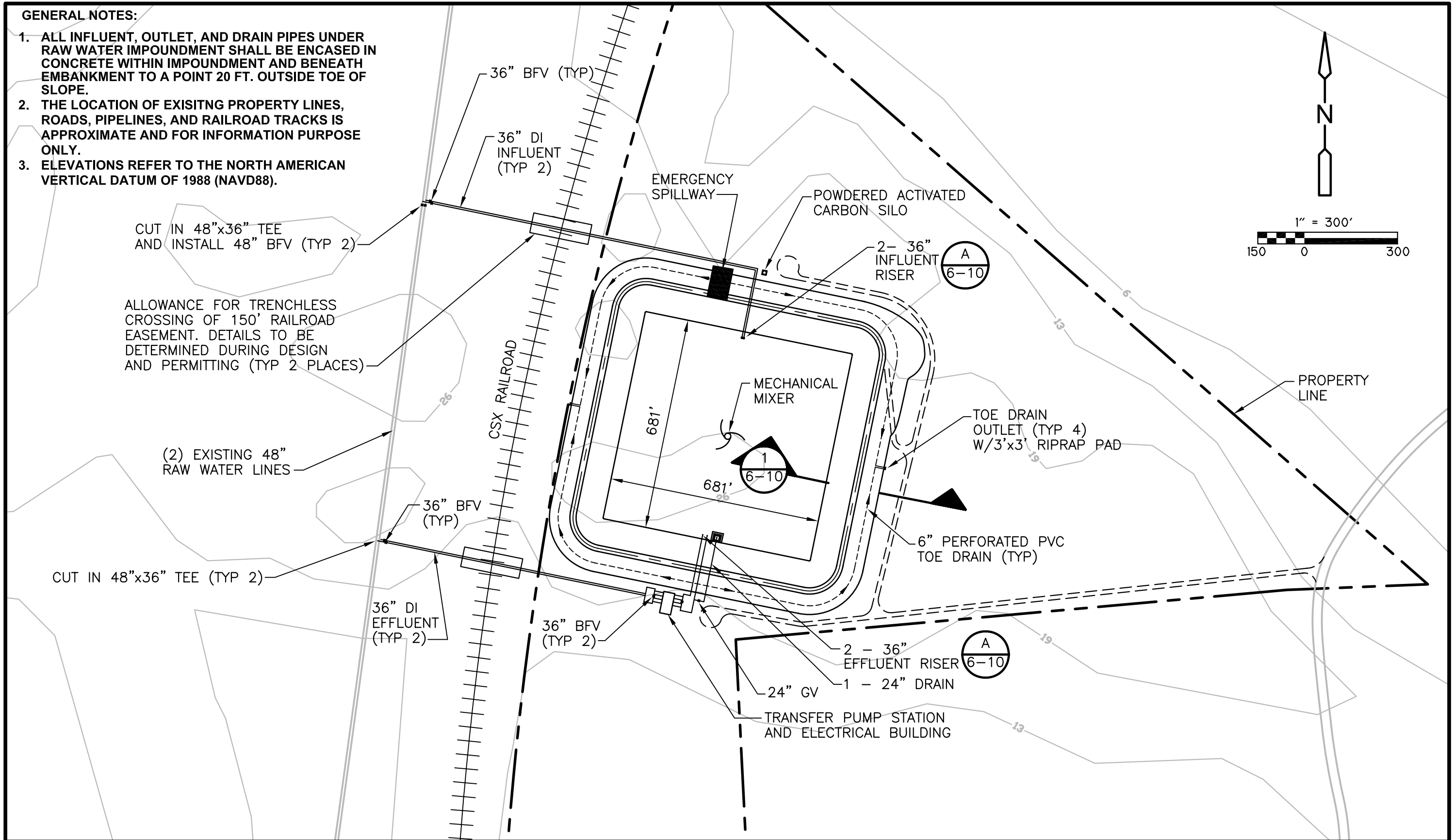


Preliminary Layout Drawings

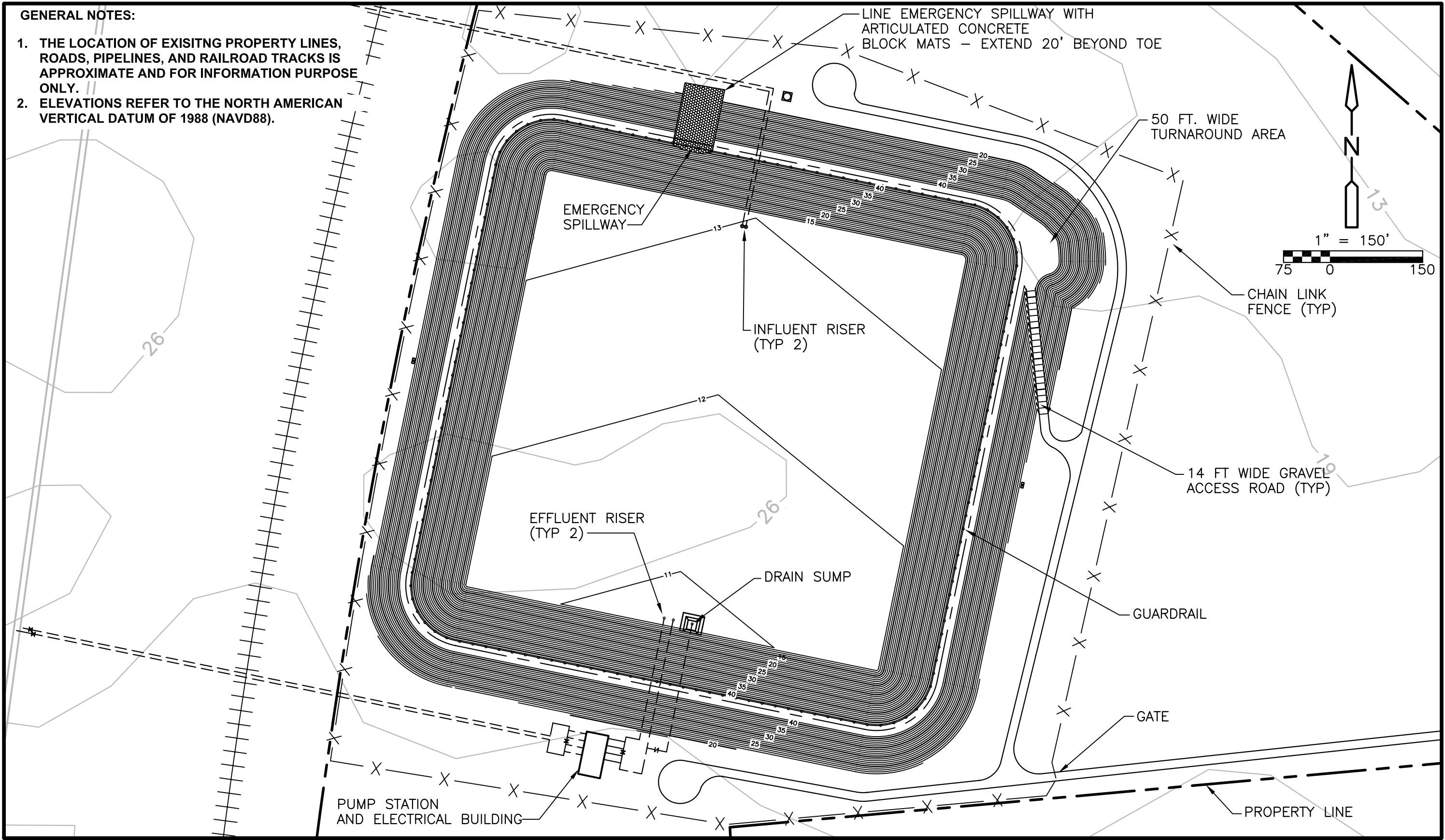
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GENERAL NOTES:

