3.47 cfs @ 12.01 hrs, Volume= 0.209 af, Depth= 2.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 RAIN DATA 24-hr SOP 100-YR 100-YR-DS Rainfall=6.50"

Area (sf)	CN	Description
* 11,640	98	ROOF
* 8,476	98	paving
26,422	32	Woods/grass comb., Good, HSG A
46,538	61	Weighted Average
26,422		56.78% Pervious Area
20,116		43.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.1	76	0.0200	1.17		Sheet Flow, Smooth surfaces n= 0.011 P2= 2.58"
1.6	137	0.0440	1.47		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.1	40	0.0150	6.02	4.73	Pipe Channel, 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012
2.8	253	Total			

**Summary for Subcatchment 4S:**

Runoff = 0.59 cfs @ 12.30 hrs, Volume= 0.081 af, Depth= 0.94"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 RAIN DATA 24-hr SOP 100-YR 100-YR-DS Rainfall=6.50"

Area (sf)	CN	Description
* 8,210	98	paving
37,122	32	Woods/grass comb., Good, HSG A
45,332	44	Weighted Average
37,122		81.89% Pervious Area
8,210		18.11% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	100	0.0750	0.12		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 2.58"
0.1	24	0.0200	2.87		Shallow Concentrated Flow, Paved Kv= 20.3 fps
3.6	150	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
17.8	274	Total			



**Summary for Subcatchment 5S:**

Runoff = 0.01 cfs @ 13.49 hrs, Volume= 0.004 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
RAIN DATA 24-hr SOP 100-YR 100-YR-DS Rainfall=6.50"

Area (sf)	CN	Description
13,908	30	Woods, Good, HSG A
13,908		100.00% Pervious Area

**Summary for Pond 7P: Enhanced Buffer Area**

Inflow Area = 1.041 ac, 18.11% Impervious, Inflow Depth = 0.94" for 100-YR-DS event  
 Inflow = 0.59 cfs @ 12.30 hrs, Volume= 0.081 af  
 Outflow = 0.59 cfs @ 12.30 hrs, Volume= 0.081 af, Atten= 0%, Lag= 0.0 min  
 Discarded = 0.59 cfs @ 12.30 hrs, Volume= 0.081 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 277.00' @ 12.30 hrs Surf.Area= 1,653 sf Storage= 0 cf

Plug-Flow detention time= 0.0 min calculated for 0.081 af (100% of inflow)  
 Center-of-Mass det. time= 0.0 min ( 905.1 - 905.1 )

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	7 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Voids (%)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
277.00	1,653	0.0	0	0
277.01	1,653	40.0	7	7

Device	Routing	Invert	Outlet Devices
#1	Discarded	277.00'	45.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=1.72 cfs @ 12.30 hrs HW=277.00' (Free Discharge)  
 ↑-1=Exfiltration (Exfiltration Controls 1.72 cfs)

**Summary for Pond CB2:**

Inflow Area = 2.434 ac, 54.78% Impervious, Inflow Depth = 3.01" for 100-YR-DS event  
 Inflow = 10.76 cfs @ 12.00 hrs, Volume= 0.611 af  
 Outflow = 10.76 cfs @ 12.00 hrs, Volume= 0.611 af, Atten= 0%, Lag= 0.0 min  
 Primary = 10.76 cfs @ 12.00 hrs, Volume= 0.611 af  
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2  
 Peak Elev= 282.30' @ 12.00 hrs

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Device	Routing	Invert	Outlet Devices
#1	Primary	280.50'	<b>24.0" Round Culvert</b> L= 43.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 280.50' / 280.00' S= 0.0116 ' S= 0.0116 ' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf
#2	Secondary	283.50'	<b>30.0" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=10.75 cfs @ 12.00 hrs HW=282.30' (Free Discharge)  
 ↑-1=Culvert (Inlet Controls 10.75 cfs @ 3.61 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=280.50' (Free Discharge)  
 ↑-2=Orifice/Grate ( Controls 0.00 cfs)

**Summary for Pond DP1: DP1**

Inflow Area = 2.753 ac, 48.42% Impervious, Inflow Depth = 0.02" for 100-YR-DS event  
 Inflow = 0.01 cfs @ 13.49 hrs, Volume= 0.004 af  
 Primary = 0.01 cfs @ 13.49 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Pond DP2: DP2**

Inflow Area = 2.483 ac, 62.32% Impervious, Inflow Depth = 0.00" for 100-YR-DS event  
 Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

**Summary for Pond FB1: forebay**

Inflow Area = 2.434 ac, 54.78% Impervious, Inflow Depth = 3.01" for 100-YR-DS event  
 Inflow = 10.76 cfs @ 12.00 hrs, Volume= 0.611 af  
 Outflow = 10.23 cfs @ 12.01 hrs, Volume= 0.550 af, Atten= 5%, Lag= 0.7 min  
 Primary = 10.23 cfs @ 12.01 hrs, Volume= 0.550 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 282.47' @ 12.01 hrs Surf.Area= 2,785 sf Storage= 3,850 cf

Plug-Flow detention time= 67.6 min calculated for 0.550 af (90% of inflow)  
 Center-of-Mass det. time= 19.6 min ( 842.9 - 823.2 )

Volume	Invert	Avail.Storage	Storage Description
#1	279.50'	7,240 cf	Custom Stage Data (Irregular) Listed below (Recalc)

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RAIN DATA 24-hr SOP 100-YR 100-YR-DS Rainfall=6.50"

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
279.50	30	41.0	0	0	30
280.00	358	306.0	82	82	7,348
281.00	1,304	325.0	782	864	8,353
282.00	2,307	344.0	1,782	2,646	9,418
283.00	3,367	363.0	2,820	5,466	10,544
283.50	3,733	369.0	1,774	7,240	10,939

Device	Routing	Invert	Outlet Devices
#1	Primary	282.00'	<b>6.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Primary	282.00'	<b>6.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b> Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Primary OutFlow Max=10.20 cfs @ 12.01 hrs HW=282.47' (Free Discharge)  
 1=Broad-Crested Rectangular Weir (Weir Controls 5.10 cfs @ 1.80 fps)  
 2=Broad-Crested Rectangular Weir (Weir Controls 5.10 cfs @ 1.80 fps)

**Summary for Pond FB2: Forebay**

Inflow Area = 1.415 ac, 76.75% Impervious, Inflow Depth = 4.56" for 100-YR-DS event  
 Inflow = 9.32 cfs @ 12.00 hrs, Volume= 0.537 af  
 Outflow = 8.60 cfs @ 12.01 hrs, Volume= 0.456 af, Atten= 8%, Lag= 0.5 min  
 Primary = 8.60 cfs @ 12.01 hrs, Volume= 0.456 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 282.50' @ 12.01 hrs Surf.Area= 2,258 sf Storage= 5,092 cf

Plug-Flow detention time= 95.6 min calculated for 0.456 af (85% of inflow)  
 Center-of-Mass det. time= 34.3 min ( 825.8 - 791.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	278.00'	5,103 cf	<b>Custom Stage Data (Irregular) Listed below (Recalc)</b>

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.00	208	91.0	0	0	208
279.00	530	118.0	357	357	669
280.00	943	148.0	727	1,083	1,318
281.00	1,462	183.0	1,193	2,276	2,255
282.00	2,052	205.0	1,749	4,025	2,961
282.50	2,260	212.0	1,078	5,103	3,216

Device	Routing	Invert	Outlet Devices
#1	Primary	281.75'	<b>5.0' long x 3.0' breadth Broad-Crested Rectangular Weir</b>

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RAIN DATA 24-hr SOP 100-YR 100-YR-DS Rainfall=6.50"

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Head (feet)	0.20	0.40	0.60	0.80	1.00	1.20	1.40	1.60	1.80	2.00
2.50	3.00	3.50	4.00	4.50						
Coef. (English)	2.44	2.58	2.68	2.67	2.65	2.64	2.64	2.68	2.68	
	2.72	2.81	2.92	2.97	3.07	3.32				

Primary OutFlow Max=8.57 cfs @ 12.01 hrs HW=282.49' (Free Discharge)  
 ↳1=Broad-Crested Rectangular Weir (Weir Controls 8.57 cfs @ 2.31 fps)

**Summary for Pond FB3: Forebay**

Inflow Area = 1.068 ac, 43.22% Impervious, Inflow Depth = 2.35" for 100-YR-DS event  
 Inflow = 3.47 cfs @ 12.01 hrs, Volume= 0.209 af  
 Outflow = 1.11 cfs @ 12.25 hrs, Volume= 0.149 af, Atten= 68%, Lag= 14.3 min  
 Primary = 1.11 cfs @ 12.25 hrs, Volume= 0.149 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 277.95' @ 12.25 hrs Surf.Area= 2,989 sf Storage= 3,165 cf

Plug-Flow detention time= 159.3 min calculated for 0.149 af (72% of inflow)  
 Center-of-Mass det. time= 64.4 min ( 903.5 - 839.1 )

Volume #1	Invert	Avail.Storage	Storage Description			
	276.00'	4,977 cf	Custom Stage Data (Irregular) Listed below (Recalc)			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
276.00	513	345.0	0	0	513	
277.00	1,608	372.0	1,010	1,010	2,095	
278.00	3,069	535.0	2,299	3,309	13,868	
278.50	3,608	542.0	1,667	4,977	14,526	

Device #1	Routing	Invert	Outlet Devices									
	Primary	277.75'	5.0' long x 3.0' breadth Broad-Crested Rectangular Weir									
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00									
			2.50 3.00 3.50 4.00 4.50									
			Coef. (English) 2.44 2.58 2.68 2.67 2.65 2.64 2.64 2.68 2.68									
			2.72 2.81 2.92 2.97 3.07 3.32									

Primary OutFlow Max=1.11 cfs @ 12.25 hrs HW=277.95' (Free Discharge)  
 ↳1=Broad-Crested Rectangular Weir (Weir Controls 1.11 cfs @ 1.10 fps)

**Summary for Pond IF1: Infiltration Basin**

Inflow Area = 2.434 ac, 54.78% Impervious, Inflow Depth = 2.71" for 100-YR-DS event  
 Inflow = 10.23 cfs @ 12.01 hrs, Volume= 0.550 af  
 Outflow = 4.25 cfs @ 12.18 hrs, Volume= 0.550 af, Atten= 58%, Lag= 10.4 min  
 Discarded = 4.25 cfs @ 12.18 hrs, Volume= 0.550 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

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RAIN DATA 24-hr SOP 100-YR 100-YR-DS Rainfall=6.50"

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Peak Elev= 281.23' @ 12.18 hrs Surf.Area= 3,702 sf Storage= 3,731 cf

Plug-Flow detention time= 5.7 min calculated for 0.550 af (100% of inflow)  
Center-of-Mass det. time= 5.5 min ( 848.4 - 842.9 )

Volume	Invert	Avail.Storage	Storage Description			
#1	280.00'	15,076 cf	<b>Custom Stage Data (Irregular) Listed below (Recalc)</b>			
Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)	
280.00	2,382	343.0	0	0	2,382	
281.00	3,452	367.0	2,901	2,901	3,784	
282.00	4,589	388.0	4,007	6,908	5,101	
283.00	5,783	407.0	5,175	12,082	6,367	
283.50	6,194	414.0	2,994	15,076	6,868	

Device	Routing	Invert	Outlet Devices											
#1	Primary	282.50'	<b>6.0' long x 2.0' breadth Broad-Crested Rectangular Weir</b>											
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00											
			2.50 3.00 3.50											
			Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88											
			2.85 3.07 3.20 3.32											
#2	Discarded	280.00'	<b>45.000 in/hr Exfiltration over Wetted area</b>											

Discarded OutFlow Max=4.25 cfs @ 12.18 hrs HW=281.23' (Free Discharge)  
↳2=Exfiltration (Exfiltration Controls 4.25 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=280.00' (Free Discharge)  
↳1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Summary for Pond IF2: Infiltration Basin**

Inflow Area = 1.415 ac, 76.75% Impervious, Inflow Depth = 3.87" for 100-YR-DS event  
Inflow = 8.60 cfs @ 12.01 hrs, Volume= 0.456 af  
Outflow = 3.65 cfs @ 12.18 hrs, Volume= 0.456 af, Atten= 58%, Lag= 10.5 min  
Discarded = 3.65 cfs @ 12.18 hrs, Volume= 0.456 af  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
Peak Elev= 279.45' @ 12.18 hrs Surf.Area= 2,874 sf Storage= 3,397 cf

Plug-Flow detention time= 6.0 min calculated for 0.456 af (100% of inflow)  
Center-of-Mass det. time= 6.0 min ( 831.8 - 825.8 )

Volume	Invert	Avail.Storage	Storage Description			
#1	278.00'	6,812 cf	<b>Custom Stage Data (Irregular) Listed below (Recalc)</b>			

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Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
278.00	1,833	207.0	0	0	1,833
279.00	2,535	241.0	2,175	2,175	3,066
280.00	3,312	265.0	2,915	5,089	4,065
280.50	3,580	271.0	1,723	6,812	4,353

Device	Routing	Invert	Outlet Devices
#1	Primary	279.50'	4.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	278.00'	45.000 in/hr Exfiltration over Wetted area

Discarded OutFlow Max=3.65 cfs @ 12.18 hrs HW=279.45' (Free Discharge)  
 ↑2=Exfiltration (Exfiltration Controls 3.65 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=278.00' (Free Discharge)  
 ↑1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**Summary for Pond IF3: Infiltration Basin**

Inflow Area = 1.068 ac, 43.22% Impervious, Inflow Depth = 1.68" for 100-YR-DS event  
 Inflow = 1.11 cfs @ 12.25 hrs, Volume= 0.149 af  
 Outflow = 1.11 cfs @ 12.26 hrs, Volume= 0.149 af, Atten= 0%, Lag= 0.2 min  
 Discarded = 1.11 cfs @ 12.26 hrs, Volume= 0.149 af  
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs  
 Peak Elev= 277.01' @ 12.26 hrs Surf.Area= 1,560 sf Storage= 16 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)  
 Center-of-Mass det. time= 0.2 min ( 903.7 - 903.5 )

Volume	Invert	Avail.Storage	Storage Description
#1	277.00'	2,915 cf	Custom Stage Data (Irregular) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
277.00	1,555	171.0	0	0	1,555
278.00	2,097	190.0	1,819	1,819	2,130
278.50	2,289	196.0	1,096	2,915	2,338

Device	Routing	Invert	Outlet Devices
#1	Primary	277.75'	5.0' long x 2.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32
#2	Discarded	277.00'	45.000 in/hr Exfiltration over Wetted area

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Discarded OutFlow Max=1.63 cfs @ 12.26 hrs HW=277.01' (Free Discharge)  
↳2=Exfiltration (Exfiltration Controls 1.63 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=277.00' (Free Discharge)  
↳1=Broad-Crested Rectangular Weir ( Controls 0.00 cfs)

**APPENDIX F**  
**GREEN INFRASTRUCTURE WORKSHEETS**



$$WQv(\text{acre-feet}) = [(P)(Rv)(A)] / 12$$

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?.....

Design Point:

P= 1.20 inch

Breakdown of Subcatchments						
Catchment Number	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Rv	WQv (ft <sup>3</sup> )	Description
1	2.43	1.33	55%	0.54	5,743	
2	1.40	1.09	78%	0.75	4,578	
3	1.06	0.46	43%	0.44	2,034	
4	1.04	0.19	18%	0.21	971	
5	0.32	0.00	0%	0.05	70	
6						
7						
8						
9						
10						
Subtotal (1-30)	6.25	3.07	49%	0.49	13,397	Subtotal 1
<b>Total</b>	<b>6.25</b>	<b>3.07</b>	<b>49%</b>	<b>0.49</b>	<b>13,397</b>	<b>Initial WQv</b>

Identify Runoff Reduction Techniques By Area			
Technique	Total Contributing Area	Contributing Impervious Area	Notes
	(Acre)	(Acre)	
Conservation of Natural Areas	0.00	0.00	minimum 10,000 sf
Riparian Buffers	0.00	0.00	maximum contributing length 75 feet to 150 feet
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	Up to 100 sf directly connected impervious area may be subtracted per tree
<b>Total</b>	<b>0.00</b>	<b>0.00</b>	

Recalculate WQv after application of Area Reduction Techniques					
	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Runoff Coefficient Rv	WQv (ft <sup>3</sup> )
"<<Initial WQv"	6.25	3.07	49%	0.49	13,397
Subtract Area	0.00	0.00			
WQv adjusted after Area Reductions	6.25	3.07	49%	0.49	13,397
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	6.25	3.07	49%	0.49	13,397
WQv reduced by Area Reduction techniques					0

# Minimum RRv

## Enter the Soils Data for the site

Soil Group	Acres	S
A	6.25	55%
B		40%
C		30%
D		20%
Total Area	6.25	

## Calculate the Minimum RRv

S =	0.55	
Impervious =	3.07	acre
Precipitation	1.2	in
Rv	0.95	
Minimum RRv	6,987	ft <sup>3</sup>
	0.16	af

**Runoff Reduction Volume and Treated volumes**

Runoff Reduction Techniques/Standard SMPs		Total Contributing Area	Total Contributing Impervious Area	WQv Reduced (RRv)	WQv Treated
		(acres)	(acres)	cf	cf
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00	
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00	
	Tree Planting/Tree Pit	RR-3	0.00	0.00	
	Disconnection of Rooftop Runoff	RR-4		0.00	
	Vegetated Swale	RR-5	0.00	0.00	0
	Rain Garden	RR-6	0.00	0.00	0
	Stormwater Planter	RR-7	0.00	0.00	0
	Rain Barrel/Cistern	RR-8	0.00	0.00	0
	Porous Pavement	RR-9	0.00	0.00	0
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0
	Infiltration Basin	I-2	4.89	2.88	11902
	Dry Well	I-3	0.00	0.00	0
	Underground Infiltration System	I-4			0
	Bioretention & Infiltration Bioretention	F-5	0.00	0.00	0
Standard SMPs	Dry swale	O-1	0.00	0.00	0
	Micropool Extended Detention (P-1)	P-1			0
	Wet Pond (P-2)	P-2			
	Wet Extended Detention (P-3)	P-3			
	Multiple Pond system (P-4)	P-4			
	Pocket Pond (p-5)	P-5			
	Surface Sand filter (F-1)	F-1			
	Underground Sand filter (F-2)	F-2			
	Perimeter Sand Filter (F-3)	F-3			
	Organic Filter (F-4)	F-4			
	Shallow Wetland (W-1)	W-1			
	Extended Detention Wetland (W-2)	W-2			
	Pond/Wetland System (W-3)	W-3			
	Pocket Wetland (W-4)	W-4			
	Wet Swale (O-2)	O-2			
Totals by Area Reduction →		0.00	0.00	0	
Totals by Volume Reduction →		0.00	0.00	0	
Totals by Standard SMP w/RRV →		4.89	2.88	11902	4904
Totals by Standard SMP →		0.00	0.00		0
Totals ( Area + Volume + all SMPs) →		4.89	2.88	11,902	4,904
Impervious Cover v		error			

# Infiltration Basin Worksheet

Design Point: <span style="border: 1px solid black; display: inline-block; width: 80px; height: 20px; vertical-align: middle;"></span>							
Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Rv	WQv (ft <sup>3</sup> )	Precipitation (in)	Description
1	2.43	1.33	0.55	0.54	5743.39	1.20	
Enter Impervious Area Reduced by Disconnection of Roofs etc			55%	0.54	5,743	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						ft <sup>3</sup>	
Pretreatment Techniques to Prevent Clogging							
Infiltration Rate			45.00	in/hour	Okay		
Pretreatment Sizing			100	% WQv	25% minimum; 50% if >2 in/hr 100% if >5in/hour		
Pretreatment Required Volume			5,743	ft <sup>3</sup>			
Pretreatment Provided			7,240	ft <sup>3</sup>			
Pretreatment Techniques utilized			Sedimentation Basin				
Size An Infiltration Basin							
Design Volume	5,743	ft <sup>3</sup>	WQv				
Basal Area Required	1,641	ft <sup>2</sup>	Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.				
Basal Area Provided	2,381	ft <sup>2</sup>					
Design Depth	3.50	ft					
Volume Provided	8,334	ft <sup>3</sup>	Storage Volume provided in infiltration basin area (not including pretreatment).				
Determine Runoff Reduction							
RRv	5,743	ft <sup>3</sup>	90% of the storage provided in the basin or WQv whichever is smaller				
Volume Treated	0	ft <sup>3</sup>	This is the portion of the WQv that is not reduced/infiltrated				
Sizing V	OK		The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.				