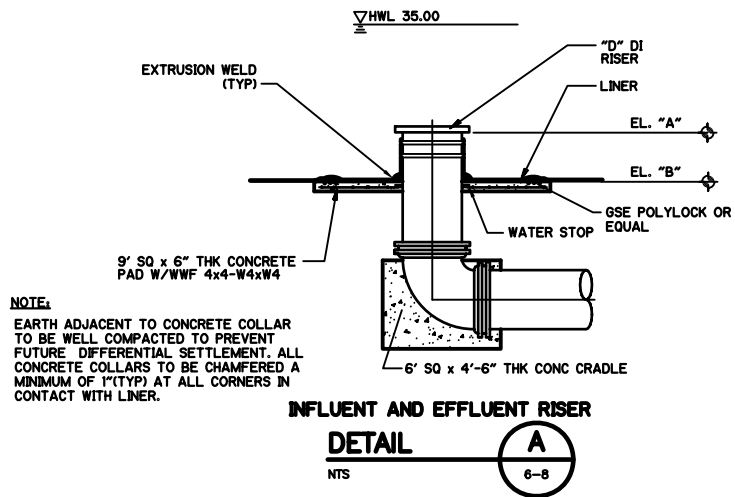
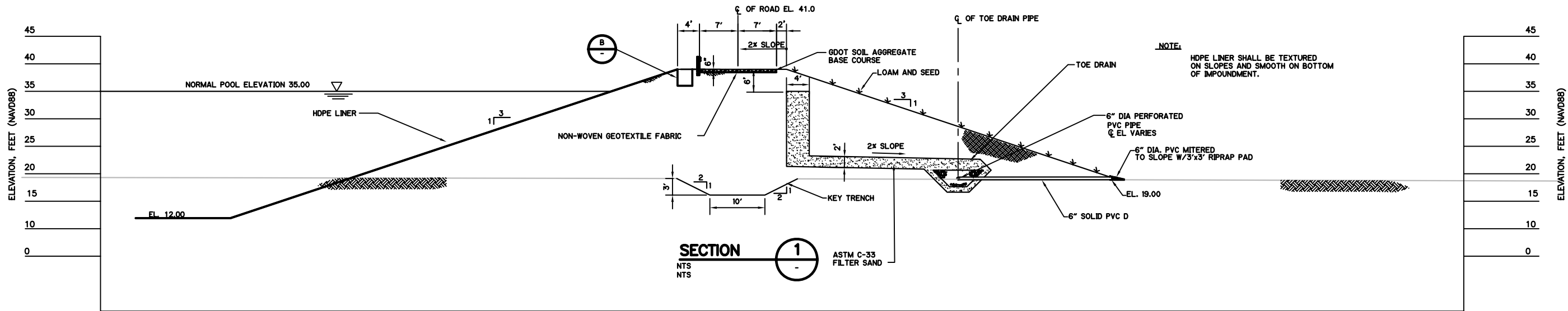
1. THE LOCATION OF EXISTING PROPERTY LINES, ROADS, PIPELINES, AND RAILROAD TRACKS IS APPROXIMATE AND FOR INFORMATION PURPOSE ONLY.
2. ELEVATIONS REFER TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).



consulting • engineering • construction • operations

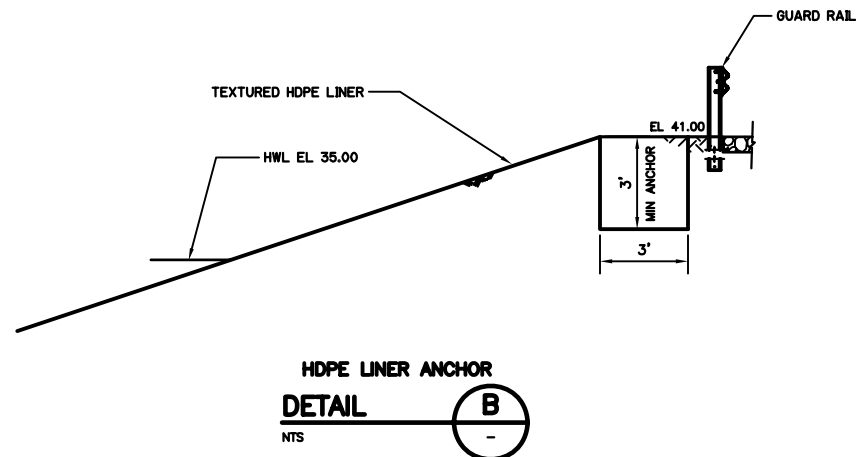
Figure No. 6-9
Preliminary Raw Water Impoundment Grading
November 2011

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"D" FLANGED DI RISER WITH SS SCREEN WITH 1/2" DIA. BARS 6" SQUARE OPENINGS (TYP - OUTLETS ONLY)

| DESCRIPTION | DIA. (IN.) | A (FT.MSL) | B (FT.MSL) |
|-------------|------------|------------|------------|
| OUTLET | 36 | 14.50 | 11.00 |
| OUTLET | 36 | 14.50 | 11.00 |
| INFLUENT | 36 | 16.50 | 13.00 |
| INFLUENT | 36 | 16.50 | 13.00 |



GENERAL NOTES:

1. ALL INFLUENT, OUTLET, AND DRAIN PIPES UNDER RAW WATER IMPOUNDMENT SHALL BE ENCASED IN CONCRETE WITHIN IMPOUNDMENT AND BENEATH EMBANKMENT TO A POINT 20 FT. OUTSIDE TOE OF SLOPE.

Geotechnical Evaluation Memorandum



Memorandum

To: Ryan S. Kingsbury

*From: Stephen L. Whiteside, P.E.
Tyler C. Dunn
Michael P. Smith*

Date: November 9, 2011

*Subject: Preliminary Evaluation of Raw Water Impoundment
Georgia Ports Authority, Savannah, Georgia*

Purpose and Scope

The purpose of this memorandum is to present the preliminary evaluation of the proposed raw water impoundment based on geotechnical, civil, and site constraints. Specifically, the scope of work included the following:

- Review available existing site information;
- Evaluate the civil, geotechnical, and site constraints;
- Evaluate the bottom elevation of the impoundment;
- Perform wave run-up analysis;
- Evaluate embankment settlement;
- Evaluate potential reuse of onsite soils;
- Locate/evaluate potential borrow sources; and
- Prepare a memorandum summarizing the results of the evaluations.

Elevation Datum

Elevations noted herein are in feet and reference to the North American Vertical Datum of 1988 (NAVD 88).

Background

CDM (August 2011) performed a study to evaluate the potential impacts of the Georgia Ports Authority (GPA) Savannah Harbor Expansion Project (SHEP) on treated water quality at the City of Savannah Industrial & Domestic water treatment plant (I&D WTP). The SHEP authorized a deep-draft navigation project up to a depth of 48 feet below Mean Lower Low Water (MLLW) level subject to further evaluation and concurrence by the regulatory agencies.

The City of Savannah I&D WTP provides drinking water to approximately 10,500 domestic customers as well as a number of industries, and draws water from an intake on Abercorn Creek, which joins the Savannah River approximately one mile upstream of the I-95 bridge. Although the intake is well upstream of the proposed harbor deepening project, the deepening would increase the amount (percentage) of seawater that reaches the intake under conditions of high tide and low freshwater flow in the creek. As result, the water quality will be impacted, likely making it difficult for the I&D WTP to continue comply with drinking water regulations. Therefore, CDM recommended that an HDPE-lined raw water impoundment (RWI) with a usable volume of 77.5 million gallons (MG) be constructed in order to stabilize and reduce the chloride concentration pumped to the plant, or that a supplemental intake further upstream be constructed. CDM recommended the total volume of the impoundment be approximately 20% greater than the 77.5-MG usable volume to allow for sediment accumulation, for a total volume of approximately 97 MG.

Existing and Proposed Site Conditions

Existing Site Conditions

The proposed site for the RWI is located within Parcel 3 of the Savannah River International Trade Park (SRITP) located off Route 21 in Savannah, Georgia, as shown on [Figure 1](#). The site is located within a developing industrial park owned by GPA that is primarily undeveloped and covered by both planted pine trees and naturally grown hardwood trees. The site is bounded to the north by an adjacent property and Black Creek, to the west by the CSX railroad, to the south by Little Hearst Branch Creek and Parcel 2, and to the east by an access road and Parcel 4.

The site grades are approximately El. 6 in the north along Black Creek and gradually slope up to approximately El. 19 to El. 26 in the middle of the site. The site then gradually slopes down to approximately El. 13 in the south along Little Hearst Branch Creek.

Proposed Construction

The proposed 97 MG RWI will be approximately 681 ft by 681 ft in plan dimension at the bottom. The impoundment embankments will be constructed with 3 horizontal to 1 vertical (3H:1V) interior and exterior slopes and a 20-foot-wide crest. The impoundment will have a normal pool water depth of 23 feet above the impoundment bottom and a minimum operating water depth of 15.13 feet.

Four (4) 36-inch-diameter pipelines will extend from the existing raw water pipeline on the opposite side of the CSX railroad to the impoundment. An evaluation of the crossings is beyond the scope of this study. A detailed study will need to be performed to evaluate the feasibility of conventional versus trenchless construction methods and to provide recommendations for the design and construction of the crossings.

Civil Evaluation

A civil evaluation was conducted for the proposed RWI. The civil evaluation consisted of siting the impoundment to reduce cut and fill and determine the bottom of the impoundment.

Impoundment Bottom

The base flood elevation for the 100-year flood event within the area of the RWI is equal to El. 12, according to the FEMA Flood Insurance Rate Map. A design groundwater level equal to the 100-year flood level, El. 12, should be used for the impoundment and its appurtenant structures.