# Infiltration Basin Worksheet

Design Point:

## Enter Site Data For Drainage Area to be Treated by Practice

Catchment Number	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Rv	WQv (ft <sup>3</sup> )	Precipitation (in)	Description
2	1.40	1.09	0.78	0.75	4578.16	1.20	
Enter Impervious Area Reduced by Disconnection of Roofs			78%	0.75	4,578	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						ft <sup>3</sup>	

## Pretreatment Techniques to Prevent Clogging

Infiltration Rate	45.00	in/hour	<i>Okay</i>
Pretreatment Sizing	100	% WQv	25% minimum; 50% if >2 in/hr 100% if >5in/hour
Pretreatment Required Volume	4,578	ft <sup>3</sup>	
Pretreatment Provided	5,103	ft <sup>3</sup>	
Pretreatment Techniques utilized	<i>Sedimentation Basin</i>		

## Size An Infiltration Basin

Design Volume	4,578	ft <sup>3</sup>	WQv
Basal Area Required	1,831	ft <sup>2</sup>	Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.
Basal Area Provided	1,833	ft <sup>2</sup>	
Design Depth	2.50	ft	
Volume Provided	4,583	ft <sup>3</sup>	Storage Volume provided in infiltration basin area (not including pretreatment).

## Determine Runoff Reduction

RRv	4,124	ft <sup>3</sup>	<i>90% of the storage provided in the basin or WQv whichever is smaller</i>
Volume Treated	454	ft <sup>3</sup>	This is the portion of the WQv that is not reduced/infiltrated
Sizing v	OK		The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.

# Infiltration Basin Worksheet

Design Point:								
Enter Site Data For Drainage Area to be Treated by Practice								
Catchment Number	Total Area (Acres)	Impervious Area (Acres)	Percent Impervious %	Rv	WQv (ft <sup>3</sup> )	Precipitation (in)	Description	
3	1.06	0.46	0.43	0.44	2034.25	1.20		
Enter Impervious Area Reduced by Disconnection of Practices			43%	0.44	2,034	<<WQv after adjusting for Disconnected Rooftops		
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						ft <sup>3</sup>		
Pretreatment Techniques to Prevent Clogging								
Infiltration Rate			45.00	in/hour	Okay			
Pretreatment Sizing			100	% WQv	25% minimum; 50% if >2 in/hr 100% if >5in/hour			
Pretreatment Required Volume			2,034	ft <sup>3</sup>				
Pretreatment Provided			4,977	ft <sup>3</sup>				
Pretreatment Techniques utilized			Sedimentation Basin					
Size An Infiltration Basin								
Design Volume	2,034	ft <sup>3</sup>	WQv					
Basal Area Required	814	ft <sup>2</sup>	Infiltration practices shall be designed to exfiltrate the entire WQv through the floor of each practice.					
Basal Area Provided	1,555	ft <sup>2</sup>						
Design Depth	2.50	ft						
Volume Provided	3,888	ft <sup>3</sup>	Storage Volume provided in infiltration basin area (not including pretreatment.					
Determine Runoff Reduction								
RRv	2,034	ft <sup>3</sup>	90% of the storage provided in the basin or WQv whichever is smaller					
Volume Treated	0	ft <sup>3</sup>	This is the portion of the WQv that is not reduced/infiltrated					
Sizing v	OK		The infiltration basin must provide storage equal to or greater than the WQv of the contributing area.					

**APPENDIX G**  
**DRAFT NOI**

# NOI for coverage under Stormwater General Permit for Construction Activity

version 1.31

(Submission #: HPC-QV22-AM7WJ, version 1)

## Details

---

Originally Started By Matthew Huntington

Submission ID HPC-QV22-AM7WJ

Submission Reason New

Status Draft

## Form Input

---

### Owner/Operator Information

Owner/Operator Name (Company/Private Owner/Municipality/Agency/Institution, etc.)  
Saratoga Biochar Solutions, LLC

Owner/Operator Contact Person Last Name (NOT CONSULTANT)  
Apy

Owner/Operator Contact Person First Name  
Raymond

Owner/Operator Mailing Address  
26 F Congress St. #346

City  
Saratoga Springs

State  
NY



**Zip**  
12866

**Phone**  
518-391-0566

**Email**  
rapy@northeasternbiochar.com

**Federal Tax ID**  
NONE PROVIDED

**Project Location**

**Project/Site Name**  
Saratoga Biochar Solutions, LLC

**Street Address (Not P.O. Box)**  
Farnan Road

**Side of Street**  
West

**City/Town/Village (THAT ISSUES BUILDING PERMIT)**  
Moreau

**State**  
NY

**Zip**  
12803

**DEC Region**  
NONE PROVIDED

**County**  
SARATOGA

**Name of Nearest Cross Street**  
Bluebird Road

**Distance to Nearest Cross Street (Feet)**  
3696

**Project In Relation to Cross Street**  
South

**Tax Map Numbers Section-Block-Parcel**  
50.-4-22 and 50.-4-16

**Tax Map Numbers**

50.-4-22; 50.-4-16

**1. Coordinates**

Provide the Geographic Coordinates for the project site. The two methods are:  
- Navigate to the project location on the map (below) and click to place a marker and obtain the XY coordinates.  
- The "Find Me" button will provide the lat/long for the person filling out this form. Then pan the map to the correct location and click the map to place a marker and obtain the XY coordinates.

Navigate to your location and click on the map to get the X,Y coordinates  
43.28299536171419,-73.60429419726917

**Project Details**

**2. What is the nature of this project?**  
New Construction

**3. Select the predominant land use for both pre and post development conditions.**

**Pre-Development Existing Landuse**  
Forest

**Post-Development Future Land Use**  
Industrial

**3a. If Single Family Subdivision was selected in question 3, enter the number of subdivision lots.**  
NONE PROVIDED

**4. In accordance with the larger common plan of development or sale, enter the total project site acreage, the acreage to be disturbed and the future impervious area (acreage)within the disturbed area.**

\*\*\* ROUND TO THE NEAREST TENTH OF AN ACRE. \*\*\*

**Total Site Area (acres)**  
5.28

**Total Area to be Disturbed (acres)**  
4.8

**Existing Impervious Area to be Disturbed (acres)**  
0

**Future Impervious Area Within Disturbed Area (acres)**  
3.25

**5. Do you plan to disturb more than 5 acres of soil at any one time?**  
No

---

**6. Indicate the percentage (%) of each Hydrologic Soil Group(HSG) at the site.**

**A (%)**  
100

**B (%)**  
0

**C (%)**  
0

**D (%)**  
0

**7. Is this a phased project?**  
Yes

**8. Enter the planned start and end dates of the disturbance activities.**

**Start Date**  
3/1/2022

**End Date**  
10/1/2027

**9. Identify the nearest surface waterbody(ies) to which construction site runoff will discharge.**  
Hudson River

**9a. Type of waterbody identified in question 9?**  
River Off Site

**Other Waterbody Type Off Site Description**  
NONE PROVIDED

**9b. If "wetland" was selected in 9A, how was the wetland identified?**  
NONE PROVIDED

**10. Has the surface waterbody(ies) in question 9 been identified as a 303(d) segment in Appendix E of GP-0-20-001?**  
No

**11. Is this project located in one of the Watersheds identified in Appendix C of GP-0-20-001?**  
No

**12. Is the project located in one of the watershed areas associated with AA and AA-S classified waters?**  
No

If No, skip question 13.

**13. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey?**  
NONE PROVIDED

If Yes, what is the acreage to be disturbed?  
NONE PROVIDED

**14. Will the project disturb soils within a State regulated wetland or the protected 100 foot adjacent area?**  
No

**15. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)?**  
Yes

**16. What is the name of the municipality/entity that owns the separate storm sewer system?**  
Town of Moreau

**17. Does any runoff from the site enter a sewer classified as a Combined Sewer?**  
No

**18. Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law?**  
No

**19. Is this property owned by a state authority, state agency, federal government or local government?**  
No

**20. Is this a remediation project being done under a Department approved work plan? (i.e. CERCLA, RCRA, Voluntary Cleanup Agreement, etc.)**  
No

### Required SWPPP Components

**21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book)?**  
Yes

**22. Does this construction activity require the development of a SWPPP that includes the post-construction stormwater management practice component (i.e. Runoff Reduction, Water Quality and Quantity Control practices/techniques)?**  
Yes

If you answered No in question 22, skip question 23 and the Post-construction Criteria and Post-construction SMP Identification sections.

**23. Has the post-construction stormwater management practice component of the SWPPP been developed in conformance with the current NYS Stormwater Management Design Manual?**  
Yes

**24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:**  
Professional Engineer (P.E.)

**SWPPP Preparer**  
Studio A Landscape Architecture & Engineering, DPC

**Contact Name (Last, Space, First)**  
Huntington Mathew

**Mailing Address**  
38 High Rock Ave, Suite 3

**City**  
Saratoga Springs

**State**  
NY

**Zip**  
12866

**Phone**  
5184504030

**Email**  
mhuntington@studioadpc.com

**Download SWPPP Preparer Certification Form**  
Please take the following steps to prepare and upload your preparer certification form:

- 1) Click on the link below to download a blank certification form
- 2) The certified SWPPP preparer should sign this form

- 3) Scan the signed form
  - 4) Upload the scanned document
- [Download SWPPP Preparer Certification Form](#)

**Please upload the SWPPP Preparer Certification**

NONE PROVIDED

**Comment**

NONE PROVIDED

### Erosion & Sediment Control Criteria

**25. Has a construction sequence schedule for the planned management practices been prepared?**

Yes

**26. Select all of the erosion and sediment control practices that will be employed on the project site:**

**Temporary Structural**  
 Silt Fence  
 Stabilized Construction Entrance

**Biotechnical**  
 None

**Vegetative Measures**  
 Topsoiling  
 Protecting Vegetation  
 Seeding

**Permanent Structural**  
 Land Grading  
 Rock Outlet Protection

**Other**  
 NONE PROVIDED

### Post-Construction Criteria

**\* IMPORTANT: Completion of Questions 27-39 is not required if response to Question 22 is No.**

**27. Identify all site planning practices that were used to prepare the final site plan/layout for the project.**

Preservation of Undisturbed Area  
 Preservation of Buffers

**27a. Indicate which of the following soil restoration criteria was used to address the requirements in Section 5.1.6("Soil Restoration") of the Design Manual (2010 version).**

All disturbed areas will be restored in accordance with the Soil Restoration requirements in Table 5.3 of the Design Manual (see page 5-22).

**28. Provide the total Water Quality Volume (WQv) required for this project (based on final site plan/layout). (Acre-feet)**  
0.27

**29. Post-construction SMP Identification**

Use the Post-construction SMP Identification section to identify the RR techniques (Area Reduction), RR techniques (Volume Reduction) and Standard SMPs with RRv Capacity that were used to reduce the Total WQv Required (#28).

Identify the SMPs to be used by providing the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

Note: Redevelopment projects shall use the Post-Construction SMP Identification section to identify the SMPs used to treat and/or reduce the WQv required. If runoff reduction techniques will not be used to reduce the required WQv, skip to question 33a after identifying the SMPs.

**30. Indicate the Total RRv provided by the RR techniques (Area/Volume Reduction) and Standard SMPs with RRv capacity identified in question 29. (acre-feet)**  
.202

**31. Is the Total RRv provided (#30) greater than or equal to the total WQv required (#28)?**  
No

If Yes, go to question 36. If No, go to question 32.

**32. Provide the Minimum RRv required based on HSG. [Minimum RRv Required = (P) (0.95) (Ai) / 12, Ai=(s) (Aic)] (acre-feet)**  
.138

**32a. Is the Total RRv provided (#30) greater than or equal to the Minimum RRv Required (#32)?**  
Yes

If Yes, go to question 33.

Note: Use the space provided in question #39 to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). A detailed evaluation of the specific site limitations and justification for not reducing 100% of the WQv required (#28) must also be included in the SWPPP.

If No, sizing criteria has not been met; therefore, NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

### 33. SMPs

Use the Post-construction SMP Identification section to identify the Standard SMPs and, if applicable, the Alternative SMPs to be used to treat the remaining total WQv (=Total WQv Required in #28 - Total RRv Provided in #30).

Also, provide the total impervious area that contributes runoff to each practice selected.

NOTE: Use the Post-construction SMP Identification section to identify the SMPs used on Redevelopment projects.

**33a. Indicate the Total WQv provided (i.e. WQv treated) by the SMPs identified in question #33 and Standard SMPs with RRv Capacity identified in question #29. (acre-feet)**

.210

Note: For the standard SMPs with RRv capacity, the WQv provided by each practice = the WQv calculated using the contributing drainage area to the practice - provided by the practice. (See Table 3.5 in Design Manual)

**34. Provide the sum of the Total RRv provided (#30) and the WQv provided (#33a).**

.412

**35. Is the sum of the RRv provided (#30) and the WQv provided (#33a) greater than or equal to the total WQv required (#28)?**

Yes

If Yes, go to question 36.

If No, sizing criteria has not been met; therefore, NOI can not be processed. SWPPP preparer must modify design to meet sizing criteria.

**36. Provide the total Channel Protection Storage Volume (CPv required and provided or select waiver (#36a), if applicable.**

**CPv Required (acre-feet)**  
NONE PROVIDED

**CPv Provided (acre-feet)**  
NONE PROVIDED

**36a. The need to provide channel protection has been waived because:**  
Reduction of the total CPv is achieved on site through runoff reduction techniques or infiltration systems.

**37. Provide the Overbank Flood (Qp) and Extreme Flood (Qf) control criteria or select waiver (#37a), if applicable.**

**Overbank Flood Control Criteria (Qp)**



**Pre-Development (CFS)**  
0

**Post-Development (CFS)**  
0

**Total Extreme Flood Control Criteria (Qf)**

**Pre-Development (CFS)**  
0.6

**Post-Development (CFS)**  
0.4

**37a. The need to meet the Qp and Qf criteria has been waived because:**  
NONE PROVIDED

**38. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed?**  
Yes

**If Yes, Identify the entity responsible for the long term Operation and Maintenance**  
Property Owner

**39. Use this space to summarize the specific site limitations and justification for not reducing 100% of WQv required (#28). (See question #32a) This space can also be used for other pertinent project information.**  
WQv was not 100% reduced due to high groundwater encountered in the eastern extremities of the site. Thought, adequate treatment capacity has been provided to reduce and treat a volume greater than total WQv.

**Post-Construction SMP Identification**

**Runoff Reduction (RR) Techniques, Standard Stormwater Management Practices (SMPs) and Alternative SMPs**

Identify the Post-construction SMPs to be used by providing the total impervious area that contributes runoff to each technique/practice selected. For the Area Reduction Techniques, provide the total contributing area (includes pervious area) and, if applicable, the total impervious area that contributes runoff to the technique/practice.

**RR Techniques (Area Reduction)**

Round to the nearest tenth

**Total Contributing Acres for Conservation of Natural Area (RR-1)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Conservation of Natural Area (RR-1)**  
NONE PROVIDED

**Total Contributing Acres for Sheetflow to Riparian Buffers/Filter Strips (RR-2)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Sheetflow to Riparian Buffers/Filter Strips (RR-2)**  
NONE PROVIDED

**Total Contributing Acres for Tree Planting/Tree Pit (RR-3)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Tree Planting/Tree Pit (RR-3)**  
NONE PROVIDED

**Total Contributing Acres for Disconnection of Rooftop Runoff (RR-4)**  
NONE PROVIDED

RR Techniques (Volume Reduction)

**Total Contributing Impervious Acres for Disconnection of Rooftop Runoff (RR-4)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Vegetated Swale (RR-5)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Rain Garden (RR-6)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Stormwater Planter (RR-7)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Rain Barrel/Cistern (RR-8)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Porous Pavement (RR-9)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Green Roof (RR-10)**  
NONE PROVIDED

Standard SMPs with RRv Capacity

**Total Contributing Impervious Acres for Infiltration Trench (I-1)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Infiltration Basin (I-2)**  
2.39

**Total Contributing Impervious Acres for Dry Well (I-3)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Underground Infiltration System (I-4)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Bioretention (F-5)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Dry Swale (O-1)**  
NONE PROVIDED

**Standard SMPs**

---

**Total Contributing Impervious Acres for Micropool Extended Detention (P-1)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Wet Pond (P-2)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Wet Extended Detention (P-3)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Multiple Pond System (P-4)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Pocket Pond (P-5)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Surface Sand Filter (F-1)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Underground Sand Filter (F-2)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Perimeter Sand Filter (F-3)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Organic Filter (F-4)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Shallow Wetland (W-1)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Extended Detention Wetland (W-2)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Pond/Wetland System (W-3)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Pocket Wetland (W-4)**  
NONE PROVIDED

**Total Contributing Impervious Acres for Wet Swale (O-2)**  
NONE PROVIDED

**Alternative SMPs (DO NOT INCLUDE PRACTICES BEING USED FOR PRETREATMENT ONLY)**

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**Total Contributing Impervious Area for Hydrodynamic**  
NONE PROVIDED

**Total Contributing Impervious Area for Wet Vault**  
NONE PROVIDED

**Total Contributing Impervious Area for Media Filter**  
NONE PROVIDED

**"Other" Alternative SMP?**  
NONE PROVIDED

**Total Contributing Impervious Area for "Other"**  
NONE PROVIDED

**Provide the name and manufacturer of the alternative SMPs (i.e. proprietary practice(s)) being used for WQv treatment.**

**Note: Redevelopment projects which do not use RR techniques, shall use questions 28, 29, 33 and 33a to provide SMPs used, total WQv required and total WQv provided for the project.**

**Manufacturer of Alternative SMP**  
NONE PROVIDED

**Name of Alternative SMP**  
NONE PROVIDED

**Other Permits**

**40. Identify other DEC permits, existing and new, that are required for this project/facility.**

- Air Pollution Control
- Solid Waste

**If SPDES Multi-Sector GP, then give permit ID**  
NONE PROVIDED

**If Other, then identify**  
NONE PROVIDED

**41. Does this project require a US Army Corps of Engineers Wetland Permit?**  
No

**If "Yes," then indicate Size of Impact, in acres, to the nearest tenth**  
NONE PROVIDED

**42. If this NOI is being submitted for the purpose of continuing or transferring coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned.**  
NONE PROVIDED

### **MS4 SWPPP Acceptance**

**43. Is this project subject to the requirements of a regulated, traditional land use control MS4?**

Yes - Please attach the MS4 Acceptance form below

If No, skip question 44

**44. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI?**  
NONE PROVIDED

**MS4 SWPPP Acceptance Form Download**  
Download form from the link below. Complete, sign, and upload.

[MS4 SWPPP Acceptance Form](#)

**MS4 Acceptance Form Upload**

NONE PROVIDED

**Comment**

NONE PROVIDED

### **Owner/Operator Certification**

**Owner/Operator Certification Form Download**  
Download the certification form by clicking the link below. Complete, sign, scan, and upload the form.