To reduce the potential for the development of uplift (buoyancy) forces on the bottom of the liner, we recommend the bottom of the impoundment be approximately at the design groundwater elevation. Sloping the impoundment bottom down from El. 13 to El. 11 for collection is acceptable.

Site Constraints

Various site constraints control the location of the impoundment, such as the topography, wetlands, railroad tracks, and irregular parcel shape. In addition, GPA has requested CDM to site the RWI so as to maintain usable acreage in Parcel 3 for potential lease. CDM evaluated potential locations for the RWI to reduce the amount of cut and fill assuming the bottom of the impoundment is at El. 12. Based on the site constraints, the RWI was located on the western extent of Parcel 3 adjacent to the railroad tracks, as shown on [Figure 2](#). The proposed layout reduces the anticipated cut and fill, reduces embankment height, and maintains usable acreage on Parcel 3.

Geotechnical Evaluation

Embankment Design

The RWI layout and cross-section are shown on [Figures 2 and 3](#), respectively. The impoundment embankments are approximately 22 feet high with a crest width of 20 feet and an interior and exterior slope of 3H:1V. The freeboard is 6 feet above maximum operating pool level (EL. 35). The embankment cross-section includes a chimney and blanket drain that will be constructed with ASTM C-33 sand. A toe drain will be constructed at the outboard end of the blanket drain as shown on [Figure 3](#).

Wave Run-up Analyses

Wave run-up analyses were performed for the interior slopes of the impoundment to assure the embankment is not overtopped during a design storm event. The analyses were performed in accordance with USACE engineering manual EM-1110-2-1414 and EM-1110-2-1420.

To estimate the wave run-up at each interior slope, five key input parameters were required; average water depth, maximum wind speed, wave fetch distance, slope roughness, and slope angle.

The average initial water depth for wave run-up analysis was based upon maximum operating pool conditions at EL. 35 for an average depth of 23 feet. The two design storm events analyzed in the wave run-up included:

- A 3-second wind gust of 50 mph and a rain storm event of the equal to the Probable Maximum Precipitation (46 inches) over a 24-hour period.
- A design 3-second wind gust of 188 mph for Category 5 hurricane winds and a rain storm event equal to 25 percent of the Probable Maximum Precipitation (11.5 inches) over a 24-hour period.

The wave fetch distance is limited by the embankment of the impoundment and is estimated as the radial average of path lengths centered on the longest path to the opposite embankment.

The internal slopes of the embankment will be lined with a 60 mil HDPE liner as shown on [Figure 3](#). All internal slopes were assumed to be 3H:1V, smooth, and impermeable.

The wave run-up calculations indicate the total height of the run-up will be approximately 5 feet above the maximum operating pool for all cases analyzed. Therefore, the 6 feet of available freeboard should be sufficient to prevent overtopping even during rainfall from the design storm event.

Settlement Evaluation

No previous geotechnical studies have been performed at the site to date. A preliminary geotechnical study was performed for Parcels 1, 2, 5, and 7 at the SRITP by WPC (2005).

Based on the WPC report, highly variable soil conditions were encountered across the referenced site at the exploration locations. In general, the subsurface soils encountered in the explorations consisted of interbedded loose to medium sands, clayey sands and firm to stiff sandy clays in the upper 7 to 10 feet underlain by loose to medium dense sands to a depth of 17 to 20 feet. Below the sands, soft clays with interbedded sand layers were encountered to depths of 35 to 38 feet followed by dense to very dense sands until the explorations were terminated. It should be noted that the subsurface explorations conducted at the adjacent parcels are up to more than a 1 mile away and up to 20 feet lower than the existing ground surface at the RWI site, therefore subsurface conditions are anticipated to vary from those encountered at the adjacent parcels.

A conceptual-level settlement evaluation was performed for the RWI embankments assuming subsurface conditions are likely similar to those encountered at the other parcels. Based on the settlement evaluation, up to 3 inches of settlement is anticipated for the RWI embankments. Approximately half of the RWI embankment settlement is anticipated to occur during construction of the embankment.

Source of Embankment Fill

Suitability of Onsite Material for Reuse

A conceptual-level evaluation of the potential reuse of onsite soils as embankment fill was performed. Soil survey maps and information from the United States Department of Agriculture (USDA) were obtained for the subject site, [Attachment A](#). The USDA soil survey indicates soils in the area belong to the Ocilla complex and the Pelham Loamy Sand.

Based on the survey, the top 2 feet in the area is anticipated to consist of Silty Sand (SM) and Poorly Graded Sand with Silt (SP-SM). Based on the present vegetation on site, the material will have various amounts of organic content and roots in the top 2 feet. This material is considered unsuitable for reuse as embankment fill and should be stripped prior to constructing the embankments.

The soil survey indicates the material transitions to a slightly plastic to medium plasticity Sandy Clay (CL) or Clayey Sand (SC) below the top 2 feet. This material is considered suitable for constructing the embankment fill. The depth of the soil survey is limited to approximately 6 feet below ground surface, and no data are available. Until further studies are conducted, we recommend a third of the material encountered be considered unsuitable for planning purposes and additional material will need to be imported from a borrow source. Suitability of the material should be confirmed by a combination of test borings and test pits and laboratory testing.

Potential Borrow Sources

Parcel 5

GPA has indicated a stormwater detention pond may be constructed on Parcel 5, and therefore, it may be a potential borrow source. Parcel 5 of the industrial park is currently undeveloped. A conceptual-level evaluation of soils suitability was performed based on the USDA soil survey and WPC test pits.

As part of the WPC geotechnical study two test pits, TP-3 and TP-4, were performed on Parcel 5. A summary of the soils encountered in the test pits is presented below.

- Poorly Graded Sand (SP) was encountered to depths ranging from 0.5 to 4 feet below ground surface. The top 6 inches also contained roots and organics. This layer of soil is considered unsuitable for embankment construction.
- Below the SP material, slightly plastic to medium plasticity Sandy Clay (CL) or Clayey Sand (SC) was encountered in the test pits to depths ranging from 6 to 10 feet below ground surface. This material is considered suitable for embankment construction.
- Below the CL/SC material a Poorly Graded Sand (SP) was encountered to the bottom of the test pits. This material is not considered suitable for embankment construction.

Based on the soil survey map, the soils at Parcel 5 belong to the Ocilla complex, Ogeechee loamy fine sand, and Cape Fear Soils. The soil survey map for Parcel 5 generally agrees with the soils encountered in the test pits.

The material belonging to the Ocilla complex and Ogeechee loamy fine sand is anticipated to generally have the same composition as the material at the site. Similar to the site, the top layer of Silty Sand (SM) and Poorly Graded Sand with Silt (SP-SM) is not considered suitable for embankment construction. The lower material generally comprised of Sandy Clay (CL) or Clayey Sand (SC) is anticipated to be suitable for construction.

The material belonging Cape fear soils generally consist of slightly plastic to high plasticity silt (ML/MH) and/or clay (CL/CH). Material with a Liquid Limit greater than 45 and a Plasticity Index greater than 15 is not considered suitable for embankment construction. Some separation and processing of the material encountered would likely be required to obtain a suitable mix of granular and fine-grained material to produce a Sandy Clay (CL) or Clayey Sand (SC).

Other Sources

There are several active borrow pits operating in the Savannah, GA area. CDM contacted multiple borrow pit operators to search for suitable embankment fill. Based on discussions with borrow pit operators, prices for material generally comprised of Sandy Clay (CL) or Clayey Sand (SC) ranged from approximately \$3/cubic yard picked up at the borrow pit to approximately \$10 to \$11/cubic yard delivered to the site.

Closure

This memorandum has been prepared exclusively for the Georgia Ports Authority Raw Water Impoundment in Savannah, Georgia based on our understanding of the project at this time and described in this memorandum. The results of the evaluations presented in this memorandum are based on information available at the time of the study and on experience and engineering judgment. This memorandum has been prepared in accordance with generally accepted engineering practices. No other warranty, express or implied, is made. In the event that changes in the design or location of the structures occur, the evaluations and conclusions contained herein should not be considered valid unless verified in writing by CDM.

Attachments:





- Figure 1 – Locus Map
- Figure 2 – Preliminary Raw Water Impoundment Site Layout
- Figure 3 – Preliminary Raw Water Impoundment Section and Details
- Attachment A – USDA Soil Resource Report



Figure 1
Locus Map

Raw Water Impoundment
Savannah, Georgia

Legend

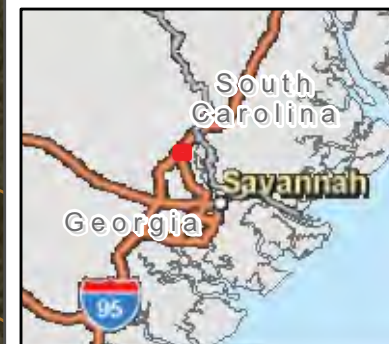
-  Railroad
-  Contour
-  Surface Water
-  Approximate Parcel Boundary

NOTES:

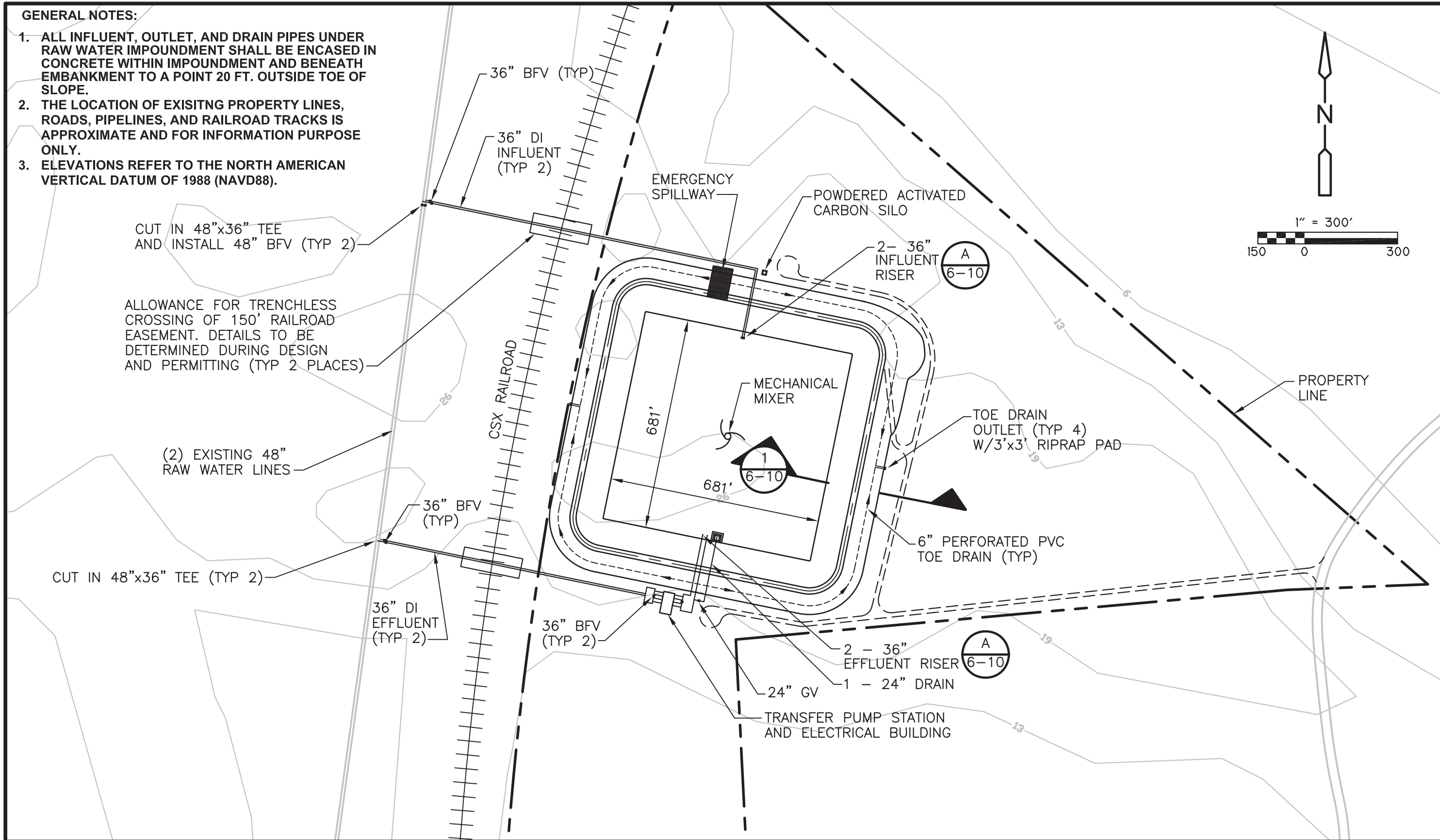
1. Parcel boundary is approximate and not surveyed*
2. Parcel PIN: 1-0903-02-002
3. Acreage: 90.37
4. Contour data obtained from USGS DLGs (1996)
5. Elevations are in feet and reference to NAVD 88

0 250 500 1,000 Feet

1 inch = 1,000 feet



CDM





| DESCRIPTION | DIA. (IN.) | A (FT.MSL) | B (FT.MSL) |
|-------------|---------------|---------------|---------------|
| OUTLET | 36 | 14.50 | 11.00 |
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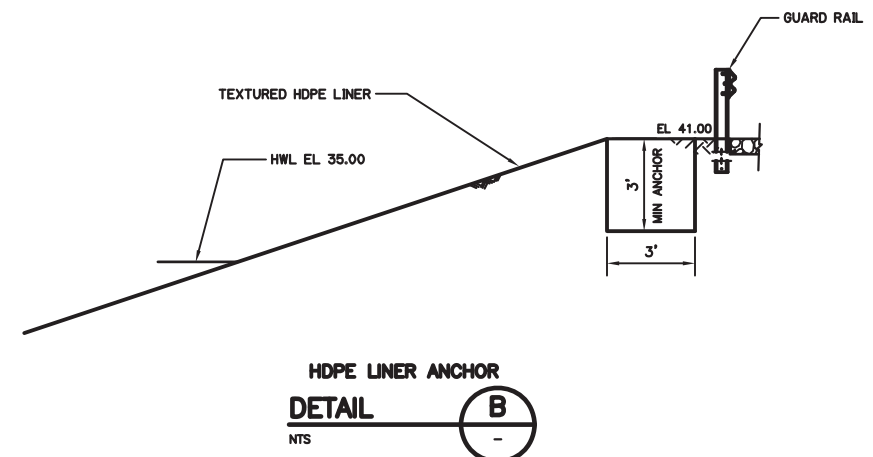


Figure No. 3
Preliminary Raw Water Impoundment Section And Details
November 2011

Attachment A
USDA Soil Resource Report



United States
Department of
Agriculture



NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Bryan and Chatham Counties, Georgia

Georgia Ports Authority - Raw
Water Reservoir



October 18, 2011

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://soils.usda.gov/sqi/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<http://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

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| Cc—Cape Fear soils..... | 13 |
| Cx—Craven loamy fine sand..... | 13 |
| Oj—Ocilla complex..... | 14 |
| Ojc—Ocilla-Urban land complex..... | 15 |
| Ok—Ogeechee loamy fine sand..... | 17 |
| Ol—Olustee fine sand..... | 18 |
| Pl—Pelham loamy sand..... | 19 |
| Pn—Pooler fine sandy loam..... | 20 |
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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