[Owner/Operator Certification Form \(PDF, 45KB\)](#)

**Upload Owner/Operator Certification Form**

NONE PROVIDED

**Comment**

NONE PROVIDED

**APPENDIX H**  
**SOIL RESTORATION REQUIREMENTS**

Soil Restoration Requirements			Comments/Examples
Type of Soil Disturbance	Soil Restoration Requirement		
No soil disturbance	Restoration not permitted		Preservation of Natural Features
Minimal soil disturbance	Restoration not required		Clearing and grubbing
Areas where topsoil is stripped only - no change in grade	HSG A & B	HSG C & D	Protect area from any ongoing construction activities.
	apply 6 inches of topsoil	Aerate* and apply 6 inches of topsoil	
Areas of cut or fill	HSG A & B	HSG C & D	
	Aerate and apply 6 inches of topsoil	Apply full Soil Restoration **	
Heavy traffic areas on site (especially in a zone 5-25 feet around buildings but not within a 5 foot perimeter around foundation walls)	Apply full Soil Restoration (de-compaction and compost enhancement)		
Areas where Runoff Reduction and/or Infiltration practices are applied	Restoration not required, but may be applied to enhance the reduction specified for appropriate practices.		Keep construction equipment from crossing these areas. To protect newly installed practice from any ongoing construction activities construct a single phase operation fence area
Redevelopment projects	Soil Restoration is required on redevelopment projects in areas where existing impervious area will be converted to pervious area.		

\*Aeration includes the use of machines such as tractor-drawn implements with coulters making a narrow slit in the soil, a roller with many spikes making indentations in the soil, or prongs which function like a mini-subsoiler.

\*\* Per "Deep Ripping and De-compaction, DEC 2008".





**New York State**  
**DEPARTMENT OF ENVIRONMENTAL CONSERVATION**

Division of Water

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# **Deep-Ripping and Decompaction**

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**April 2008**

**New York State**  
**Department of Environmental Conservation**

**Document Prepared by:**

**John E. Lacey,  
Land Resource Consultant and Environmental Compliance Monitor  
(Formerly with the Division of Agricultural Protection and Development Services,  
NYS Dept. of Agriculture & Markets)**

## Alternative Stormwater Management Deep-Ripping and Decompaction

### Description

The two-phase practice of 1) “Deep Ripping;” and 2) “Decompaction” (deep subsoiling), of the soil material as a step in the cleanup and restoration/landscaping of a construction site, helps mitigate the physically induced impacts of soil compression; i.e.: soil compaction or the substantial increase in the bulk density of the soil material.

Deep Ripping and Decompaction are key factors which help in restoring soil pore space and permeability for water infiltration. Conversely, the physical actions of cut-and-fill work, land grading, the ongoing movement of construction equipment and the transport of building materials throughout a site alter the architecture and structure of the soil, resulting in: the mixing of layers (horizons) of soil materials, compression of those materials and diminished soil porosity which, if left unchecked, severely impairs the soil’s water holding capacity and vertical drainage (rainfall infiltration), from the surface downward.

In a humid climate region, compaction damage on a site is virtually guaranteed over the duration of a project. Soil in very moist to wet condition when compacted, will have severely reduced permeability. Figure 1 displays the early stage of the deep-ripping phase (Note that all topsoil was stripped prior to construction access, and it remains stockpiled until the next phase – decompaction – is complete). A heavy-duty tractor is pulling a three-shank ripper on the first of several series of incrementally deepening passes through the construction access corridor's densely compressed subsoil material. Figure 2 illustrates the approximate volumetric composition of a loam surface soil when conditions are good for plant growth, with adequate natural pore space for fluctuating moisture conditions.



Fig. 1. A typical deep ripping phase of this practice, during the first in a series of progressively deeper “rips” through severely compressed subsoil.

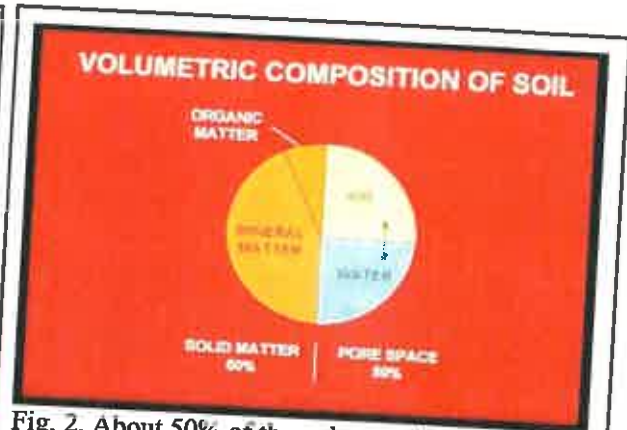


Fig. 2. About 50% of the volume of undisturbed loam surface soil is pore space, when soil is in good condition for plant growth. Brady, 2002.

## Recommended Application of Practice

The objective of Deep Ripping and Decompaction is to effectively fracture (vertically and laterally) through the thickness of the physically compressed subsoil material (see Figure 3), restoring soil porosity and permeability and aiding infiltration to help reduce runoff. Together with topsoil stripping, the “two-phase” practice of Deep Ripping and Decompaction first became established as a “best management practice” through ongoing success on commercial farmlands affected by heavy utility construction right-of-way projects (transmission pipelines and large power lines).



Soil permeability, soil drainage and cropland productivity were restored. For broader construction application, the two-phase practice of Deep Ripping and Decompaction is best adapted to areas impacted with significant soil compaction, on contiguous open portions of large construction sites and inside long, open construction corridors used as temporary access over the duration of construction. Each mitigation area should have minimal above-and-below-ground obstructions for the easy avoidance and maneuvering of a large tractor and ripping/decompacting implements. Conversely, the complete two-phase practice is not recommended in congested or obstructed areas due to the limitations on tractor and implement movement.

## Benefits

Aggressive “deep ripping” through the compressed thickness of exposed subsoil before the replacement/respreading of the topsoil layer, followed by “decompaction,” i.e.: “sub-soiling,” through the restored topsoil layer down into the subsoil, offers the following benefits:

- Increases the project (larger size) area’s direct surface infiltration of rainfall by providing the open site’s mitigated soil condition and lowers the demand on concentrated runoff control structures
- Enhances direct groundwater recharge through greater dispersion across and through a broader surface than afforded by some runoff-control structural measures
- Decreases runoff volume generated and provides hydrologic source control
- May be planned for application in feasible open locations either alone or in

conjunction with plans for structural practices (e.g., subsurface drain line or infiltration basin) serving the same or contiguous areas

- Promotes successful long-term revegetation by restoring soil permeability, drainage and water holding capacity for healthy (rather than restricted) root-system development of trees, shrubs and deep rooted ground cover, minimizing plant drowning during wet periods and burnout during dry periods.

## Feasibility/Limitations

The effectiveness of Deep Ripping and Decompaction is governed mostly by site factors such as: the original (undisturbed) soil's hydrologic characteristics; the general slope; local weather/timing (soil moisture) for implementation; the space-related freedom of equipment/implement maneuverability (noted above in **Recommended Application of Practice**), and by the proper selection and operation of tractor and implements (explained below in **Design Guidance**). The more notable site-related factors include:

### Soil

In the undisturbed condition, each identified soil type comprising a site is grouped into one of four categories of soil hydrology, Hydrologic Soil Group A, B, C or D, determined primarily by a range of characteristics including soil texture, drainage capability when thoroughly wet, and depth to water table. The natural rates of infiltration and transmission of soil-water through the undisturbed soil layers for Group A is "high" with a low runoff potential while soils in Group B are moderate in infiltration and the transmission of soil-water with a moderate runoff potential, depending somewhat on slope. Soils in Group C have slow rates of infiltration and transmission of soil-water and a moderately high runoff potential influenced by soil texture and slope; while soils in Group D have exceptionally slow rates of infiltration and transmission of soil-water, and high runoff potential.

In Figure 4, the profile displays the undisturbed horizons of a soil in Hydrologic Soil Group C and the naturally slow rate of infiltration through the subsoil. The slow rate of infiltration begins immediately below the topsoil horizon (30 cm), due to the limited amount of macro pores, e.g.: natural subsoil fractures, worm holes and root channels. Infiltration after the construction-induced mixing and compression of such subsoil material is virtually absent; but can be restored back to this natural level with the two-phase practice of deep ripping and decompaction, followed by the permanent establishment of an appropriate, deep taproot

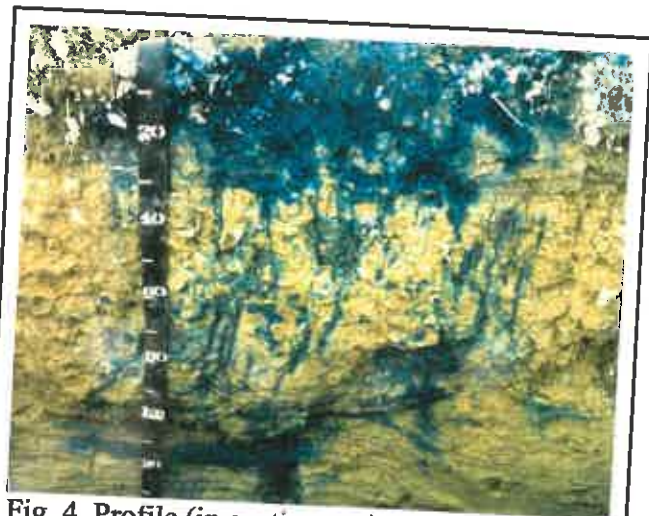


Fig. 4. Profile (in centimeters) displaying the infiltration test result of the natural undisturbed horizons of a soil in Hydrologic Soil Group C.

lawn/ground cover to help maintain the restored subsoil structure. Infiltration after construction-induced mixing and compression of such subsoil material can be notably rehabilitated with the Deep Ripping and Decompaction practice, which prepares the site for the appropriate long-term lawn/ground cover mix including deep taproot plants such as clover, fescue or trefoil, etc. needed for all rehabilitated soils.

Generally, soils in Hydrologic Soil Groups A and B, which respectively may include deep, well-drained, sandy-gravelly materials or deep, moderately well-drained basal till materials, are among the easier ones to restore permeability and infiltration, by deep ripping and decompaction. Among the many different soils in Hydrologic Soil Group C are those unique glacial tills having a natural fragipan zone, beginning about 12 to 18 inches (30 – 45cm), below surface. Although soils in Hydrologic Soil Group C do require a somewhat more carefully applied level of the Deep Ripping and Decompaction practice, it can greatly benefit such affected areas by reducing the runoff and fostering infiltration to a level equal to that of pre-disturbance.

Soils in Hydrologic Soil Group D typically have a permanent high water table close to the surface, influenced by a clay or other highly impervious layer of material. In many locations with clay subsoil material, the bulk density is so naturally high that heavy trafficking has little or no added impact on infiltration; and structural runoff control practices rather than Deep Ripping and Decompaction should be considered.

The information about Hydrologic Soil Groups is merely a general guideline. Site-specific data such as limited depths of cut-and-fill grading with minimal removal or translocation of the inherent subsoil materials (as analyzed in the county soil survey) or, conversely, the excavation and translocation of deeper, unconsolidated substratum or consolidated bedrock materials (unlike the analyzed subsoil horizons' materials referred to in the county soil survey) should always be taken into account.

Sites made up with significant quantities of large rocks, or having a very shallow depth to bedrock, are not conducive to deep ripping and decompaction (subsoiling); and other measures may be more practical.

### **Slope**

The two-phase application of 1) deep ripping and 2) decompaction (deep subsoiling), is most practical on flat, gentle and moderate slopes. In some situations, such as but not limited to temporary construction access corridors, inclusion areas that are moderately steep along a project's otherwise gentle or moderate slope may also be deep ripped and decompacted. For limited instances of moderate steepness on other projects, however, the post-construction land use and the relative alignment of the potential ripping and decompaction work in relation to the lay of the slope should be reviewed for safety and practicality. In broad construction areas predominated by moderately steep or steep slopes, the practice is generally not used.

### **Local Weather/Timing/Soil Moisture**

Effective fracturing of compressed subsoil material from the exposed work surface, laterally and vertically down through the affected zone is achieved only when the soil material is moderately dry to moderately moist. Neither one of the two-phases, deep ripping nor decompaction (deep

subsoiling), can be effectively conducted when the soil material (subsoil or replaced topsoil) is in either a “plastic” or “liquid” state of soil consistency. Pulling the respective implements legs through the soil when it is overly moist only results in the “slicing and smearing” of the material or added “squeezing and compression” instead of the necessary fracturing. Ample drying time is needed for a “rippable” soil condition not merely in the material close to the surface, but throughout the material located down to the bottom of the physically compressed zone of the subsoil.

The “poor man’s Atterberg field test” for soil plasticity is a simple “hand-roll” method used for quick, on-site determination of whether or not the moisture level of the affected soil material is low enough for: effective deep ripping of subsoil; respreading of topsoil in a friable state; and final decompaction (deep subsoiling). Using a sample of soil material obtained from the planned bottom depth of ripping, e.g.: 20 - 24 inches below exposed subsoil surface, the sample is hand rolled between the palms down to a 1/8-inch diameter thread. (Use the same test for stored topsoil material before respreading on the site.) If the respective soil sample crumbles apart in segments no greater than 3/8 of an inch long, by the time it is rolled down to 1/8 inch diameter, it is low enough in moisture for deep ripping (or topsoil replacement), and decompaction. Conversely, as shown in Figure 5, if the rolled sample stretches out in increments greater than 3/8 of an inch long before crumbling, it is in a “plastic” state of soil consistency and is too wet for subsoil ripping (as well as topsoil replacement) and final decompaction.



Fig. 5. Augered from a depth of 19 inches below the surface of the replaced topsoil, this subsoil sample was hand rolled to a 1/8-inch diameter. The test shows the soil at this site stretches out too far without crumbling; it indicates the material is in a plastic state of consistence, too wet for final decompaction (deep subsoiling) at this time.

## Design Guidance

Beyond the above-noted site factors, a vital requirement for the effective Deep Ripping and Decompaction (deep subsoiling), is implementing the practice in its distinct, two-phase process:

- 1) Deep rip the affected thickness of exposed subsoil material (see Figure 10 and 11), aggressively fracturing it before the protected topsoil is reapplied on the site (see Figure 12); and
- 2) Decompact (deep subsoil), simultaneously through the restored topsoil layer and the upper half of the affected subsoil (Figure 13). The second phase, “decompaction,” mitigates the partial recompaction which occurs during the heavy process of topsoil spreading/grading. Prior to deep ripping and decompacting the site, all construction activity, including construction equipment and material storage, site cleanup and trafficking (Figure 14), should be finished; and the site closed off to further disturbance. Likewise, once the practice is underway and the area’s soil permeability and

rainfall infiltration are being restored, a policy limiting all further traffic to permanent travel lanes is maintained.

The other critical elements, outlined below, are: using the proper implements (deep, heavy-duty rippers and subsoilers), and ample pulling-power equipment (tractors); and conducting the practice at the appropriate speed, depth and pattern(s) of movement.

Note that an appropriate plan for the separate practice of establishing a healthy perennial ground cover, with deep rooting to help maintain the restored soil structure, should be developed in advance. This may require the assistance of an agronomist or landscape horticulturist.

### Implements

Avoid the use of all undersize implements. The small-to-medium, light-duty tool will, at best, only “scarify” the uppermost surface portion of the mass of compacted subsoil material. The term “chisel plow” is commonly but incorrectly applied to a broad range of implements. While a few may be adapted for the moderate subsoiling of non-impacted soils, the majority are less durable and used for only lighter land-fitting (see Figure 6).



Fig. 6. A light duty chisel implement, not adequate for either the deep ripping or decompaction (deep subsoiling) phase.



Fig. 7. One of several variations of an agricultural ripper. This unit has long, rugged shanks mounted on a steel V-frame for deep, aggressive fracturing through Phase 1.

Use a “heavy duty” agricultural-grade, deep ripper (see Figures 7,9,10 and 11) for the first phase: the lateral and vertical fracturing of the mass of exposed and compressed subsoil, down and through, to the bottom of impact, prior to the replacement of the topsoil layer. (Any oversize rocks which are uplifted to the subsoil surface during the deep ripping phase are picked and removed.) Like the heavy-duty class of implement for the first phase, the decompaction (deep subsoiling) Phase 2 is conducted with the heavy-duty version of the deep subsoiler. More preferable is the angled-leg variety of deep subsoiler (shown in Figures 8 and 13). It minimizes the inversion of the subsoil and topsoil layers while laterally and vertically fracturing the upper half of the previously ripped subsoil layer and all of the topsoil layer by delivering a momentary, wave-like “lifting and shattering” action up through the soil layers as it is pulled.



### **Pulling-Power of Equipment**

Use the following rule of thumb for tractor horsepower (hp) whenever deep ripping and decompacting a significantly impacted site: For both types of implement, have at least 40 hp of tractor pull available for each mounted shank/ leg.

Using the examples of a 3-shank and a 5-shank implement, the respective tractors should have 120 and 200 hp available for fracturing down to the final depth of 20-to-24 inches per phase. Final depth for the deep ripping in Phase 1 is achieved incrementally by a progressive series of passes (see Depth and Patterns of Movement, below); while for Phase 2, the full operating depth of the deep subsoiler is applied from the beginning.