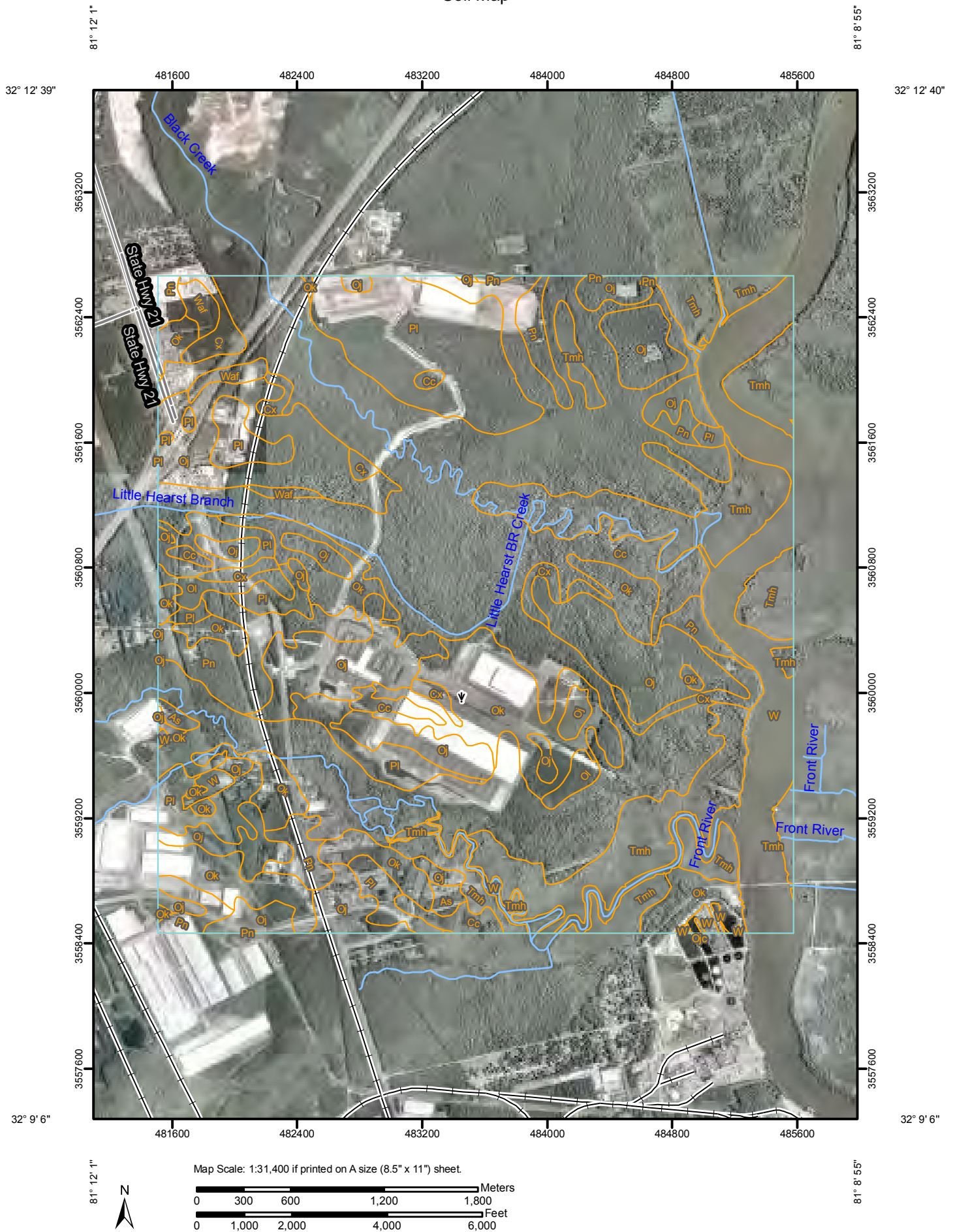
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND






















Area of Interest (AOI)




 Area of Interest (AOI)

Soils




 Soil Map Units

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

-  Gully
-  Short Steep Slope
-  Other






Political Features

-  Cities

Water Features

-  Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

MAP INFORMATION

Map Scale: 1:31,400 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 17N NAD83

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

Soil Survey Area: Bryan and Chatham Counties, Georgia
Survey Area Data: Version 7, Mar 28, 2011

Date(s) aerial images were photographed: 7/19/2007

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 Unit Legend

| Bryan and Chatham Counties, Georgia (GA613) | | | |
|---|---------------------------|----------------|----------------|
| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
| As | Albany fine sand | 15.2 | 0.4% |
| Cc | Cape Fear soils | 1,353.0 | 32.0% |
| Cx | Craven loamy fine sand | 90.2 | 2.1% |
| Oj | Ocilla complex | 663.1 | 15.7% |
| Ojc | Ocilla-Urban land complex | 0.9 | 0.0% |
| Ok | Ogeechee loamy fine sand | 468.6 | 11.1% |
| Ol | Olustee fine sand | 36.3 | 0.9% |
| Pl | Pelham loamy sand | 439.4 | 10.4% |
| Pn | Pooler fine sandy loam | 220.6 | 5.2% |
| Tmh | Tidal marsh, fresh | 565.0 | 13.4% |
| W | Water | 342.8 | 8.1% |
| Waf | Wahee sandy loam | 34.0 | 0.8% |
| Totals for Area of Interest | | 4,229.1 | 100.0% |

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.

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.

Bryan and Chatham Counties, Georgia

As—Albany fine sand

Map Unit Setting

Elevation: 20 to 450 feet

Mean annual precipitation: 44 to 52 inches

Mean annual air temperature: 64 to 70 degrees F

Frost-free period: 230 to 290 days

Map Unit Composition

Albany and similar soils: 95 percent

Minor components: 5 percent

Description of Albany

Setting

Landform: Flats

Landform position (three-dimensional): Rise

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Marine deposits

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 1.98 in/hr)

Depth to water table: About 12 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Very low (about 2.7 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Typical profile

0 to 48 inches: Fine sand

48 to 56 inches: Sandy loam

56 to 88 inches: Sandy clay loam

Minor Components

Pelham

Percent of map unit: 5 percent

Landform: Depressions, flats

Landform position (three-dimensional): Dip

Down-slope shape: Concave, linear

Across-slope shape: Concave, linear

Cc—Cape Fear soils

Map Unit Setting

Mean annual precipitation: 44 to 52 inches

Mean annual air temperature: 64 to 70 degrees F

Frost-free period: 230 to 290 days

Map Unit Composition

Cape fear and similar soils: 100 percent

Description of Cape Fear

Setting

Landform: Drainageways, depressions

Down-slope shape: Linear, concave

Across-slope shape: Concave

Parent material: Marine deposits

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Very poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 0 to 12 inches

Frequency of flooding: Rare

Frequency of ponding: None

Available water capacity: High (about 9.6 inches)

Interpretive groups

Land capability (nonirrigated): 6w

Typical profile

0 to 16 inches: Loam

16 to 52 inches: Clay

52 to 62 inches: Loamy fine sand

Cx—Craven loamy fine sand

Map Unit Setting

Elevation: 20 to 450 feet

Mean annual precipitation: 44 to 52 inches

Mean annual air temperature: 64 to 70 degrees F

Frost-free period: 230 to 290 days

Map Unit Composition

Craven and similar soils: 95 percent

Minor components: 5 percent

Description of Craven

Setting

Landform: Interfluves

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Marine deposits

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

Depth to water table: About 18 to 42 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Moderate (about 7.3 inches)

Interpretive groups

Land capability (nonirrigated): 2w

Typical profile

0 to 13 inches: Loamy fine sand

13 to 48 inches: Sandy clay

48 to 58 inches: Sandy clay loam

58 to 80 inches: Sandy clay loam

Minor Components

Pelham

Percent of map unit: 5 percent

Landform: Depressions, flats

Landform position (three-dimensional): Dip

Down-slope shape: Concave, linear

Across-slope shape: Concave, linear

Oj—Ocilla complex

Map Unit Setting

Elevation: 10 to 450 feet

Mean annual precipitation: 44 to 52 inches

Mean annual air temperature: 64 to 70 degrees F

Frost-free period: 230 to 290 days

Map Unit Composition

Ocilla and similar soils: 95 percent

Minor components: 5 percent

Description of Ocilla

Setting

Landform: Interfluves

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Marine deposits

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 1.98 in/hr)

Depth to water table: About 12 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Low (about 5.5 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Typical profile

0 to 28 inches: Loamy fine sand

28 to 59 inches: Sandy clay loam

59 to 67 inches: Sandy clay loam

Minor Components

Ellabelle

Percent of map unit: 3 percent

Landform: Depressions, drainageways

Down-slope shape: Concave, linear

Across-slope shape: Concave

Pelham

Percent of map unit: 2 percent

Landform: Depressions, flats

Landform position (three-dimensional): Dip

Down-slope shape: Concave, linear

Across-slope shape: Concave, linear

Ojc—Ocilla-Urban land complex

Map Unit Setting

Elevation: 10 to 450 feet

Mean annual precipitation: 44 to 52 inches

Custom Soil Resource Report

Mean annual air temperature: 64 to 70 degrees F

Frost-free period: 230 to 290 days

Map Unit Composition

Ocilla and similar soils: 60 percent

Urban land: 30 percent

Ogeechee and similar soils: 5 percent

Minor components: 5 percent

Description of Ocilla

Setting

Landform: Interfluves

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Marine deposits

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 1.98 in/hr)

Depth to water table: About 12 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Low (about 5.5 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Typical profile

0 to 28 inches: Loamy fine sand

28 to 59 inches: Sandy clay loam

59 to 67 inches: Sandy clay loam

Description of Ogeechee

Setting

Landform: Depressions, drainageways, flats

Down-slope shape: Concave, linear

Across-slope shape: Concave, linear

Parent material: Marine deposits

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: About 0 to 12 inches

Frequency of flooding: Frequent

Frequency of ponding: None

Available water capacity: Moderate (about 6.4 inches)

Interpretive groups

Land capability (nonirrigated): 4w

Typical profile

0 to 8 inches: Loamy fine sand
8 to 23 inches: Sandy clay loam
23 to 42 inches: Sandy clay
42 to 60 inches: Sandy clay loam

Minor Components

Pelham

Percent of map unit: 5 percent
Landform: Depressions, flats
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear

Ok—Ogeechee loamy fine sand

Map Unit Setting

Elevation: 10 to 50 feet
Mean annual precipitation: 44 to 52 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 230 to 290 days