The operating speed for pulling both types of implement should not exceed 2 to 3 mph. At this slow and managed rate of operating speed, maximum functional performance is sustained by the tractor and the implement performing the soil fracturing. Referring to Figure 8, the implement is the 6-leg version of the deep angled-leg subsoiler. Its two outside legs are "chained up" so that only four legs will be engaged (at the maximum depth), requiring no less than 160 hp, (rather than 240 hp) of pull. The 4-wheel drive, articulated-frame tractor in Figure 8 is 174 hp. It will be decompacting this unobstructed, former construction access area simultaneously through 11 inches of replaced topsoil and the upper 12 inches of the previously deep-ripped subsoil. In constricted areas of Phase 1) Deep Ripping, a medium-size tractor with adequate hp, such as the one in Figure 9 pulling a 3-shank deep ripper, may be more maneuverable.

Some industrial-grade variations of ripping implements are attached to power graders and bulldozers. Although highly durable, they are generally not recommended. Typically, the shanks or "teeth" of these rippers are too short and stout; and they are mounted too far apart to achieve the well-distributed type of lateral and vertical fracturing of the soil materials necessary to restore soil permeability and infiltration. In addition, the power graders and bulldozers, as pullers, are far less maneuverable for turns and patterns than the tractor.



Fig. 8. A deep, angled-leg subsoiler, ideal for Phase 2 decompaction of after the topsoil layer is graded on top of the ripped subsoil.



Fig. 9. This medium tractor is pulling a 3-shank deep ripper. The severely compacted construction access corridor is narrow, and the 120 hp tractor is more maneuverable for Phase 1 deep ripping (subsoil fracturing), here.

### Depth and Patterns of Movement

As previously noted both Phase 1 Deep Ripping through significantly compressed, exposed subsoil and Phase 2 Decomposition (deep subsoiling) through the replaced topsoil and upper subsoil need to be performed at maximum capable depth of each implement. With an implement's guide wheels attached, some have a "normal" maximum operating depth of 18 inches, while others may go deeper. In many situations, however, the tractor/implement operator must first remove the guide wheels and other non essential elements from the implement. This adapts the ripper or the deep subsoiler for skillful pulling with its frame only a few inches above surface, while the shanks or legs, fracture the soil material 20-to-24 inches deep.

There may be construction sites where the depth of the exposed subsoil's compression is moderate, e.g.: 12 inches, rather than deep. This can be verified by using a  $\frac{3}{4}$  inch cone penetrometer and a shovel to test the subsoil for its level of compaction, incrementally, every three inches of increasing depth. Once the full thickness of the subsoil's compacted zone is finally "pieced" and there is a significant drop in the psi measurements of the soil penetrometer, the depth/thickness of compaction is determined. This is repeated at several representative locations of the construction site. If the thickness of the site's subsoil compaction is verified as, for example, ten inches, then the Phase 1 Deep Ripping can be correspondingly reduced to the implement's minimum operable depth of 12 inches. However, the Phase 2 simultaneous Decomposition (subsoiling) of an 11 inch thick layer of replaced topsoil and the upper subsoil should run at the subsoiling implements full operating depth.



Fig. 10. An early pass with a 3-shank deep ripper penetrating only 8 inches into this worksite's severely compressed subsoil.



Fig. 11. A repeat run of the 3-shank ripper along the same patterned pass area as Fig. 9; here, incrementally reaching 18 of the needed 22 inches of subsoil fracture.

Typically, three separate series (patterns) are used for both the Phase 1 Deep Ripping and the Phase 2 Decomposition on significantly compacted sites. For Phase 1, each series begins with a moderate depth of rip and, by repeat-pass, continues until full depth is reached. Phase 2 applies the full depth of Decomposition (subsoiling), from the beginning.

Every separate series (pattern) consists of parallel, forward-and-return runs, with each progressive

pass of the implement's legs or shanks evenly staggered between those from the previous pass. This compensates for the shank or leg-spacing on the implement, e.g., with 24-to-30 inches between each shank or leg. The staggered return pass ensures lateral and vertical fracturing actuated every 12 to 15 inches across the densely compressed soil mass.

### Large, Unobstructed Areas

For larger easy areas, use the standard patterns of movement:

- The first series (pattern) of passes is applied lengthwise, parallel with the longest spread of the site; gradually progressing across the site's width, with each successive pass.
- The second series runs obliquely, crossing the first series at an angle of about 45 degrees.
- The third series runs at right angle (or 90 degrees), to the first series to complete the fracturing and shattering on severely compacted sites, and avoid leaving large unbroken blocks of compressed soil material. (In certain instances, the third series may be optional, depending on how thoroughly the first two series loosen the material and eliminate large chunks/blocks of material as verified by tests with a  $\frac{3}{4}$ -inch cone penetrometer.)



Fig. 12. Moderately dry topsoil is being replaced on the affected site now that Phase 1 deep ripping of the compressed subsoil is complete.



Fig. 13. The same deep, angled-leg subsoiler shown in Fig. 7 is engaged at maximum depth for Phase 2, decompaction (deep soiling), of the replaced topsoil and the upper subsoil materials.

### Corridors

In long corridors of limited width and less maneuverability than larger sites, e.g.: along compacted areas used as temporary construction access, a modified series of pattern passes are used.

- First, apply the same initial lengthwise, parallel series of passes described above.

- A second series of passes makes a broad “S” shaped pattern of rips, continually and gradually alternating the “S” curves between opposite edges inside the compacted corridor.
- The third and final series again uses the broad, alternating S pattern, but it is “flip-flopped” to continually cross the previous S pattern along the corridor’s centerline. This final series of the S pattern curves back along the edge areas skipped by the second series.

### Maintenance and Cost

Once the two-phase practice of Deep Ripping and Decompaction is completed, two items are essential for maintaining a site’s soil porosity and permeability for infiltration. They are: planting and maintaining the appropriate ground cover with deep roots to maintain the soil structure (see Figure 15); and keeping the site free of traffic or other weight loads.

Note that site-specific choice of an appropriate vegetative ground-cover seed mix, including the proper seeding ratio of one or more perennial species with a deep taproot system and the proper amount of lime and soil nutrients (fertilizer mix) adapted to the soil-needs, are basic to the final practice of landscaping, i.e: surface tillage, seeding/planting/fertilizing and culti-packing or mulching is applied. The "maintenance" of an effectively deep-ripped and decompacted area is generally limited to the successful perennial (long-term) landscape ground cover; as long as no weight-bearing force of soil compaction is applied.



Fig. 14. The severely compacted soil of a temporary construction yard used daily by heavy equipment for four months; shown before deep ripping, topsoil replacement, and decompaction.



Fig. 15. The same site as Fig. 14 after deep ripping of the exposed subsoil, topsoil replacement, decompaction through the topsoil and upper subsoil and final surface tillage and revegetation to maintain soil permeability and infiltration.

The Deep Ripping and Decompaction practice is, by necessity, more extensive than periodic subsoiling of farmland. The cost of deep ripping and decompacting (deep subsoiling), will vary according to the depth and severity of soil-material compression and the relative amount of tractor and implement time that is required. In some instances, depending on open maneuverability, two-to-three acres of compacted project area may be deep-ripped in one day. In other situations of more severe compaction and - or less maneuverability, as little as one acre may be fully ripped in a day. Generally, if the Phase 1) Deep Ripping is fully effective, the Phase 2) Decompaction should be completed in 2/3 to 3/4 of the time required for Phase 1.

Using the example of two acres of Phase 1) Deep Ripping in one day, at \$1800 per day, the net cost is \$900 per acre. If the Phase 2) Decompacting or deep subsoiling takes 3/4 the time as Phase 1, it costs \$675 per acre for a combined total of \$1575 per acre to complete the practice (these figures do not include the cost of the separate practice of topsoil stripping and replacement). Due to the many variables, it must be recognized that cost will be determined by the specific conditions or constraints of the site and the availability of proper equipment.

## Resources

### Publications:

- American Society of Agricultural Engineers. 1971. *Compaction of Agricultural Soils*. ASAE.
- Brady, N.C., and R.R. Weil. 2002. *The Nature and Properties of Soils*. 13<sup>th</sup> ed. Pearson Education, Inc.
- Baver, L.D. 1948. *Soil Physics*. John Wiley & Sons.
- Carpachi, N. 1987 (1995 fifth printing). *Excavation and Grading Handbook, Revised*. 2<sup>nd</sup> ed. Craftsman Book Company
- Ellis, B. (Editor). 1997. *Safe & Easy Lawn Care: The Complete Guide to Organic Low Maintenance Lawn*. Houghton Mifflin.
- Harpstead, M.I., T.J. Sauer, and W.F. Bennett. 2001. *Soil Science Simplified*. 4<sup>th</sup> ed. Iowa State University Press.
- Magdoff, F., and H. van Es. 2000. *Building Soils for Better Crops*. 2<sup>nd</sup> ed. Sustainable Agricultural Networks
- McCarthy, D.F. 1993. *Essentials of Soil Mechanics and Foundations, Basic Geotechnics* 4<sup>th</sup> ed. Regents/Prentice Hall.
- Plaster, E.J. 1992. *Soil Science & Management*. 3<sup>rd</sup> ed. Delmar Publishers.
- Union Gas Limited, Ontario, Canada. 1984. *Rehabilitation of Agricultural Lands, Dawn-Kerwood Loop Pipeline; Technical Report*. Ecological Services for Planning, Ltd.; Robinson, Merritt & Devries, Ltd. and Smith, Hoffman Associates, Ltd.
- US Department of Agriculture in cooperation with Cornell University Agricultural Experiment Station. Various years. *Soil Survey of (various names) County, New York*. USDA.

### Internet Access:

- Examples of implements:  
V-Rippers. Access by internet search of *John Deere Ag -New Equipment for 915 (larger-frame model) V-Ripper*; and, for 913 (smaller-frame model) *V-Ripper*. Deep, angled-leg subsoiler. Access by internet search of: *Bigham Brothers Shear Bolt Paratill-Subsoiler*.  
[http://salesmanual.deere.com/sales/salesmanual/en\\_NA/primary\\_tillage/2008/feature/rippers/915v\\_pattern\\_frame.html?sbu=a&link=prodcats](http://salesmanual.deere.com/sales/salesmanual/en_NA/primary_tillage/2008/feature/rippers/915v_pattern_frame.html?sbu=a&link=prodcats) Last visited March 08.
- Soils data of USDA Natural Resources Conservation Service. *NRCS Web Soil Survey*. <http://websoilsurvey.nrcs.usda.gov/app/> and *USDA-NRCS Official Soil Series Descriptions; View by Name*. <http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdname.cgi> . Last visited Jan. 08.
- Soil penetrometer information. Access by internet searches of: *Diagnosing Soil Compaction using a Penetrometer (soil compaction tester)*, PSU Extension; as well as *Dickey-john Soil Compaction Tester*.  
<http://www.dickey-johnproducts.com/pdf/SoilCompactionTest.pdf> and <http://cropsoil.psu.edu/Extension/Facts/uc178pdf> Last visited Sept. 07

**APPENDIX I**  
**SAMPLE STORMWATER CONTROL FACILITY MAINTENANCE**  
**AGREEMENT**

# SAMPLE STORMWATER CONTROL FACILITY MAINTENANCE AGREEMENT

Whereas, the Municipality of \_\_\_\_\_ ("Municipality") and the \_\_\_\_\_ ("facility owner") want to enter into an agreement to provide for the long term maintenance and continuation of stormwater control measures approved by the Municipality for the below named project, and

Whereas, the Municipality and the facility owner desire that the stormwater control measures be built in accordance with the approved project plans and thereafter be maintained, cleaned, repaired, replaced and continued in perpetuity in order to ensure optimum performance of the components. Therefore, the Municipality and the facility owner agree as follows:

1. This agreement binds the Municipality and the facility owner, its successors and assigns, to the maintenance provisions depicted in the approved project plans which are attached as Schedule A of this agreement.

2. The facility owner shall maintain, clean, repair, replace and continue the stormwater control measures depicted in Schedule A as necessary to ensure optimum performance of the measures to design specifications. The stormwater control measures shall include, but shall not be limited to, the following: drainage ditches, swales, dry wells, infiltrators, drop inlets, pipes, culverts, soil absorption devices and retention ponds.

3. The facility owner shall be responsible for all expenses related to the maintenance of the stormwater control measures and shall establish a means for the collection and distribution of expenses among parties for any commonly owned facilities.

4. The facility owner shall provide for the periodic inspection of the stormwater control measures, not less than once in every five year period, to determine the condition and integrity of the measures. Such inspection shall be performed by a Professional Engineer licensed by the State of New York. The inspecting engineer shall prepare and submit to the Municipality within 30 days of the inspection, a written report of the findings including recommendations for those actions necessary for the continuation of the stormwater control measures.

5. The facility owner shall not authorize, undertake or permit alteration, abandonment, modification or discontinuation of the stormwater control measures except in accordance with written approval of the Municipality.

6. The facility owner shall undertake necessary repairs and replacement of the stormwater control measures at the direction of the Municipality or in accordance with the recommendations of the inspecting engineer.

7. The facility owner shall provide to the Municipality within 30 days of the date of this agreement, a security for the maintenance and continuation of the stormwater control measures in the form of ( a Bond, letter of credit or escrow account).

8. This agreement shall be recorded in the Office of the County Clerk, County of \_\_\_\_\_ together with the deed for the common property and shall be included in the offering plan and/or prospectus approved pursuant to \_\_\_\_\_.

9. If ever the Municipality determines that the facility owner has failed to construct or maintain the stormwater control measures in accordance with the project plan or has failed to undertake corrective action specified by the Municipality or by the inspecting engineer, the Municipality is authorized to undertake such steps as reasonably necessary for the preservation, continuation or maintenance of the stormwater control measures and to affix the expenses thereof as a lien against the property.

10. This agreement is effective \_\_\_\_\_.

\_\_\_\_\_



**APPENDIX J**  
**NYSDEC SOLID WASTE MANAGEMENT FACILITY PERMIT**

[PLACE HOLDER]

**APPENDIX K**  
**OPRHP NO IMPACT LETTER**



**Parks, Recreation,  
and Historic Preservation**

KATHY HOCHUL  
Governor

ERIK KULLESEID  
Commissioner

November 10, 2021

Timothy Clark  
Geologist  
Sterling Environmental Engineering, P.C.  
24 Wade Road  
Latham, NY 12110

Re: DEC  
Saratoga Biochar Solutions, LLC Carbon Manufacturing Facility  
Town of Moreau, Saratoga County, NY  
21PR06254

Dear Timothy Clark:

Thank you for requesting the comments of the Division for Historic Preservation of the Office of Parks, Recreation and Historic Preservation (OPRHP). We have reviewed the submitted materials in accordance with the New York State Historic Preservation Act of 1980 (section 14.09 of the New York Parks, Recreation and Historic Preservation Law). These comments are those of the Division for Historic Preservation and relate only to Historic/Cultural resources. They do not include potential environmental impacts to New York State Parkland that may be involved in or near your project. Such impacts must be considered as part of the environmental review of the project pursuant to the State Environmental Quality Review Act (New York Environmental Conservation Law Article 8) and its implementing regulations (6NYCRR Part 617).

OPRHP has reviewed the prior project review for the Moreau Industrial Park (1989-2002). The OPRHP letter dated August 11, 2000 states that it is the opinion of OPRHP that no further work was warranted, and the Industrial Park project (95PR01690) can proceed to construction. I am hereby rescinding my recommendation for a Phase IA/IB Archaeological Survey.

It is the opinion of the OPRHP that no properties, including archaeological and/or historic resources, listed in or eligible for the New York State and National Registers of Historic Places will be impacted by this project.

If you have any questions, I can be reached at [Jessica.Schreyer@parks.ny.gov](mailto:Jessica.Schreyer@parks.ny.gov).

Sincerely,

Jessica Schreyer  
Scientist Archaeology

**APPENDIX L**  
**FULL ENVIRONMENTAL ASSESSMENT FORM**

**Full Environmental Assessment Form  
Part 1 - Project and Setting**

**Instructions for Completing Part 1**

**Part 1 is to be completed by the applicant or project sponsor.** Responses become part of the application for approval or funding, are subject to public review, and may be subject to further verification.

Complete Part 1 based on information currently available. If additional research or investigation would be needed to fully respond to any item, please answer as thoroughly as possible based on current information; indicate whether missing information does not exist, or is not reasonably available to the sponsor; and, when possible, generally describe work or studies which would be necessary to update or fully develop that information.

Applicants/sponsors must complete all items in Sections A & B. In Sections C, D & E, most items contain an initial question that must be answered either "Yes" or "No". If the answer to the initial question is "Yes", complete the sub-questions that follow. If the answer to the initial question is "No", proceed to the next question. Section F allows the project sponsor to identify and attach any additional information. Section G requires the name and signature of the applicant or project sponsor to verify that the information contained in Part 1 is accurate and complete.

**A. Project and Applicant/Sponsor Information.**

Name of Action or Project: Saratoga Biochar Solutions, LLC. - Carbon Fertilizer Manufacturing Facility - Moreau Industrial Park		
Project Location (describe, and attach a general location map): Moreau Industrial Park (Parcels 50.-4-16 and 50.-4-22) , Moreau, NY (Map Attached)		
Brief Description of Proposed Action (include purpose or need): The Applicant is proposing to construct and operate a Carbon Fertilizer Manufacturing Facility (the "Facility") within the Moreau Industrial Park (Parcels 50.-4-16 and 50.-4-22) that will manufacture carbon fertilizer (a form of biochar) from biosolids at a rate of 720 tons of received biosolids per day. Construction is proposed in three phases over five years. Each phase will be capable of processing 240 tons of received biosolids per day. The Facility includes a fully enclosed building for receiving and handling biosolids as the feedstock for the carbon fertilizer manufacturing process. The Facility requires Site Plan approval by the Town of Moreau Planning Board and issuance of a Solid Waste Management Facility Permit and Air State Facility Permit from the New York State Department of Environmental Conservation (NYSDEC). The development proposes to merge parcels 50.-4-16 and 50.-4-22 into a single parcel with access directly from Farnam Road.		
Name of Applicant/Sponsor: Saratoga Biochar Solutions, LLC.	Telephone: 518-391-0568	E-Mail: ray@northeasternbiochar.com
Address: 26F Congress Street #346	State: NY	Zip Code: 12833
City/PO: Saratoga Springs	Telephone: 518-391-0568	E-Mail: ray@northeasternbiochar.com
Project Contact (if not same as sponsor; give name and title/role): Raymond Apy, CEO Northeastern Biochar Solutions, LLC	Telephone: 518-391-0568	E-Mail: ray@northeasternbiochar.com
Address: 26F Congress Street #346	State: NY	Zip Code: 12833
City/PO: Saratoga Springs	Telephone:	E-Mail:
Property Owner (if not same as sponsor): Moreau Industrial Park, LLC	Telephone:	E-Mail:
Address: 269 Ballard Road	State: NY	Zip Code: 12831
City/PO: Wilton		

**B. Government Approvals**

**B. Government Approvals, Funding, or Sponsorship.** ("Funding" includes grants, loans, tax relief, and any other forms of financial assistance.)

Government Entity	If Yes: Identify Agency and Approval(s) Required	Application Date (Actual or projected)
a. City Council, Town Board, <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No or Village Board of Trustees		
b. City, Town or Village <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Planning Board or Commission	Town of Moreau Planning Board - Site Plan Application	August 2021
c. City, Town or <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Village Zoning Board of Appeals		
d. Other local agencies <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	City of Glens Falls Wastewater Discharge Permit	September 2021
e. County agencies <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
f. Regional agencies <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		
g. State agencies <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	NYSDEC Region 5 - Part 380 SWMF Permit, Air State Facility Permit, Construction SPDES	October 2021
h. Federal agencies <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No		

- i. Coastal Resources.
- i. Is the project site within a Coastal Area, or the waterfront area of a Designated Inland Waterway?  Yes  No
  - ii. Is the project site located in a community with an approved Local Waterfront Revitalization Program?  Yes  No
  - iii. Is the project site within a Coastal Erosion Hazard Area?  Yes  No

**C. Planning and Zoning**

**C.1. Planning and zoning actions.**

Will administrative or legislative adoption, or amendment of a plan, local law, ordinance, rule or regulation be the only approval(s) which must be granted to enable the proposed action to proceed?  Yes  No

- If Yes, complete sections C, F and G.
- If No, proceed to question C.2 and complete all remaining sections and questions in Part 1

**C.2. Adopted land use plans.**

- a. Do any municipally- adopted (city, town, village or county) comprehensive land use plan(s) include the site where the proposed action would be located?  Yes  No  
If Yes, does the comprehensive plan include specific recommendations for the site where the proposed action would be located?  Yes  No
- b. Is the site of the proposed action within any local or regional special planning district (for example: Greenway; Brownfield Opportunity Area (BOA); designated State or Federal heritage area; watershed management plan; or other?)  Yes  No

If Yes, identify the plan(s):  
NYS Heritage Areas: Mohawk Valley Heritage Corridor

- c. Is the proposed action located wholly or partially within an area listed in an adopted municipal open space plan, or an adopted municipal farmland protection plan?  Yes  No  
If Yes, identify the plan(s):

**C.3. Zoning**

a. Is the site of the proposed action located in a municipality with an adopted zoning law or ordinance.  Yes  No  
If Yes, what is the zoning classification(s) including any applicable overlay district?  
M1 - Manufacturing 1

b. Is the use permitted or allowed by a special or conditional use permit?  Yes  No

c. Is a zoning change requested as part of the proposed action?  Yes  No  
If Yes,  
i. What is the proposed new zoning for the site?

**C.4. Existing community services.**

a. In what school district is the project site located? South Glens Falls

b. What police or other public protection forces serve the project site?  
South Glens Falls Police Department

c. Which fire protection and emergency medical services serve the project site?  
Moreau Fire Protection (FD028)

d. What parks serve the project site?  
None

**D. Project Details**

**D.1. Proposed and Potential Development**

a. What is the general nature of the proposed action (e.g., residential, industrial, commercial, recreational; if mixed, include all components)? Industrial - Manufacturing

b. a. Total acreage of the site of the proposed action? 5.89 acres  
b. Total acreage to be physically disturbed? 4.64 acres  
c. Total acreage (project site and any contiguous properties) owned or controlled by the applicant or project sponsor? 5.89 acres

c. Is the proposed action an expansion of an existing project or use?  
i. If Yes, what is the approximate percentage of the proposed expansion and identify the units (e.g., acres, miles, housing units, square feet)? % \_\_\_\_\_ Units: \_\_\_\_\_  Yes  No

d. Is the proposed action a subdivision, or does it include a subdivision?  
If Yes,  
i. Purpose or type of subdivision? (e.g., residential, industrial, commercial; if mixed, specify types) \_\_\_\_\_  Yes  No

ii. Is a cluster/conservation layout proposed?  
iii. Number of lots proposed? \_\_\_\_\_  
iv. Minimum and maximum proposed lot sizes? Minimum \_\_\_\_\_ Maximum \_\_\_\_\_  Yes  No

e. Will the proposed action be constructed in multiple phases? \_\_\_\_\_ months  
i. If No, anticipated period of construction:  
ii. If Yes:  
• Total number of phases anticipated 3  
• Anticipated commencement date of phase 1 (including demolition) Dec month 2022 year  
• Anticipated completion date of final phase Dec month 2028 year  
• Generally describe connections or relationships among phases, including any contingencies where progress of one phase may determine timing or duration of future phases: \_\_\_\_\_

Following approval, Phase 1 will be constructed to achieve 240 tons per day capacity of received biosolids. Phase 2 and 3 will be constructed over the first 5 years of operation to bring the facility to the target manufacturing capacity of 720 tons per day of received biosolids.



f. Does the project include new residential uses?

If Yes, show numbers of units proposed.

Yes  No

	<u>One Family</u>	<u>Two Family</u>	<u>Three Family</u>	<u>Multiple Family (four or more)</u>
Initial Phase				
At completion				
of all phases				

g. Does the proposed action include new non-residential construction (including expansions)?

If Yes,

Yes  No

- i. Total number of structures 1
- ii. Dimensions (in feet) of largest proposed structure: 50 height; 303 width; and 222 length
- iii. Approximate extent of building space to be heated or cooled: 7562 ~~2,000~~ square feet

h. Does the proposed action include construction or other activities that will result in the impoundment of any liquids, such as creation of a water supply, reservoir, pond, lake, waste lagoon or other storage?

If Yes,

Yes  No

- i. Purpose of the impoundment: \_\_\_\_\_
- ii. If a water impoundment, the principal source of the water:  Ground water  Surface water streams  Other specify: \_\_\_\_\_
- iii. If other than water, identify the type of impounded/contained liquids and their source. \_\_\_\_\_

- iv. Approximate size of the proposed impoundment. Volume: \_\_\_\_\_ million gallons; surface area: \_\_\_\_\_ acres
- v. Dimensions of the proposed dam or impounding structure: \_\_\_\_\_ height; \_\_\_\_\_ length
- vi. Construction method/materials for the proposed dam or impounding structure (e.g., earth fill, rock, wood, concrete): \_\_\_\_\_

### D.2. Project Operations

a. Does the proposed action include any excavation, mining, or dredging, during construction, operations, or both? (Not including general site preparation, grading or installation of utilities or foundations where all excavated materials will remain onsite)  Yes  No

If Yes:

- i. What is the purpose of the excavation or dredging? \_\_\_\_\_
- ii. How much material (including rock, earth, sediments, etc.) is proposed to be removed from the site?
  - Volume (specify tons or cubic yards): \_\_\_\_\_
  - Over what duration of time? \_\_\_\_\_
- iii. Describe nature and characteristics of materials to be excavated or dredged, and plans to use, manage or dispose of them. \_\_\_\_\_

iv. Will there be onsite dewatering or processing of excavated materials? If yes, describe. \_\_\_\_\_

Yes  No

v. What is the total area to be dredged or excavated? \_\_\_\_\_

vi. What is the maximum area to be worked at any one time? \_\_\_\_\_ acres

vii. What would be the maximum depth of excavation or dredging? \_\_\_\_\_ feet

viii. Will the excavation require blasting? \_\_\_\_\_

ix. Summarize site reclamation goals and plan: \_\_\_\_\_  Yes  No

b. Would the proposed action cause or result in alteration of, increase or decrease in size of, or encroachment into any existing wetland, waterbody, shoreline, beach or adjacent area?  Yes  No

If Yes:

i. Identify the wetland or waterbody which would be affected (by name, water index number, wetland map number or geographic description): \_\_\_\_\_

ii. Describe how the proposed action would affect that waterbody or wetland, e.g. excavation, fill, placement of structures, or alteration of channels, banks and shorelines. Indicate extent of activities, alterations and additions in square feet or acres:

Yes  No

iii. Will the proposed action cause or result in disturbance to bottom sediments?  
If Yes, describe: \_\_\_\_\_

Yes  No

iv. Will the proposed action cause or result in the destruction or removal of aquatic vegetation?  
If Yes:

- acres of aquatic vegetation proposed to be removed: \_\_\_\_\_
- expected acreage of aquatic vegetation remaining after project completion: \_\_\_\_\_
- purpose of proposed removal (e.g. beach clearing, invasive species control, boat access): \_\_\_\_\_
- proposed method of plant removal: \_\_\_\_\_
- if chemical/herbicide treatment will be used, specify product(s): \_\_\_\_\_

v. Describe any proposed reclamation/mitigation following disturbance: \_\_\_\_\_

Yes  No

c. Will the proposed action use, or create a new demand for water?

If Yes: i. Total anticipated water usage/demand per day: \_\_\_\_\_ 30,079 gallons/day

Yes  No

ii. Will the proposed action obtain water from an existing public water supply?  
If Yes:

- Name of district or service area: Moreau Water District #3
- Does the existing public water supply have capacity to serve the proposal?  Yes  No
- Is the project site in the existing district?  Yes  No
- Is expansion of the district needed?  Yes  No
- Do existing lines serve the project site?  Yes  No

iii. Will line extension within an existing district be necessary to supply the project?  
If Yes:

- Describe extensions or capacity expansions proposed to serve this project: \_\_\_\_\_

iv. Is a new water supply district or service area proposed to be formed to serve the project site?  
If Yes:

Yes  No

- Applicant/sponsor for new district: \_\_\_\_\_
- Date application submitted or anticipated: \_\_\_\_\_
- Proposed source(s) of supply for new district: \_\_\_\_\_

v. If a public water supply will not be used, describe plans to provide water supply for the project: \_\_\_\_\_  
vi. If water supply will be from wells (public or private), what is the maximum pumping capacity: \_\_\_\_\_ gallons/minute.

Yes  No

d. Will the proposed action generate liquid wastes?  
If Yes:

- i. Total anticipated liquid waste generation per day: \_\_\_\_\_ 29,456 gallons/day
- ii. Nature of liquid wastes to be generated (e.g., sanitary wastewater, industrial; if combination, describe all components and approximate volumes or proportions of each):  
Sanitary Wastewater - 35 gph, Truck Wash - 75 gph, and Processing - 1,284 gph

Yes  No

iii. Will the proposed action use any existing public wastewater treatment facilities?  
If Yes:

- Name of wastewater treatment plant to be used: City of Glens Falls Wastewater Treatment Plant
- Name of district: Sewer District #1
- Does the existing wastewater treatment plant have capacity to serve the project?  Yes  No
- Is the project site in the existing district?  Yes  No
- Is expansion of the district needed?  Yes  No

- Do existing sewer lines serve the project site?  Yes  No
  - Will a line extension within an existing district be necessary to serve the project?  Yes  No
- If Yes:
- Describe extensions or capacity expansions proposed to serve this project: \_\_\_\_\_

- iv. Will a new wastewater (sewage) treatment district be formed to serve the project site?  Yes  No
- If Yes:
- Applicant/sponsor for new district: \_\_\_\_\_
  - Date application submitted or anticipated: \_\_\_\_\_
  - What is the receiving water for the wastewater discharge? \_\_\_\_\_

v. If public facilities will not be used, describe plans to provide wastewater treatment for the project, including specifying proposed receiving water (name and classification if surface discharge or describe subsurface disposal plans): \_\_\_\_\_

vi. Describe any plans or designs to capture, recycle or reuse liquid waste: \_\_\_\_\_

- e. Will the proposed action disturb more than one acre and create stormwater runoff, either from new point sources (i.e. ditches, pipes, swales, curbs, gutters or other concentrated flows of stormwater) or non-point source (i.e. sheet flow) during construction or post construction?  Yes  No
- If Yes:

- i. How much impervious surface will the project create in relation to total size of project parcel?
- \_\_\_\_\_ Square feet or 3.07 acres (impervious surface)
- \_\_\_\_\_ Square feet or 5.88 acres (parcel size)
- ii. Describe types of new point sources. N/A

iii. Where will the stormwater runoff be directed (i.e. on-site stormwater management facility/structures, adjacent properties, groundwater, on-site surface water or off-site surface waters)?  
on-site stormwater management facility/structures and groundwater

- If to surface waters, identify receiving water bodies or wetlands: \_\_\_\_\_
- Will stormwater runoff flow to adjacent properties?

iv. Does the proposed plan minimize impervious surfaces, use pervious materials or collect and re-use stormwater?  Yes  No

f. Does the proposed action include, or will it use on-site, one or more sources of air emissions, including fuel combustion, waste incineration, or other processes or operations?  Yes  No

- If Yes, identify:
- i. Mobile sources during project operations (e.g., heavy equipment, fleet or delivery vehicles)  
Delivery vehicles during operation.
- ii. Stationary sources during construction (e.g., power generation, structural heating, batch plant, crushers)  
None.
- iii. Stationary sources during operations (e.g., process emissions, large boilers, electric generation)  
Process Emissions from manufacturing process requiring air permit.

g. Will any air emission sources named in D.2.f (above), require a NY State Air Registration, Air Facility Permit, or Federal Clean Air Act Title IV or Title V Permit?  Yes  No

If Yes:

i. Is the project site located in an Air quality non-attainment area? (Area routinely or periodically fails to meet ambient air quality standards for all or some parts of the year)  Yes  No

- ii. In addition to emissions as calculated in the application, the project will generate:
- 98,232 Tons/year (short tons) of Carbon Dioxide (CO<sub>2</sub>)
  - 0 Tons/year (short tons) of Nitrous Oxide (N<sub>2</sub>O)
  - 0 Tons/year (short tons) of Perfluorocarbons (PFCs)
  - 0 Tons/year (short tons) of Sulfur Hexafluoride (SF<sub>6</sub>)
  - 0 Tons/year (short tons) of Carbon Dioxide equivalent of Hydrofluorocarbons (HFCs)
  - 12.7 Tons/year (short tons) of Hazardous Air Pollutants (HAPs)

h. Will the proposed action generate or emit methane (including, but not limited to, sewage treatment plants, landfills, composting facilities)?  Yes  No

If Yes:

- i. Estimate methane generation in tons/year (metric): 0
- ii. Describe any methane capture, control or elimination measures included in project design (e.g., combustion to generate heat or electricity, flaring): Methane generation eliminated through thermal oxidizer

i. Will the proposed action result in the release of air pollutants from open-air operations or processes, such as quarry or landfill operations?  Yes  No

If Yes: Describe operations and nature of emissions (e.g., diesel exhaust, rock particulates/dust):

j. Will the proposed action result in a substantial increase in traffic above present levels or generate substantial new demand for transportation facilities or services?  Yes  No

If Yes:

i. When is the peak traffic expected (Check all that apply):  Morning  Evening  Weekend

Randomly between hours of \_\_\_\_\_ to \_\_\_\_\_

ii. For commercial activities only, projected number of truck trips/day and type (e.g., semi trailers and dump trucks): \_\_\_\_\_  
Up to 50 truck trips per day (90% rear dump semi trailers; <5% roll-off trucks; <5% single unit box truck)

iii. Parking spaces: Existing 0 Proposed 22 Net increase/decrease 22  Yes  No

iv. Does the proposed action include any shared use parking?

v. If the proposed action includes any modification of existing roads, creation of new roads or change in existing access, describe: No new roads proposed.

vi. Are public/private transportation service(s) or facilities available within 1/2 mile of the proposed site?  Yes  No

vii. Will the proposed action include access to public transportation or accommodations for use of hybrid, electric or other alternative fueled vehicles?  Yes  No

viii. Will the proposed action include plans for pedestrian or bicycle accommodations for connections to existing pedestrian or bicycle routes?  Yes  No

k. Will the proposed action (for commercial or industrial projects only) generate new or additional demand for energy?  Yes  No

If Yes:

i. Estimate annual electricity demand during operation of the proposed action: \_\_\_\_\_  
1,500 kW/hr (500 kW/hr per phase)

ii. Anticipated sources/suppliers of electricity for the project (e.g., on-site combustion, on-site renewable, via grid/local utility, or other):

Local Utility Provider:

iii. Will the proposed action require a new, or an upgrade, to an existing substation?  Yes  No

l. Hours of operation. Answer all items which apply.

i. During Construction:

- Monday - Friday: 7 AM - 5 PM
- Saturday: 7 AM - 5 PM
- Sunday: NA
- Holidays: NA

ii. During Operations:

- Monday - Friday: 24/7 Ops, Deliveries 6 AM-6PM
- Saturday: 24/7 Ops, Deliveries 6 AM-6PM
- Sunday: 24/7 Ops, No Deliveries
- Holidays: 24/7 Ops, No Deliveries

m. Will the proposed action produce noise that will exceed existing ambient noise levels during construction, operation, or both?  Yes  No

If yes:

i. Provide details including sources, time of day and duration:

Construction equipment during workday hours will temporarily exceed ambient noise levels during construction. Noise sources during operations will be indoors and operations are not expected to result in offsite exceedances of ambient noise levels.

ii. Will the proposed action remove existing natural barriers that could act as a noise barrier or screen?  Yes  No

Describe:

n. Will the proposed action have outdoor lighting?

If yes:

i. Describe source(s), location(s), height of fixture(s), direction/aim, and proximity to nearest occupied structures:

Lighting will be used to illuminate onsite driving areas consisting of LED wallpack and pole mounted fixtures. Lights will be shielded and directed to prevent offsite dispersion. The nearest building is located approximately 225 feet east of parcel 50.-4-16 across Faman Road.

ii. Will proposed action remove existing natural barriers that could act as a light barrier or screen?  Yes  No

Describe:

o. Does the proposed action have the potential to produce odors for more than one hour per day?  Yes  No

If Yes, describe possible sources, potential frequency and duration of odor emissions, and proximity to nearest occupied structures:

Biosolids deliveries (6 days/week) during receiving hours (8 AM-6 PM). Manufacturing operations occur 24/7. All biosolids receipt and manufacturing operations occur indoors with advanced odor control systems. The nearest occupied structure is located approximately 225 feet east of parcel 50.-4-16.

p. Will the proposed action include any bulk storage of petroleum (combined capacity of over 1,100 gallons) or chemical products 185 gallons in above ground storage or any amount in underground storage?  Yes  No

If Yes:

i. Product(s) to be stored Sulfuric Acid

ii. Volume(s) 218 Gal per unit time day (e.g., month, year)

iii. Generally, describe the proposed storage facilities:

5,000 gallon sulfuric acid tank located within secondary containment and accessible for truck loading. Requires NYSDEC CBS Registration.

q. Will the proposed action (commercial, industrial and recreational projects only) use pesticides (i.e., herbicides, insecticides) during construction or operation?  Yes  No

If Yes:

i. Describe proposed treatment(s):

ii. Will the proposed action use Integrated Pest Management Practices?  Yes  No

r. Will the proposed action (commercial or industrial projects only) involve or require the management or disposal of solid waste (excluding hazardous materials)?  Yes  No

If Yes:

i. Describe any solid waste(s) to be generated during construction or operation of the facility:

• Construction: TBD tons per Week (unit of time)

• Operation: TBD tons per Week (unit of time)

ii. Describe any proposals for on-site minimization, recycling or reuse of materials to avoid disposal as solid waste:

• Construction: Recycling containers will be maintained during construction to collect recyclables for recycling.