Map Unit Composition

Ogeechee and similar soils: 100 percent

Description of Ogeechee

Setting

Landform: Flats, depressions, drainageways
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Parent material: Marine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water capacity: Moderate (about 6.4 inches)

Interpretive groups

Land capability (nonirrigated): 4w

Typical profile

0 to 8 inches: Loamy fine sand

Custom Soil Resource Report

8 to 23 inches: Sandy clay loam
23 to 42 inches: Sandy clay
42 to 60 inches: Sandy clay loam

Ol—Olustee fine sand

Map Unit Setting

Elevation: 10 to 450 feet
Mean annual precipitation: 44 to 52 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 230 to 290 days

Map Unit Composition

Olustee and similar soils: 95 percent
Minor components: 5 percent

Description of Olustee

Setting

Landform: Flats
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Marine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.8 inches)

Interpretive groups

Land capability (nonirrigated): 3w

Typical profile

0 to 7 inches: Fine sand
7 to 15 inches: Sand
15 to 38 inches: Sand
38 to 80 inches: Sandy clay loam

Minor Components

Ellabelle

Percent of map unit: 3 percent
Landform: Depressions, drainageways
Down-slope shape: Concave, linear
Across-slope shape: Concave

Pelham

Percent of map unit: 2 percent
Landform: Depressions, flats
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear

PI—Pelham loamy sand

Map Unit Setting

Elevation: 20 to 450 feet
Mean annual precipitation: 44 to 52 inches
Mean annual air temperature: 64 to 70 degrees F
Frost-free period: 230 to 290 days

Map Unit Composition

Pelham and similar soils: 100 percent

Description of Pelham

Setting

Landform: Depressions, drainageways, flats
Landform position (three-dimensional): Dip
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Parent material: Marine deposits

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water capacity: Low (about 5.9 inches)

Interpretive groups

Land capability (nonirrigated): 5w

Typical profile

0 to 27 inches: Loamy sand
27 to 56 inches: Sandy clay loam
56 to 68 inches: Sandy clay loam

Pn—Pooler fine sandy loam

Map Unit Setting

Elevation: 20 to 100 feet

Mean annual precipitation: 44 to 52 inches

Mean annual air temperature: 64 to 70 degrees F

Frost-free period: 230 to 290 days

Map Unit Composition

Pooler and similar soils: 100 percent

Description of Pooler

Setting

Landform: Depressions, flats

Down-slope shape: Concave, linear

Across-slope shape: Concave, linear

Parent material: Marine deposits

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 0 to 12 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability (nonirrigated): 6w

Typical profile

0 to 6 inches: Fine sandy loam

6 to 12 inches: Sandy clay loam

12 to 52 inches: Clay

52 to 72 inches: Sandy clay loam

Tmh—Tidal marsh, fresh

Map Unit Setting

Elevation: 0 to 10 feet

Mean annual precipitation: 44 to 52 inches

Mean annual air temperature: 64 to 70 degrees F

Frost-free period: 230 to 290 days

Map Unit Composition

Tidal marsh, fresh: 100 percent

Description of Tidal Marsh, Fresh

Setting

Landform: Tidal marshes

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Marine deposits

Properties and qualities

Slope: 0 to 1 percent

Drainage class: Very poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 0 inches

Frequency of flooding: Frequent

Frequency of ponding: Frequent

Maximum salinity: Nonsaline (0.0 to 2.0 mmhos/cm)

Sodium adsorption ratio, maximum: 20.0

Available water capacity: High (about 11.4 inches)

Interpretive groups

Land capability (nonirrigated): 7w

Typical profile

0 to 8 inches: Silty clay loam

8 to 60 inches: Silty clay

W—Water

Map Unit Setting

Mean annual precipitation: 52 to 68 inches

Mean annual air temperature: 54 to 59 degrees F

Frost-free period: 160 to 210 days

Map Unit Composition

Water: 100 percent

Waf—Wahee sandy loam

Map Unit Setting

Elevation: 20 to 450 feet

Mean annual precipitation: 44 to 52 inches

Mean annual air temperature: 64 to 70 degrees F

Frost-free period: 230 to 290 days

Map Unit Composition

Wahee and similar soils: 95 percent

Minor components: 5 percent

Description of Wahee

Setting

Landform: Interfluves

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Marine deposits

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 6 to 18 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: High (about 9.2 inches)

Interpretive groups

Land capability (nonirrigated): 2w

Typical profile

0 to 11 inches: Sandy loam

11 to 56 inches: Clay

56 to 65 inches: Sandy clay loam

Minor Components

Pooler

Percent of map unit: 5 percent

Landform: Depressions, flats

Landform position (three-dimensional): Talf

Down-slope shape: Concave, linear

Across-slope shape: Concave, linear

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Unified Soil Classification (Surface)

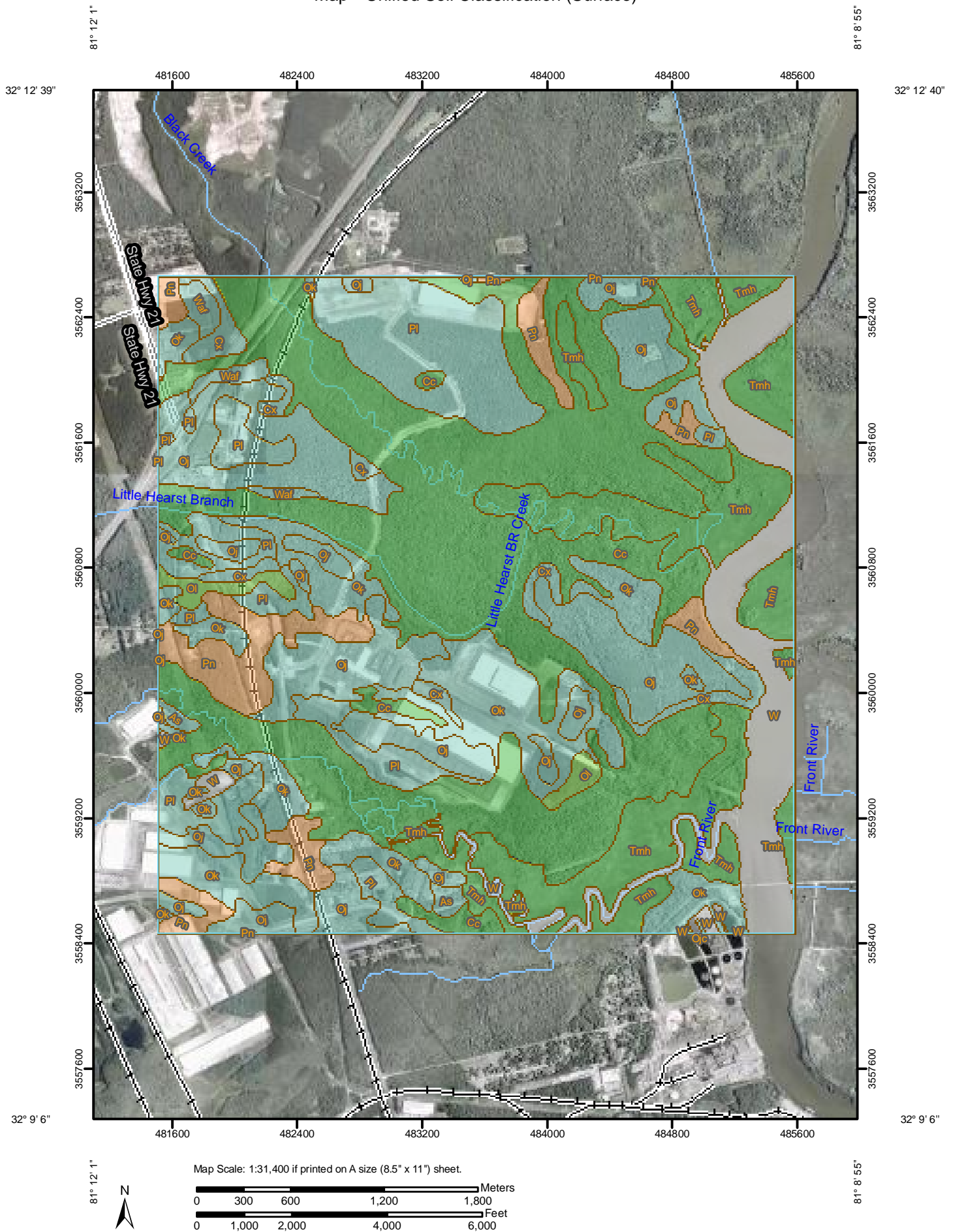
The Unified soil classification system classifies mineral and organic mineral soils for engineering purposes on the basis of particle-size characteristics, liquid limit, and plasticity index. It identifies three major soil divisions: (i) coarse-grained soils having less than 50 percent, by weight, particles smaller than 0.074 mm in diameter; (ii) fine-grained soils having 50 percent or more, by weight, particles smaller than 0.074 mm in diameter; and (iii) highly organic soils that demonstrate certain organic characteristics. These divisions are further subdivided into a total of 15 basic soil groups. The major soil divisions and basic soil groups are determined on the basis of estimated or measured values for grain-size distribution and Atterberg limits. ASTM D 2487 shows the criteria chart used for classifying soil in the Unified system and the 15 basic soil groups of the system and the plasticity chart for the Unified system.