• Operation: Recycling containers will be maintained during operations to collect recyclables for recycling.

iii. Proposed disposal methods/facilities for solid waste generated on-site:

• Construction: Waste containers will be maintained onsite during construction that will be serviced weekly by a local hauling company for landfill disposal.

• Operation: Waste containers will be maintained onsite during operations that will be serviced weekly by a local hauling company for landfill disposal.

s. Does the proposed action include construction or modification of a solid waste management facility?  Yes  No

If Yes:

i. Type of management or handling of waste proposed for the site (e.g., recycling or transfer station, composting, landfill, or other disposal activities): Receiving and thermally treating biosolids to manufacture a "beneficial use" carbon fertilizer.

ii. Anticipated rate of disposal/processing:

- N/A Tons/month, if transfer or other non-combustion/thermal treatment, or
- 30 Tons/hour, if combustion or thermal treatment

iii. If landfill, anticipated site life: N/A years

t. Will the proposed action at the site involve the commercial generation, treatment, storage, or disposal of hazardous waste?  Yes  No

If Yes:

i. Name(s) of all hazardous wastes or constituents to be generated, handled or managed at facility: \_\_\_\_\_

ii. Generally describe processes or activities involving hazardous wastes or constituents: \_\_\_\_\_

iii. Specify amount to be handled or generated \_\_\_\_\_ tons/month

iv. Describe any proposals for on-site minimization, recycling or reuse of hazardous constituents: \_\_\_\_\_

v. Will any hazardous wastes be disposed at an existing offsite hazardous waste facility?  Yes  No

If Yes: provide name and location of facility: \_\_\_\_\_

If No: describe proposed management of any hazardous wastes which will not be sent to a hazardous waste facility: \_\_\_\_\_

### E. Site and Setting of Proposed Action

#### E.1. Land uses on and surrounding the project site

a. Existing land uses.

i. Check all uses that occur on, adjoining and near the project site.

- Urban  Industrial  Commercial  Residential (suburban)  Rural (non-farm)  
 Forest  Agriculture  Aquatic  Other (specify): \_\_\_\_\_

ii. If mix of uses, generally describe:

The proposed development is located within the Moreau Industrial Park consisting of industrial use. Undeveloped land within the industrial park and immediate surrounding area is predominantly forest.

b. Land uses and covertypes on the project site.

Land use or Covertype	Current Acreage	Acreage After Project Completion	Change (Acres +/-)
• Roads, buildings, and other paved or impervious surfaces	0	3.07	+3.07
• Forested	2.6	0.38	-2.22
• Meadows, grasslands or brushlands (non-agricultural, including abandoned agricultural)	3.29	2.44	-0.85
• Agricultural (includes active orchards, field, greenhouse etc.)	0	0	0
• Surface water features (lakes, ponds, streams, rivers, etc.)	0	0	0
• Wetlands (freshwater or tidal)	0	0	0
• Non-vegetated (bare rock, earth or fill)	0	0	0
• Other Describe: _____			

c. Is the project site presently used by members of the community for public recreation?  Yes  No  
i. If Yes: explain: \_\_\_\_\_

d. Are there any facilities serving children, the elderly, people with disabilities (e.g., schools, hospitals, licensed day care centers, or group homes) within 1500 feet of the project site?  Yes  No  
If Yes,  
i. Identify Facilities: \_\_\_\_\_

e. Does the project site contain an existing dam?  Yes  No  
If Yes:

i. Dimensions of the dam and impoundment:

- Dam height: \_\_\_\_\_ feet
- Dam length: \_\_\_\_\_ feet
- Surface area: \_\_\_\_\_ acres
- Volume impounded: \_\_\_\_\_ gallons OR acre-feet

ii. Dam's existing hazard classification: \_\_\_\_\_

iii. Provide date and summarize results of last inspection: \_\_\_\_\_

f. Has the project site ever been used as a municipal, commercial or industrial solid waste management facility, or does the project site adjoin property which is now, or was at one time, used as a solid waste management facility?  Yes  No  
If Yes:

i. Has the facility been formally closed?

- If yes, cite sources/documentation: \_\_\_\_\_  Yes  No

ii. Describe the location of the project site relative to the boundaries of the solid waste management facility: \_\_\_\_\_

iii. Describe any development constraints due to the prior solid waste activities: \_\_\_\_\_

g. Have hazardous wastes been generated, treated and/or disposed of at the site, or does the project site adjoin property which is now or was at one time used to commercially treat, store and/or dispose of hazardous waste?  Yes  No  
If Yes:

i. Describe waste(s) handled and waste management activities, including approximate time when activities occurred: \_\_\_\_\_

h. Potential contamination history. Has there been a reported spill at the proposed project site, or have any remedial actions been conducted at or adjacent to the proposed site?  Yes  No  
If Yes:

i. Is any portion of the site listed on the NYSDEC Spills Incidents database or Environmental Site Remediation database? Check all that apply:  Yes  No

Yes - Spills Incidents database

Yes - Environmental Site Remediation database

Neither database

Provide DEC ID number(s): \_\_\_\_\_

Provide DEC ID number(s): \_\_\_\_\_

ii. If site has been subject of RCRA corrective activities, describe control measures: \_\_\_\_\_

iii. Is the project within 2000 feet of any site in the NYSDEC Environmental Site Remediation database?  Yes  No  
If yes, provide DEC ID number(s): 546031

iv. If yes to (i), (ii) or (iii) above, describe current status of site(s): \_\_\_\_\_

Site 546031 is the Hudson River PCB Sediments, a Class 2 State Superfund Site. The Hudson River is located approximately 1,300 feet east of parcel 50-4-16.

v. Is the project site subject to an institutional control limiting property uses?  Yes  No

- If yes, DEC site ID number: \_\_\_\_\_
- Describe the type of institutional control (e.g., deed restriction or easement): \_\_\_\_\_
- Describe any use limitations: \_\_\_\_\_
- Describe any engineering controls: \_\_\_\_\_
- Will the project affect the institutional or engineering controls in place?  Yes  No
- Explain: \_\_\_\_\_

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**E.2. Natural Resources On or Near Project Site**

a. What is the average depth to bedrock on the project site? \_\_\_\_\_ >6.5 feet  Yes  No

b. Are there bedrock outcroppings on the project site? \_\_\_\_\_ %  
 If Yes, what proportion of the site is comprised of bedrock outcroppings? \_\_\_\_\_ %

c. Predominant soil type(s) present on project site: Loamy Sand (WnB) \_\_\_\_\_ 100 %  
 \_\_\_\_\_ %  
 \_\_\_\_\_ %

d. What is the average depth to the water table on the project site? Average: \_\_\_\_\_ >8.5 feet

e. Drainage status of project site soils:  Well Drained: \_\_\_\_\_ 100 % of site  
 Moderately Well Drained: \_\_\_\_\_ % of site  
 Poorly Drained \_\_\_\_\_ % of site

f. Approximate proportion of proposed action site with slopes:  0-10%: \_\_\_\_\_ 100 % of site  
 10-15%: \_\_\_\_\_ % of site  
 15% or greater: \_\_\_\_\_ % of site

g. Are there any unique geologic features on the project site?  Yes  No  
 If Yes, describe: \_\_\_\_\_

h. Surface water features.  Yes  No

i. Does any portion of the project site contain wetlands or other waterbodies (including streams, rivers, ponds or lakes)?  Yes  No

ii. Do any wetlands or other waterbodies adjoin the project site?  Yes  No

If Yes to either i or ii, continue. If No, skip to E.2.i.

iii. Are any of the wetlands or waterbodies within or adjoining the project site regulated by any federal, state or local agency?  Yes  No

iv. For each identified regulated wetland and waterbody on the project site, provide the following information:

• Streams:	Name _____	Classification _____
• Lakes or Ponds:	Name _____	Classification _____
• Wetlands:	Name _____	Approximate Size _____
• Wetland No. (if regulated by DEC)	_____	_____

v. Are any of the above water bodies listed in the most recent compilation of NYS water quality-impaired waterbodies?  Yes  No  
 If yes, name of impaired water body/bodies and basis for listing as impaired: \_\_\_\_\_

i. Is the project site in a designated Floodway?  Yes  No

j. Is the project site in the 100-year Floodplain?  Yes  No

k. Is the project site in the 500-year Floodplain?  Yes  No

l. Is the project site located over, or immediately adjoining, a primary, principal or sole source aquifer?  Yes  No  
 If Yes:  
 i. Name of aquifer: Principal Aquifer



m. Identify the predominant wildlife species that occupy or use the project site:

Typical suburban wildlife

n. Does the project site contain a designated significant natural community?  
If Yes:

Yes  No

i. Describe the habitat/community (composition, function, and basis for designation):

ii. Source(s) of description or evaluation:

iii. Extent of community/habitat:

- Currently: \_\_\_\_\_ acres
- Following completion of project as proposed: \_\_\_\_\_ acres
- Gain or loss (indicate + or -): \_\_\_\_\_ acres

o. Does project site contain any species of plant or animal that is listed by the federal government or NYS as endangered or threatened, or does it contain any areas identified as habitat for an endangered or threatened species?  
If Yes:

Yes  No

i. Species and listing (endangered or threatened):

p. Does the project site contain any species of plant or animal that is listed by NYS as rare, or as a species of special concern?  
If Yes:

Yes  No

i. Species and listing:

q. Is the project site or adjoining area currently used for hunting, trapping, fishing or shell fishing?  
If yes, give a brief description of how the proposed action may affect that use:

Yes  No

### E.3. Designated Public Resources On or Near Project Site

a. Is the project site, or any portion of it, located in a designated agricultural district certified pursuant to Agriculture and Markets Law, Article 25-AA, Section 303 and 304?  
If Yes, provide county plus district name/number:

Yes  No

b. Are agricultural lands consisting of highly productive soils present?  
i. If Yes: acreage(s) on project site?

Yes  No

ii. Source(s) of soil rating(s):

c. Does the project site contain all or part of, or is it substantially contiguous to, a registered National Natural Landmark?  
If Yes:

Yes  No

i. Nature of the natural landmark:  Biological Community  Geological Feature

ii. Provide brief description of landmark, including values behind designation and approximate size/extent:

d. Is the project site located in or does it adjoin a state listed Critical Environmental Area?  
If Yes:

Yes  No

i. CEA name:

ii. Basis for designation:

iii. Designating agency and date:

e. Does the project site contain, or is it substantially contiguous to, a building, archaeological site, or district which is listed on the National or State Register of Historic Places, or that has been determined by the Commissioner of the NYS Office of Parks, Recreation and Historic Preservation to be eligible for listing on the State Register of Historic Places?  Yes  No

If Yes:  
 i. Nature of historic/archaeological resource:  Archaeological Site  Historic Building or District

ii. Name: \_\_\_\_\_

iii. Brief description of attributes on which listing is based: \_\_\_\_\_

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f. Is the project site, or any portion of it, located in or adjacent to an area designated as sensitive for archaeological sites on the NY State Historic Preservation Office (SHPO) archaeological site inventory?  Yes  No

g. Have additional archaeological or historic site(s) or resources been identified on the project site?  Yes  No

If Yes:  
 i. Describe possible resource(s): \_\_\_\_\_

ii. Basis for identification: \_\_\_\_\_

h. Is the project site within five miles of any officially designated and publicly accessible federal, state, or local scenic or aesthetic resource?  Yes  No

If Yes:  
 i. Identify resource: Mohawk Valley Corridor

ii. Nature of, or basis for, designation (e.g., established highway overlook, state or local park, state historic trail or scenic byway, etc.): NYS Designated Maritime Area

iii. Distance between project and resource: 0 (includes entire county) miles.

i. Is the project site located within a designated river corridor under the Wild, Scenic and Recreational Rivers Program of NYCRR 666?  Yes  No

If Yes:  
 i. Identify the name of the river and its designation: \_\_\_\_\_

ii. Is the activity consistent with development restrictions contained in 6NYCRR Part 666?  Yes  No

**F. Additional Information**

Attach any additional information which may be needed to clarify your project.

If you have identified any adverse impacts which could be associated with your proposal, please describe those impacts plus any measures which you propose to avoid or minimize them.

**G. Verification**

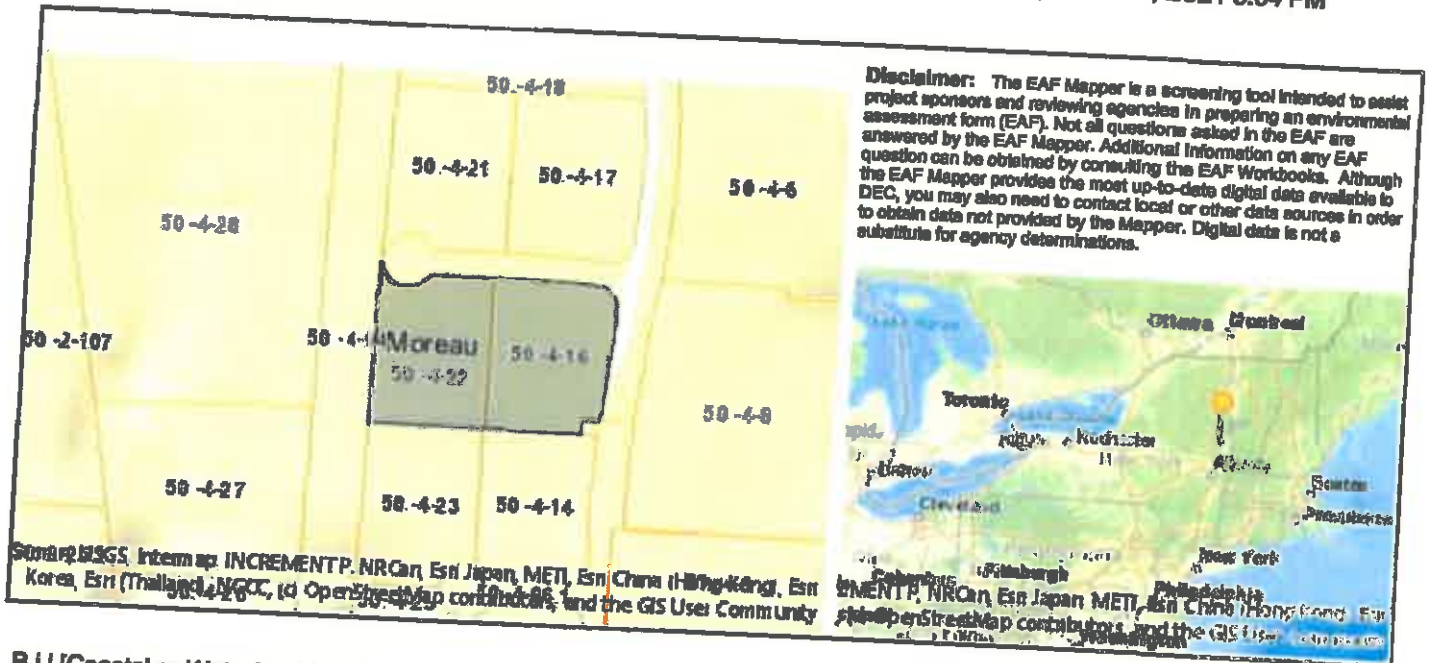
I certify that the information provided is true to the best of my knowledge.

Applicant/Sponsor Name: RAYMOND APY Date: 2-22-2022

Signature: [Handwritten Signature] Title: CEO

# EAF Mapper Summary Report

Monday, June 28, 2021 3:54 PM



Source: USGS, Intermap, INCREMENTP, NRCAN, Esri Japan, METI, Esri China (Beijing), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

B.1.i [Coastal or Waterfront Area]	No
B.1.ii [Local Waterfront Revitalization Area]	No
C.2.b. [Special Planning District]	Yes - Digital mapping data are not available for all Special Planning Districts. Refer to EAF Workbook.
C.2.b. [Special Planning District - Name]	NYS Heritage Areas: Mohawk Valley Heritage Corridor
E.1.h [DEC Spills or Remediation Site - Potential Contamination History]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h.i [DEC Spills or Remediation Site - Listed]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h.ii [DEC Spills or Remediation Site - Environmental Site Remediation Database]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.1.h.iii [Within 2,000' of DEC Remediation Site]	Yes
E.1.h.iii [Within 2,000' of DEC Remediation Site - DEC ID]	546031
E.2.g [Unique Geologic Features]	No
E.2.h.i [Surface Water Features]	No
E.2.h.ii [Surface Water Features]	No
E.2.h.iii [Surface Water Features]	No
E.2.h.v [Impaired Water Bodies]	No
E.2.i. [Floodway]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.2.j. [100 Year Floodplain]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.2.k. [500 Year Floodplain]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.2.l. [Aquifers]	Yes

	Principal Aquifer
E.2.i. [Aquifer Names]	
E.2.n. [Natural Communities]	No
E.2.o. [Endangered or Threatened Species]	No
E.2.p. [Rare Plants or Animals]	No
E.3.a. [Agricultural District]	No
E.3.c. [National Natural Landmark]	No
E.3.d. [Critical Environmental Area]	No
E.3.e. [National or State Register of Historic Places or State Eligible Sites]	Digital mapping data are not available or are incomplete. Refer to EAF Workbook.
E.3.f. [Archeological Sites]	Yes
E.3.i. [Designated River Corridor]	No

**Full Environmental Assessment Form**  
**Part 2 - Identification of Potential Project Impacts**

Agency Use Only [If applicable]  
 Project : Saratoga Bio Char  
 Date : March 7, 2022

Part 2 is to be completed by the lead agency. Part 2 is designed to help the lead agency inventory all potential resources that could be affected by a proposed project or action. We recognize that the lead agency's reviewer(s) will not necessarily be environmental professionals. So, the questions are designed to walk a reviewer through the assessment process by providing a series of questions that can be answered using the information found in Part 1. To further assist the lead agency in completing Part 2, the form identifies the most relevant questions in Part 1 that will provide the information needed to answer the Part 2 question. When Part 2 is completed, the lead agency will have identified the relevant environmental areas that may be impacted by the proposed activity.

If the lead agency is a state agency and the action is in any Coastal Area, complete the Coastal Assessment Form before proceeding with this assessment.