The various groupings of this classification correlate in a general way with the engineering behavior of soils. This correlation provides a useful first step in any field or laboratory investigation for engineering purposes. It can serve to make some general interpretations relating to probable performance of the soil for engineering uses.

Custom Soil Resource Report

For each soil horizon in the database one or more Unified soil classifications may be listed. One is marked as the representative or most commonly occurring. The representative classification is shown here for the surface layer of the soil.


Custom Soil Resource Report
Map—Unified Soil Classification (Surface)



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Units


Soil Ratings


 CH


 CL

 CL-A (proposed)

 CL-K (proposed)

 CL-ML

 CL-O (proposed)

 CL-T (proposed)

 GC

 GC-GM

 GM

 GP

 GP-GC


 GP-GM


 GW


 GW-GC


 GW-GM

 MH

 MH-A (proposed)


 MH-K (proposed)


 MH-O (proposed)


 MH-T (proposed)

 ML


 ML-A (proposed)

 ML-K (proposed)

 ML-O (proposed)

 ML-T (proposed)


 OH

 OH-T (proposed)

 OL


 PT


 SC

 SC-SM


 SM


 SP

 SP-SC

 SP-SM

 SW

 SW-SC


 SW-SM

 Not rated or not available

Political Features

 Cities

Water Features

 Streams and Canals


Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

MAP INFORMATION

Map Scale: 1:31,400 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

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 accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
Coordinate System: UTM Zone 17N NAD83

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

Soil Survey Area: Bryan and Chatham Counties, Georgia
Survey Area Data: Version 7, Mar 28, 2011

Date(s) aerial images were photographed: 7/19/2007

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.

Table—Unified Soil Classification (Surface)

| Unified Soil Classification (Surface)— Summary by Map Unit — Bryan and Chatham Counties, Georgia (GA613) | | | | |
|--|---------------------------|--------|----------------|----------------|
| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
| As | Albany fine sand | SM | 15.2 | 0.4% |
| Cc | Cape Fear soils | CL | 1,353.0 | 32.0% |
| Cx | Craven loamy fine sand | SM | 90.2 | 2.1% |
| Oj | Ocilla complex | SM | 663.1 | 15.7% |
| Ojc | Ocilla-Urban land complex | SM | 0.9 | 0.0% |
| Ok | Ogeechee loamy fine sand | SM | 468.6 | 11.1% |
| Ol | Olustee fine sand | SP-SM | 36.3 | 0.9% |
| Pl | Pelham loamy sand | SM | 439.4 | 10.4% |
| Pn | Pooler fine sandy loam | SC | 220.6 | 5.2% |
| Tmh | Tidal marsh, fresh | CL | 565.0 | 13.4% |
| W | Water | | 342.8 | 8.1% |
| Waf | Wahee sandy loam | SM | 34.0 | 0.8% |
| Totals for Area of Interest | | | 4,229.1 | 100.0% |

Rating Options—Unified Soil Classification (Surface)

Aggregation Method: Dominant Component

Aggregation is the process by which a set of component attribute values is reduced to a single value that represents the map unit as a whole.

A map unit is typically composed of one or more "components". A component is either some type of soil or some nonsoil entity, e.g., rock outcrop. For the attribute being aggregated, the first step of the aggregation process is to derive one attribute value for each of a map unit's components. From this set of component attributes, the next step of the aggregation process derives a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for soil map units can be rendered. Aggregation must be done because, on any soil map, map units are delineated but components are not.

For each of a map unit's components, a corresponding percent composition is recorded. A percent composition of 60 indicates that the corresponding component typically makes up approximately 60% of the map unit. Percent composition is a critical factor in some, but not all, aggregation methods.

The aggregation method "Dominant Component" returns the attribute value associated with the component with the highest percent composition in the map unit. If more than one component shares the highest percent composition, the corresponding "tie-break" rule determines which value should be returned. The "tie-break" rule indicates whether the lower or higher attribute value should be returned in the case of a percent composition tie.

Custom Soil Resource Report

The result returned by this aggregation method may or may not represent the dominant condition throughout the map unit.

Component Percent Cutoff: None Specified

Components whose percent composition is below the cutoff value will not be considered. If no cutoff value is specified, all components in the database will be considered. The data for some contrasting soils of minor extent may not be in the database, and therefore are not considered.

Tie-break Rule: Lower

The tie-break rule indicates which value should be selected from a set of multiple candidate values, or which value should be selected in the event of a percent composition tie.

Layer Options: Surface Layer

For an attribute of a soil horizon, a depth qualification must be specified. In most cases it is probably most appropriate to specify a fixed depth range, either in centimeters or inches. The Bottom Depth must be greater than the Top Depth, and the Top Depth can be greater than zero. The choice of "inches" or "centimeters" only applies to the depth of soil to be evaluated. It has no influence on the units of measure the data are presented in.

When "Surface Layer" is specified as the depth qualifier, only the surface layer or horizon is considered when deriving a value for a component, but keep in mind that the thickness of the surface layer varies from component to component.

When "All Layers" is specified as the depth qualifier, all layers recorded for a component are considered when deriving the value for that component.

Whenever more than one layer or horizon is considered when deriving a value for a component, and the attribute being aggregated is a numeric attribute, a weighted average value is returned, where the weighting factor is the layer or horizon thickness.

Soil Reports

The Soil Reports section includes various formatted tabular and narrative reports (tables) containing data for each selected soil map unit and each component of each unit. No aggregation of data has occurred as is done in reports in the Soil Properties and Qualities and Suitabilities and Limitations sections.

The reports contain soil interpretive information as well as basic soil properties and qualities. A description of each report (table) is included.

Soil Physical Properties

This folder contains a collection of tabular reports that present soil physical properties. The reports (tables) include all selected map units and components for each map unit. Soil physical properties are measured or inferred from direct observations in the field or laboratory. Examples of soil physical properties include percent clay, organic matter, saturated hydraulic conductivity, available water capacity, and bulk density.

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

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If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an oven-dry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

References:

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

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Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash.

| Engineering Properties— Bryan and Chatham Counties, Georgia | | | | | | | | | | | | |
|---|-----------|---|----------------|--------------------|------------|-------------|----------------------------------|--------|--------|-------|--------------|------------------|
| Map unit symbol and soil name | Depth | USDA texture | Classification | | Fragments | | Percentage passing sieve number— | | | | Liquid limit | Plasticity index |
| | | | Unified | AASHTO | >10 inches | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | <i>In</i> | | | | <i>Pct</i> | <i>Pct</i> | | | | | <i>Pct</i> | |
| As—Albany fine sand | | | | | | | | | | | | |
| Albany | 0-48 | *Fine sand | SM, SP-SM | A-2 | 0 | 0 | 100 | 100 | 75-90 | 10-20 | — | NP |
| | 48-56 | *Sandy loam | SM | A-2 | 0 | 0 | 100 | 100 | 75-92 | 22-30 | — | NP |
| | 56-88 | *Sandy clay loam, Sandy loam, fine sandy loam | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 97-100 | 95-100 | 70-100 | 20-50 | 15-40 | NP-17 |
| Pelham | 0-27 | *Loamy sand | SM | A-2 | 0 | 0 | 100 | 95-100 | 75-90 | 15-30 | — | NP |
| | 27-56 | *Sandy clay loam, Sandy loam, fine sandy loam | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 95-100 | 65-90 | 27-50 | 15-30 | 2-12 |
| | 56-68 | *Sandy clay loam, Sandy loam, sandy clay | CL, ML, SC, SM | A-2, A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 65-90 | 27-65 | 20-45 | 3-20 |
| Cc—Cape Fear soils | | | | | | | | | | | | |
| Cape fear | 0-16 | *Loam | CL, CL-ML, ML | A-4, A-6 | 0 | 0 | 100 | 95-100 | 85-100 | 60-90 | 20-40 | 3-15 |
| | 16-52 | *Clay, Clay loam, silty clay | CH, CL, MH, ML | A-7 | 0 | 0 | 100 | 95-100 | 90-100 | 60-85 | 41-65 | 15-35 |
| | 52-62 | *Loamy fine sand, Sand, loamy sand | SM, SP, SP-SM | A-2, A-3 | 0 | 0 | 95-100 | 95-100 | 50-80 | 2-25 | 0-20 | NP |