**Tips for completing Part 2:**

- Review all of the information provided in Part 1.
- Review any application, maps, supporting materials and the Full EAF Workbook.
- Answer each of the 18 questions in Part 2.
- If you answer "Yes" to a numbered question, please complete all the questions that follow in that section.
- If you answer "No" to a numbered question, move on to the next numbered question.
- Check appropriate column to indicate the anticipated size of the impact.
- Proposed projects that would exceed a numeric threshold contained in a question should result in the reviewing agency checking the box "Moderate to large impact may occur."
- The reviewer is not expected to be an expert in environmental analysis.
- If you are not sure or undecided about the size of an impact, it may help to review the sub-questions for the general question and consult the workbook.
- When answering a question consider all components of the proposed activity, that is, the "whole action".
- Consider the possibility for long-term and cumulative impacts as well as direct impacts.
- Answer the question in a reasonable manner considering the scale and context of the project.

1. Impact on Land		<input type="checkbox"/> NO	<input checked="" type="checkbox"/> YES
Proposed action may involve construction on, or physical alteration of, the land surface of the proposed site. (See Part 1. D.1)			
<i>If "Yes", answer questions a - j. If "No", move on to Section 2.</i>			
	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may involve construction on land where depth to water table is less than 3 feet.	E2d	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b. The proposed action may involve construction on slopes of 15% or greater.	E2f	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c. The proposed action may involve construction on land where bedrock is exposed, or generally within 5 feet of existing ground surface.	E2a	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d. The proposed action may involve the excavation and removal of more than 1,000 tons of natural material.	D2a	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e. The proposed action may involve construction that continues for more than one year or in multiple phases.	D1e	<input checked="" type="checkbox"/>	<input type="checkbox"/>
f. The proposed action may result in increased erosion, whether from physical disturbance or vegetation removal (including from treatment by herbicides).	D2e, D2q	<input checked="" type="checkbox"/>	<input type="checkbox"/>
g. The proposed action is, or may be, located within a Coastal Erosion hazard area.	B1i	<input checked="" type="checkbox"/>	<input type="checkbox"/>
h. Other impacts: <u>None.</u>		<input checked="" type="checkbox"/>	<input type="checkbox"/>

**2. Impact on Geological Features**  
 The proposed action may result in the modification or destruction of, or inhibit access to, any unique or unusual land forms on the site (e.g., cliffs, dunes, minerals, fossils, caves). (See Part 1. E.2.g)  
 If "Yes", answer questions a - c. If "No", move on to Section 3.

NO       YES

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. Identify the specific land form(s) attached: _____	E2g	<input type="checkbox"/>	<input type="checkbox"/>
b. The proposed action may affect or is adjacent to a geological feature listed as a registered National Natural Landmark. Specific feature: _____	E3c	<input type="checkbox"/>	<input type="checkbox"/>
c. Other impacts: _____		<input type="checkbox"/>	<input type="checkbox"/>

**3. Impacts on Surface Water**  
 The proposed action may affect one or more wetlands or other surface water bodies (e.g., streams, rivers, ponds or lakes). (See Part 1. D.2, E.2.h)  
 If "Yes", answer questions a - l. If "No", move on to Section 4.

NO       YES

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may create a new water body.	D2b, D1h	<input type="checkbox"/>	<input type="checkbox"/>
b. The proposed action may result in an increase or decrease of over 10% or more than a 10 acre increase or decrease in the surface area of any body of water.	D2b	<input type="checkbox"/>	<input type="checkbox"/>
c. The proposed action may involve dredging more than 100 cubic yards of material from a wetland or water body.	D2a	<input type="checkbox"/>	<input type="checkbox"/>
d. The proposed action may involve construction within or adjoining a freshwater or tidal wetland, or in the bed or banks of any other water body.	E2h	<input type="checkbox"/>	<input type="checkbox"/>
e. The proposed action may create turbidity in a waterbody, either from upland erosion, runoff or by disturbing bottom sediments.	D2a, D2h	<input type="checkbox"/>	<input type="checkbox"/>
f. The proposed action may include construction of one or more intake(s) for withdrawal of water from surface water.	D2c	<input type="checkbox"/>	<input type="checkbox"/>
g. The proposed action may include construction of one or more outfall(s) for discharge of wastewater to surface water(s).	D2d	<input type="checkbox"/>	<input type="checkbox"/>
h. The proposed action may cause soil erosion, or otherwise create a source of stormwater discharge that may lead to siltation or other degradation of receiving water bodies.	D2e	<input type="checkbox"/>	<input type="checkbox"/>
i. The proposed action may affect the water quality of any water bodies within or downstream of the site of the proposed action.	E2h	<input type="checkbox"/>	<input type="checkbox"/>
j. The proposed action may involve the application of pesticides or herbicides in or around any water body.	D2q, E2h	<input type="checkbox"/>	<input type="checkbox"/>
k. The proposed action may require the construction of new, or expansion of existing, wastewater treatment facilities.	D1a, D2d	<input type="checkbox"/>	<input type="checkbox"/>

1. Other impacts: \_\_\_\_\_

	<input type="checkbox"/>	<input type="checkbox"/>
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**4. Impact on groundwater**  
 The proposed action may result in new or additional use of ground water, or may have the potential to introduce contaminants to ground water or an aquifer.  
 (See Part 1. D.2.a, D.2.c, D.2.d, D.2.p, D.2.q, D.2.t)  
 If "Yes", answer questions a - h. If "No", move on to Section 5.

NO       YES

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may require new water supply wells, or create additional demand on supplies from existing water supply wells.	D2c	<input type="checkbox"/>	<input type="checkbox"/>
b. Water supply demand from the proposed action may exceed safe and sustainable withdrawal capacity rate of the local supply or aquifer. Cite Source: _____	D2c	<input type="checkbox"/>	<input type="checkbox"/>
c. The proposed action may allow or result in residential uses in areas without water and sewer services.	D1a, D2c	<input type="checkbox"/>	<input type="checkbox"/>
d. The proposed action may include or require wastewater discharged to groundwater.	D2d, E2l	<input type="checkbox"/>	<input type="checkbox"/>
e. The proposed action may result in the construction of water supply wells in locations where groundwater is, or is suspected to be, contaminated.	D2c, E1f, E1g, E1h	<input type="checkbox"/>	<input type="checkbox"/>
f. The proposed action may require the bulk storage of petroleum or chemical products over ground water or an aquifer.	D2p, E2l	<input type="checkbox"/>	<input type="checkbox"/>
g. The proposed action may involve the commercial application of pesticides within 100 feet of potable drinking water or irrigation sources.	E2h, D2g, E2l, D2c	<input type="checkbox"/>	<input type="checkbox"/>
h. Other impacts: _____		<input type="checkbox"/>	<input type="checkbox"/>

**5. Impact on Flooding**  
 The proposed action may result in development on lands subject to flooding.  
 (See Part 1. E.2)  
 If "Yes", answer questions a - g. If "No", move on to Section 6.

NO       YES

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may result in development in a designated floodway.	E2i	<input type="checkbox"/>	<input type="checkbox"/>
b. The proposed action may result in development within a 100 year floodplain.	E2j	<input type="checkbox"/>	<input type="checkbox"/>
c. The proposed action may result in development within a 500 year floodplain.	E2k	<input type="checkbox"/>	<input type="checkbox"/>
d. The proposed action may result in, or require, modification of existing drainage patterns.	D2b, D2c	<input type="checkbox"/>	<input type="checkbox"/>
e. The proposed action may change flood water flows that contribute to flooding.	D2b, E2i, E2j, E2k	<input type="checkbox"/>	<input type="checkbox"/>
f. If there is a dam located on the site of the proposed action, is the dam in need of repair, or upgrade?	E1e	<input type="checkbox"/>	<input type="checkbox"/>

g. Other impacts: \_\_\_\_\_

**6. Impacts on Air**

The proposed action may include a state regulated air emission source.  
 (See Part 1. D.2.f., D.2.h, D.2.g)  
 If "Yes", answer questions a - f. If "No", move on to Section 7.

NO  YES

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. If the proposed action requires federal or state air emission permits, the action may also emit one or more greenhouse gases at or above the following levels: i. More than 1000 tons/year of carbon dioxide (CO <sub>2</sub> ) ii. More than 3.5 tons/year of nitrous oxide (N <sub>2</sub> O) iii. More than 1000 tons/year of carbon equivalent of perfluorocarbons (PFCs) iv. More than .045 tons/year of sulfur hexafluoride (SF <sub>6</sub> ) v. More than 1000 tons/year of carbon dioxide equivalent of hydrochlorofluorocarbons (HFCs) emissions vi. 43 tons/year or more of methane	D2g D2g D2g D2g D2g D2h	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
b. The proposed action may generate 10 tons/year or more of any one designated hazardous air pollutant, or 25 tons/year or more of any combination of such hazardous air pollutants.	D2g	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c. The proposed action may require a state air registration, or may produce an emissions rate of total contaminants that may exceed 5 lbs. per hour, or may include a heat source capable of producing more than 10 million BTU's per hour.	D2f, D2g	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d. The proposed action may reach 50% of any of the thresholds in "a" through "c", above.	D2g	<input type="checkbox"/>	<input checked="" type="checkbox"/>
e. The proposed action may result in the combustion or thermal treatment of more than 1 ton of refuse per hour.	D2s	<input type="checkbox"/>	<input checked="" type="checkbox"/>
f. Other impacts: <u>None</u>		<input checked="" type="checkbox"/>	<input type="checkbox"/>

**7. Impact on Plants and Animals**

The proposed action may result in a loss of flora or fauna. (See Part 1. E.2. m.-q.)  
 If "Yes", answer questions a - j. If "No", move on to Section 8.

NO  YES

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may cause reduction in population or loss of individuals of any threatened or endangered species, as listed by New York State or the Federal government, that use the site, or are found on, over, or near the site.	E2o	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b. The proposed action may result in a reduction or degradation of any habitat used by any rare, threatened or endangered species, as listed by New York State or the federal government.	E2o	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c. The proposed action may cause reduction in population, or loss of individuals, of any species of special concern or conservation need, as listed by New York State or the Federal government, that use the site, or are found on, over, or near the site.	E2p	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d. The proposed action may result in a reduction or degradation of any habitat used by any species of special concern and conservation need, as listed by New York State or the Federal government.	E2p	<input type="checkbox"/>	<input type="checkbox"/>



e. The proposed action may diminish the capacity of a registered National Natural Landmark to support the biological community it was established to protect.	E3c	<input checked="" type="checkbox"/>	<input type="checkbox"/>
f. The proposed action may result in the removal of, or ground disturbance in, any portion of a designated significant natural community. Source: <u>NYS DEC Mapper and applicant site plan.</u>	E2n	<input checked="" type="checkbox"/>	<input type="checkbox"/>
g. The proposed action may substantially interfere with nesting/breeding, foraging, or over-wintering habitat for the predominant species that occupy or use the project site.	E2m	<input checked="" type="checkbox"/>	<input type="checkbox"/>
h. The proposed action requires the conversion of more than 10 acres of forest, grassland or any other regionally or locally important habitat. Habitat type & information source: <u>NYS DEC Mapper and applicant site plan.</u>	E1b	<input checked="" type="checkbox"/>	<input type="checkbox"/>
i. Proposed action (commercial, industrial or recreational projects, only) involves use of herbicides or pesticides.	D2q	<input checked="" type="checkbox"/>	<input type="checkbox"/>
j. Other impacts: <u>None.</u>		<input checked="" type="checkbox"/>	<input type="checkbox"/>

8. Impact on Agricultural Resources			
The proposed action may impact agricultural resources. (See Part 1. E.3.a. and b.)			
If "Yes", answer questions a - h. If "No", move on to Section 9.			
		<input checked="" type="checkbox"/> NO	<input type="checkbox"/> YES
	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may impact soil classified within soil group 1 through 4 of the NYS Land Classification System.	E2c, E3b	<input type="checkbox"/>	<input type="checkbox"/>
b. The proposed action may sever, cross or otherwise limit access to agricultural land (includes cropland, hayfields, pasture, vineyard, orchard, etc).	E1a, E1b	<input type="checkbox"/>	<input type="checkbox"/>
c. The proposed action may result in the excavation or compaction of the soil profile of active agricultural land.	E3b	<input type="checkbox"/>	<input type="checkbox"/>
d. The proposed action may irreversibly convert agricultural land to non-agricultural uses, either more than 2.5 acres if located in an Agricultural District, or more than 10 acres if not within an Agricultural District.	E1b, E3a	<input type="checkbox"/>	<input type="checkbox"/>
e. The proposed action may disrupt or prevent installation of an agricultural land management system.	E1 a, E1b	<input type="checkbox"/>	<input type="checkbox"/>
f. The proposed action may result, directly or indirectly, in increased development potential or pressure on farmland.	C2c, C3, D2c, D2d	<input type="checkbox"/>	<input type="checkbox"/>
g. The proposed project is not consistent with the adopted municipal Farmland Protection Plan.	C2c	<input type="checkbox"/>	<input type="checkbox"/>
h. Other impacts: _____		<input type="checkbox"/>	<input type="checkbox"/>

**9. Impact on Aesthetic Resources**  NO  YES

The land use of the proposed action are obviously different from, or are in sharp contrast to, current land use patterns between the proposed project and a scenic or aesthetic resource. (Part 1. E.1.a, E.1.b, E.3.h.)  
*If "Yes", answer questions a - g. If "No", go to Section 10.*

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. Proposed action may be visible from any officially designated federal, state, or local scenic or aesthetic resource.	E3h	<input type="checkbox"/>	<input type="checkbox"/>
b. The proposed action may result in the obstruction, elimination or significant screening of one or more officially designated scenic views.	E3h, C2b	<input type="checkbox"/>	<input type="checkbox"/>
c. The proposed action may be visible from publicly accessible vantage points: i. Seasonally (e.g., screened by summer foliage, but visible during other seasons) ii. Year round	E3h	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
d. The situation or activity in which viewers are engaged while viewing the proposed action is: i. Routine travel by residents, including travel to and from work ii. Recreational or tourism based activities	E3h E2q, E1c	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>
e. The proposed action may cause a diminishment of the public enjoyment and appreciation of the designated aesthetic resource.	E3h	<input type="checkbox"/>	<input type="checkbox"/>
f. There are similar projects visible within the following distance of the proposed project: 0-1/2 mile 1/2 - 3 mile 3-5 mile 5+ mile	D1a, E1a, D1f, D1g	<input type="checkbox"/>	<input type="checkbox"/>
g. Other impacts: _____		<input type="checkbox"/>	<input type="checkbox"/>

**10. Impact on Historic and Archeological Resources**  NO  YES

The proposed action may occur in or adjacent to a historic or archaeological resource. (Part 1. E.3.e, f. and g.)  
*If "Yes", answer questions a - e. If "No", go to Section 11.*

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may occur wholly or partially within, or substantially contiguous to, any buildings, archaeological site or district which is listed on the National or State Register of Historical Places, or that has been determined by the Commissioner of the NYS Office of Parks, Recreation and Historic Preservation to be eligible for listing on the State Register of Historic Places.	E3e	<input type="checkbox"/>	<input type="checkbox"/>
b. The proposed action may occur wholly or partially within, or substantially contiguous to, an area designated as sensitive for archaeological sites on the NY State Historic Preservation Office (SHPO) archaeological site inventory.	E3f	<input type="checkbox"/>	<input type="checkbox"/>
c. The proposed action may occur wholly or partially within, or substantially contiguous to, an archaeological site not included on the NY SHPO inventory. Source: _____	E3g	<input type="checkbox"/>	<input type="checkbox"/>

d. Other impacts: _____		<input type="checkbox"/>	<input type="checkbox"/>
If any of the above (a-d) are answered "Moderate to large impact may occur", continue with the following questions to help support conclusions in Part 3:			
i. The proposed action may result in the destruction or alteration of all or part of the site or property.	E3e, E3g, E3f	<input type="checkbox"/>	<input type="checkbox"/>
ii. The proposed action may result in the alteration of the property's setting or integrity.	E3e, E3f, E3g, E1a, E1b	<input type="checkbox"/>	<input type="checkbox"/>
iii. The proposed action may result in the introduction of visual elements which are out of character with the site or property, or may alter its setting.	E3e, E3f, E3g, E3h, C2, C3	<input type="checkbox"/>	<input type="checkbox"/>

**11. Impact on Open Space and Recreation**  
 The proposed action may result in a loss of recreational opportunities or a reduction of an open space resource as designated in any adopted municipal open space plan.  NO  YES  
 (See Part 1. C.2.c, E.1.c., E.2.q.)  
 If "Yes", answer questions a - e. If "No", go to Section 12.

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may result in an impairment of natural functions, or "ecosystem services", provided by an undeveloped area, including but not limited to stormwater storage, nutrient cycling, wildlife habitat.	D2e, E1b E2h, E2m, E2o, E2n, E2p	<input type="checkbox"/>	<input type="checkbox"/>
b. The proposed action may result in the loss of a current or future recreational resource.	C2a, E1c, C2c, E2q	<input type="checkbox"/>	<input type="checkbox"/>
c. The proposed action may eliminate open space or recreational resource in an area with few such resources.	C2a, C2c E1c, E2q	<input type="checkbox"/>	<input type="checkbox"/>
d. The proposed action may result in loss of an area now used informally by the community as an open space resource.	C2c, E1c	<input type="checkbox"/>	<input type="checkbox"/>
e. Other impacts: _____		<input type="checkbox"/>	<input type="checkbox"/>

**12. Impact on Critical Environmental Areas**  
 The proposed action may be located within or adjacent to a critical environmental area (CEA). (See Part 1. E.3.d)  
 If "Yes", answer questions a - c. If "No", go to Section 13.  NO  YES

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may result in a reduction in the quantity of the resource or characteristic which was the basis for designation of the CEA.	E3d	<input type="checkbox"/>	<input type="checkbox"/>
b. The proposed action may result in a reduction in the quality of the resource or characteristic which was the basis for designation of the CEA.	E3d	<input type="checkbox"/>	<input type="checkbox"/>
c. Other impacts: _____		<input type="checkbox"/>	<input type="checkbox"/>

**13. Impact on Transportation**  
 The proposed action may result in a change to existing transportation systems.  
 (See Part 1. D.2.j)  
 If "Yes", answer questions a - f. If "No", go to Section 14.

NO  YES

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. Projected traffic increase may exceed capacity of existing road network.	D2j	<input type="checkbox"/>	<input type="checkbox"/>
b. The proposed action may result in the construction of paved parking area for 500 or more vehicles.	D2j	<input type="checkbox"/>	<input type="checkbox"/>
c. The proposed action will degrade existing transit access.	D2j	<input type="checkbox"/>	<input type="checkbox"/>
d. The proposed action will degrade existing pedestrian or bicycle accommodations.	D2j	<input type="checkbox"/>	<input type="checkbox"/>
e. The proposed action may alter the present pattern of movement of people or goods.	D2j	<input type="checkbox"/>	<input type="checkbox"/>
f. Other impacts: _____		<input type="checkbox"/>	<input type="checkbox"/>

**14. Impact on Energy**  
 The proposed action may cause an increase in the use of any form of energy.  
 (See Part 1. D.2.k)  
 If "Yes", answer questions a - e. If "No", go to Section 15.

NO  YES

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action will require a new, or an upgrade to an existing, substation.	D2k	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b. The proposed action will require the creation or extension of an energy transmission or supply system to serve more than 50 single or two-family residences or to serve a commercial or industrial use.	D1f, D1q, D2k	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c. The proposed action may utilize more than 2,500 MWhrs per year of electricity.	D2k	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d. The proposed action may involve heating and/or cooling of more than 100,000 square feet of building area when completed.	D1g	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e. Other Impacts: None.		<input checked="" type="checkbox"/>	<input type="checkbox"/>

**15. Impact on Noise, Odor, and Light**  
 The proposed action may result in an increase in noise, odors, or outdoor lighting.  
 (See Part 1. D.2.m., n., and o.)  
 If "Yes", answer questions a - f. If "No", go to Section 16.

NO  YES

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may produce sound above noise levels established by local regulation.	D2m	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b. The proposed action may result in blasting within 1,500 feet of any residence, hospital, school, licensed day care center, or nursing home.	D2m, E1d	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c. The proposed action may result in routine odors for more than one hour per day.	D2o	<input type="checkbox"/>	<input checked="" type="checkbox"/>

d. The proposed action may result in light shining onto adjoining properties.	D2n	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e. The proposed action may result in lighting creating sky-glow brighter than existing area conditions.	D2n, E1a	<input checked="" type="checkbox"/>	<input type="checkbox"/>
f. Other impacts: <u>None.</u>		<input checked="" type="checkbox"/>	<input type="checkbox"/>

**16. Impact on Human Health**

The proposed action may have an impact on human health from exposure to new or existing sources of contaminants. (See Part 1.D.2.q., E.1. d. f. g. and h.)  
 If "Yes", answer questions a - m. If "No", go to Section 17.

NO

YES

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action is located within 1500 feet of a school, hospital, licensed day care center, group home, nursing home or retirement community.	E1d	<input checked="" type="checkbox"/>	<input type="checkbox"/>
b. The site of the proposed action is currently undergoing remediation.	E1g, E1h	<input checked="" type="checkbox"/>	<input type="checkbox"/>
c. There is a completed emergency spill remediation, or a completed environmental site remediation on, or adjacent to, the site of the proposed action.	E1g, E1h	<input checked="" type="checkbox"/>	<input type="checkbox"/>
d. The site of the action is subject to an institutional control limiting the use of the property (e.g., easement or deed restriction).	E1g, E1h	<input checked="" type="checkbox"/>	<input type="checkbox"/>
e. The proposed action may affect institutional control measures that were put in place to ensure that the site remains protective of the environment and human health.	E1g, E1h	<input checked="" type="checkbox"/>	<input type="checkbox"/>
f. The proposed action has adequate control measures in place to ensure that future generation, treatment and/or disposal of hazardous wastes will be protective of the environment and human health.	D2t	<input checked="" type="checkbox"/>	<input type="checkbox"/>
g. The proposed action involves construction or modification of a solid waste management facility.	D2q, E1f	<input checked="" type="checkbox"/>	<input type="checkbox"/>
h. The proposed action may result in the unearthing of solid or hazardous waste.	D2q, E1f	<input checked="" type="checkbox"/>	<input type="checkbox"/>
i. The proposed action may result in an increase in the rate of disposal, or processing, of solid waste.	D2r, D2s	<input checked="" type="checkbox"/>	<input type="checkbox"/>
j. The proposed action may result in excavation or other disturbance within 2000 feet of a site used for the disposal of solid or hazardous waste.	E1f, E1g E1h	<input checked="" type="checkbox"/>	<input type="checkbox"/>
k. The proposed action may result in the migration of explosive gases from a landfill site to adjacent off site structures.	E1f, E1g	<input checked="" type="checkbox"/>	<input type="checkbox"/>
l. The proposed action may result in the release of contaminated leachate from the project site.	D2s, E1f, D2r	<input checked="" type="checkbox"/>	<input type="checkbox"/>
m. Other impacts: <u>None.</u>		<input checked="" type="checkbox"/>	<input type="checkbox"/>

**17. Consistency with Community Plans**

The proposed action is not consistent with adopted land use plans.  
(See Part 1. C.1, C.2. and C.3.)  
If "Yes", answer questions a - h. If "No", go to Section 18.

NO

YES

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action's land use components may be different from, or in sharp contrast to, current surrounding land use pattern(s).	C2, C3, D1a E1a, E1b	<input type="checkbox"/>	<input type="checkbox"/>
b. The proposed action will cause the permanent population of the city, town or village in which the project is located to grow by more than 5%.	C2	<input type="checkbox"/>	<input type="checkbox"/>
c. The proposed action is inconsistent with local land use plans or zoning regulations.	C2, C2, C3	<input type="checkbox"/>	<input type="checkbox"/>
d. The proposed action is inconsistent with any County plans, or other regional land use plans.	C2, C2	<input type="checkbox"/>	<input type="checkbox"/>
e. The proposed action may cause a change in the density of development that is not supported by existing infrastructure or is distant from existing infrastructure.	C3, D1c, D1d, D1f, D1d, E1b	<input type="checkbox"/>	<input type="checkbox"/>
f. The proposed action is located in an area characterized by low density development that will require new or expanded public infrastructure.	C4, D2c, D2d D2j	<input type="checkbox"/>	<input type="checkbox"/>
g. The proposed action may induce secondary development impacts (e.g., residential or commercial development not included in the proposed action)	C2a	<input type="checkbox"/>	<input type="checkbox"/>
h. Other: _____		<input type="checkbox"/>	<input type="checkbox"/>

**18. Consistency with Community Character**

The proposed project is inconsistent with the existing community character.  
(See Part 1. C.2, C.3, D.2, E.3)  
If "Yes", answer questions a - g. If "No", proceed to Part 3.

NO

YES

	Relevant Part I Question(s)	No, or small impact may occur	Moderate to large impact may occur
a. The proposed action may replace or eliminate existing facilities, structures, or areas of historic importance to the community.	E3e, E3f, E3g	<input type="checkbox"/>	<input type="checkbox"/>
b. The proposed action may create a demand for additional community services (e.g. schools, police and fire)	C4	<input type="checkbox"/>	<input type="checkbox"/>
c. The proposed action may displace affordable or low-income housing in an area where there is a shortage of such housing.	C2, C3, D1f D1g, E1a	<input type="checkbox"/>	<input type="checkbox"/>
d. The proposed action may interfere with the use or enjoyment of officially recognized or designated public resources.	C2, E3	<input type="checkbox"/>	<input type="checkbox"/>
e. The proposed action is inconsistent with the predominant architectural scale and character.	C2, C3	<input type="checkbox"/>	<input type="checkbox"/>
f. Proposed action is inconsistent with the character of the existing natural landscape.	C2, C3 E1a, E1b E2g, E2h	<input type="checkbox"/>	<input type="checkbox"/>
g. Other impacts: _____		<input type="checkbox"/>	<input type="checkbox"/>

**PRINT FULL FORM**

**Full Environmental Assessment Form**  
**Part 3 - Evaluation of the Magnitude and Importance of Project Impacts**  
**and**  
**Determination of Significance**

Part 3 provides the reasons in support of the determination of significance. The lead agency must complete Part 3 for every question in Part 2 where the impact has been identified as potentially moderate to large or where there is a need to explain why a particular element of the proposed action will not, or may, result in a significant adverse environmental impact.

Based on the analysis in Part 3, the lead agency must decide whether to require an environmental impact statement to further assess the proposed action or whether available information is sufficient for the lead agency to conclude that the proposed action will not have a significant adverse environmental impact. By completing the certification on the next page, the lead agency can complete its determination of significance.

**Reasons Supporting This Determination:**

To complete this section:

- Identify the impact based on the Part 2 responses and describe its magnitude. Magnitude considers factors such as severity, size or extent of an impact.
- Assess the importance of the impact. Importance relates to the geographic scope, duration, probability of the impact occurring, number of people affected by the impact and any additional environmental consequences if the impact were to occur.
- The assessment should take into consideration any design element or project changes.
- Repeat this process for each Part 2 question where the impact has been identified as potentially moderate to large or where there is a need to explain why a particular element of the proposed action will not, or may, result in a significant adverse environmental impact.
- Provide the reason(s) why the impact may, or will not, result in a significant adverse environmental impact
- For Conditional Negative Declarations identify the specific condition(s) imposed that will modify the proposed action so that no significant adverse environmental impacts will result.
- Attach additional sheets, as needed.

**Determination of Significance - Type 1 and Unlisted Actions**

SEQR Status:  Type 1  Unlisted

Identify portions of EAF completed for this Project:  Part 1  Part 2  Part 3

Upon review of the information recorded on this EAF, as noted, plus this additional support information

and considering both the magnitude and importance of each identified potential impact, it is the conclusion of the \_\_\_\_\_ as lead agency that:

A. This project will result in no significant adverse impacts on the environment, and, therefore, an environmental impact statement need not be prepared. Accordingly, this negative declaration is issued.

B. Although this project could have a significant adverse impact on the environment, that impact will be avoided or substantially mitigated because of the following conditions which will be required by the lead agency:  
#6 IMPACTS ON AIR MITIGATED BY NYS DEC ISSUANCE OF AIR EMISSION PERMIT AND PERIODIC 3RD PARTY MONITORING.  
#15 IMPACT ON NOISE, ODOR AND LIGHT MITIGATED BY BUILDING ENCLOSURE, SCRAPPING AND BEING UNDER NEGATIVE AIR PRESSURE AND BIO FILTERS  
#16 HUMAN HEALTH - HAZARDOUS WASTE NOT RECEIVED NOR PROCESSED AT SITE IN ACCORD WITH SOLID WASTE PERMIT.  
There will, therefore, be no significant adverse impacts from the project as conditioned, and, therefore, this conditioned negative declaration is issued. A conditioned negative declaration may be used only for UNLISTED actions (see 6 NYCRR 617.7(d)).

C. This Project may result in one or more significant adverse impacts on the environment, and an environmental impact statement must be prepared to further assess the impact(s) and possible mitigation and to explore alternatives to avoid or reduce those impacts. Accordingly, this positive declaration is issued.

Name of Action: SARATOGA BIO CHAR SOLUTIONS

Name of Lead Agency: TOWN OF MOREAU PLANNING BOARD

Name of Responsible Officer in Lead Agency: PETER JENSEN

Title of Responsible Officer: CHAIR PERSON

Signature of Responsible Officer in Lead Agency: \_\_\_\_\_ Date: \_\_\_\_\_

Signature of Preparer (if different from Responsible Officer) *P. Jensen* Date: 3/07/2020

**For Further Information:**

Contact Person: JAMES MARTIN, ZONING ADMINISTRATOR

Address: 357 REYNOLDS ROAD, MOREAU, N.Y. 12828

Telephone Number: 518/792-4762

E-mail: zoningadministrator@townofmoreau.org.

**For Type 1 Actions and Conditioned Negative Declarations, a copy of this Notice is sent to:**

Chief Executive Officer of the political subdivision in which the action will be principally located (e.g., Town / City / Village of) \_\_\_\_\_  
Other involved agencies (if any) \_\_\_\_\_

Applicant (if any) \_\_\_\_\_  
Environmental Notice Bulletin: <http://www.dec.ny.gov/enb/enb.html>

PRINT FULL FORM



PEDESTRIAN CIRCULATION NETWORK

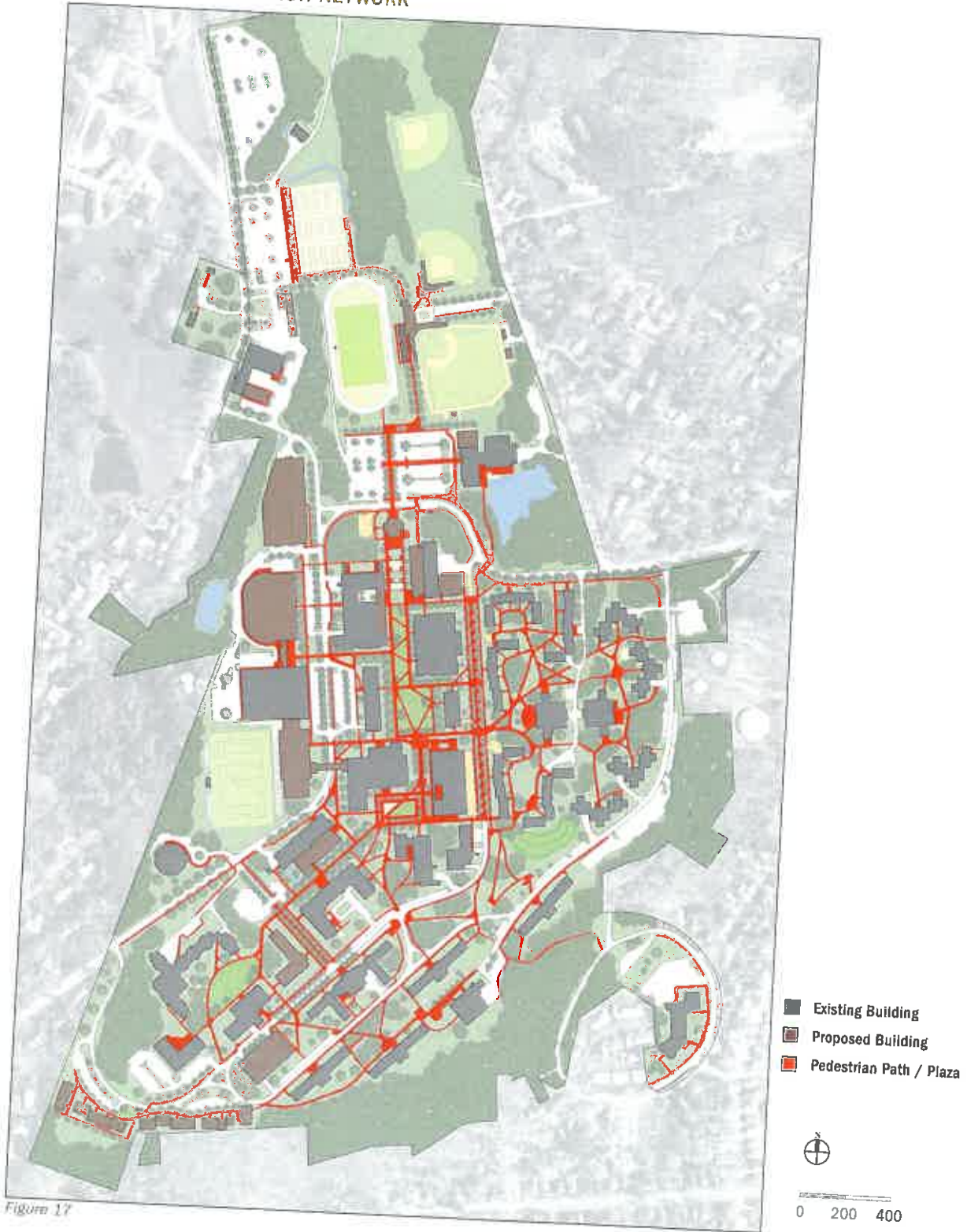


Figure 17



FINAL PLAN: PARKING ANALYSIS

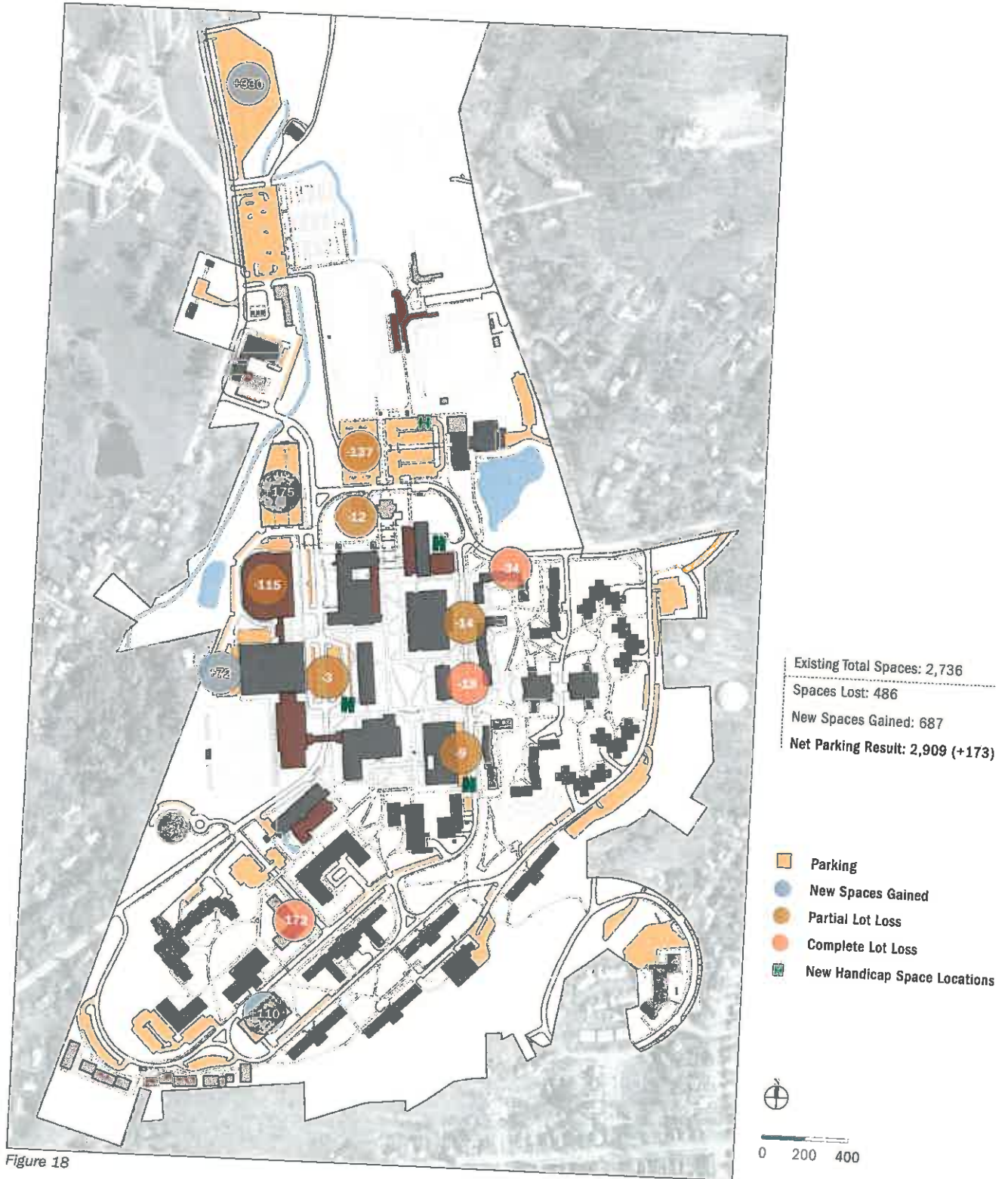


Figure 18