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| Engineering Properties— Bryan and Chatham Counties, Georgia | | | | | | | | | | | | |
|---|-----------|---|----------------|--------------------|------------|-------------|----------------------------------|--------|--------|-------|--------------|------------------|
| Map unit symbol and soil name | Depth | USDA texture | Classification | | Fragments | | Percentage passing sieve number— | | | | Liquid limit | Plasticity index |
| | | | Unified | AASHTO | >10 inches | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | <i>In</i> | | | | <i>Pct</i> | <i>Pct</i> | | | | | <i>Pct</i> | |
| Cx—Craven loamy fine sand | | | | | | | | | | | | |
| Craven | 0-13 | *Loamy fine sand | SC-SM, SM | A-2 | 0 | 0 | 100 | 95-100 | 50-100 | 18-35 | 15-20 | NP-4 |
| | 13-48 | *Sandy clay, Clay, clay loam | CL, SC | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 70-99 | 45-80 | 25-45 | 8-37 |
| | 48-58 | *Sandy clay loam, Sandy loam | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 90-100 | 60-100 | 18-50 | 15-35 | 3-15 |
| | 58-80 | *Sandy clay loam, Sandy loam, loamy sand | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 95-100 | 50-100 | 15-49 | 15-35 | NP-15 |
| Pelham | 0-27 | *Loamy sand | SM | A-2 | 0 | 0 | 100 | 95-100 | 75-90 | 15-30 | — | NP |
| | 27-56 | *Sandy clay loam, Sandy loam, fine sandy loam | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 95-100 | 65-90 | 27-50 | 15-30 | 2-12 |
| | 56-68 | *Sandy clay loam, Sandy loam, sandy clay | CL, ML, SC, SM | A-2, A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 65-90 | 27-65 | 20-45 | 3-20 |

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| Engineering Properties— Bryan and Chatham Counties, Georgia | | | | | | | | | | | | |
|---|-----------|---|----------------|--------------------|------------|-------------|----------------------------------|--------|--------|-------|--------------|------------------|
| Map unit symbol and soil name | Depth | USDA texture | Classification | | Fragments | | Percentage passing sieve number— | | | | Liquid limit | Plasticity index |
| | | | Unified | AASHTO | >10 inches | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | <i>In</i> | | | | <i>Pct</i> | <i>Pct</i> | | | | | <i>Pct</i> | |
| Oj—Ocilla complex | | | | | | | | | | | | |
| Ocilla | 0-28 | *Loamy fine sand | SM, SP-SM | A-2, A-3 | 0 | 0 | 100 | 95-100 | 75-100 | 8-35 | — | NP |
| | 28-59 | *Sandy clay loam, Sandy loam, fine sandy loam | CL, ML, SC, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 95-100 | 80-100 | 20-55 | 20-40 | NP-18 |
| | 59-67 | *Sandy clay loam, Sandy clay, sandy loam | CL, SC | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 80-100 | 36-60 | 20-45 | 7-20 |
| Ellabelle | 0-27 | *Loamy sand | SM, SP-SM | A-1, A-2 | 0 | 0 | 100 | 95-100 | 48-75 | 11-26 | — | NP |
| | 27-64 | *Sandy clay loam | SC | A-6, A-7 | 0 | 0 | 100 | 95-100 | 65-90 | 36-47 | 32-46 | 15-25 |
| | 64-72 | *Sandy clay loam, Sandy clay | CL, SC | A-6, A-7 | 0 | 0 | 100 | 95-100 | 55-85 | 38-55 | 36-46 | 15-25 |
| Pelham | 0-27 | *Loamy sand | SM | A-2 | 0 | 0 | 100 | 95-100 | 75-90 | 15-30 | — | NP |
| | 27-56 | *Sandy clay loam, Sandy loam, fine sandy loam | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 95-100 | 65-90 | 27-50 | 15-30 | 2-12 |
| | 56-68 | *Sandy clay loam, Sandy loam, sandy clay | CL, ML, SC, SM | A-2, A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 65-90 | 27-65 | 20-45 | 3-20 |

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| Engineering Properties— Bryan and Chatham Counties, Georgia | | | | | | | | | | | | |
|---|-----------|---|----------------|--------------------|------------|-------------|----------------------------------|--------|--------|-------|--------------|------------------|
| Map unit symbol and soil name | Depth | USDA texture | Classification | | Fragments | | Percentage passing sieve number— | | | | Liquid limit | Plasticity index |
| | | | Unified | AASHTO | >10 inches | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | <i>In</i> | | | | <i>Pct</i> | <i>Pct</i> | | | | | <i>Pct</i> | |
| Ojc—Ocilla-Urban land complex | | | | | | | | | | | | |
| Ocilla | 0-28 | *Loamy fine sand | SM, SP-SM | A-2, A-3 | 0 | 0 | 100 | 95-100 | 75-100 | 8-35 | — | NP |
| | 28-59 | *Sandy clay loam, Sandy loam, fine sandy loam | CL, ML, SC, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 95-100 | 80-100 | 20-55 | 20-40 | NP-18 |
| | 59-67 | *Sandy clay loam, Sandy clay, sandy loam | CL, SC | A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 80-100 | 36-60 | 20-45 | 7-20 |
| Urban land | — | — | — | — | — | — | — | — | — | — | — | — |
| Ogeechee | 0-8 | *Loamy fine sand | SM, SP-SM | A-1-b, A-2 | 0 | 0 | 100 | 95-100 | 48-70 | 10-25 | — | NP |
| | 8-23 | *Sandy clay loam, Clay loam | CL, SC | A-6 | 0 | 0 | 100 | 95-100 | 65-90 | 40-55 | 27-40 | 12-23 |
| | 23-42 | *Sandy clay, Sandy clay loam, clay | CL, SC | A-6, A-7 | 0 | 0 | 100 | 95-100 | 65-90 | 43-65 | 32-46 | 16-24 |
| | 42-60 | *Sandy clay loam, Clay loam, sandy loam | CL, SC | A-2, A-6 | 0 | 0 | 100 | 90-100 | 50-65 | 25-45 | 30-40 | 15-25 |
| Pelham | 0-27 | *Loamy sand | SM | A-2 | 0 | 0 | 100 | 95-100 | 75-90 | 15-30 | — | NP |
| | 27-56 | *Sandy clay loam, Sandy loam, fine sandy loam | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 95-100 | 65-90 | 27-50 | 15-30 | 2-12 |
| | 56-68 | *Sandy clay loam, Sandy loam, sandy clay | CL, ML, SC, SM | A-2, A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 65-90 | 27-65 | 20-45 | 3-20 |

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| Engineering Properties— Bryan and Chatham Counties, Georgia | | | | | | | | | | | | |
|---|-----------|---|----------------|--------------------|------------|-------------|----------------------------------|--------|--------|-------|--------------|------------------|
| Map unit symbol and soil name | Depth | USDA texture | Classification | | Fragments | | Percentage passing sieve number— | | | | Liquid limit | Plasticity index |
| | | | Unified | AASHTO | >10 inches | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | <i>In</i> | | | | <i>Pct</i> | <i>Pct</i> | | | | | <i>Pct</i> | |
| Ok—Ogeechee loamy fine sand | | | | | | | | | | | | |
| Ogeechee | 0-8 | *Loamy fine sand | SM, SP-SM | A-1-b, A-2 | 0 | 0 | 100 | 95-100 | 48-70 | 10-25 | — | NP |
| | 8-23 | *Sandy clay loam, Clay loam | CL, SC | A-6 | 0 | 0 | 100 | 95-100 | 65-90 | 40-55 | 27-40 | 12-23 |
| | 23-42 | *Sandy clay, Sandy clay loam, clay | CL, SC | A-6, A-7 | 0 | 0 | 100 | 95-100 | 65-90 | 43-65 | 32-46 | 16-24 |
| | 42-60 | *Sandy clay loam, Clay loam, sandy loam | SC | A-2, A-6 | 0 | 0 | 100 | 90-100 | 50-65 | 25-45 | 30-40 | 15-25 |
| OI—Olstee fine sand | | | | | | | | | | | | |
| Olstee | 0-7 | *Fine sand | SM, SP-SM | A-2-4, A-3 | 0 | 0 | 100 | 100 | 75-100 | 5-15 | — | NP |
| | 7-15 | *Sand, Fine sand, loamy sand | SM, SP-SM | A-2-4, A-3 | 0 | 0 | 100 | 100 | 75-100 | 5-15 | — | NP |
| | 15-38 | *Sand, Fine sand, loamy sand | SM, SP-SM | A-2-4, A-3 | 0 | 0 | 100 | 100 | 75-100 | 5-15 | — | NP |
| | 38-80 | *Sandy clay loam, Sandy loam | SC, SC-SM | A-2, A-4, A-6 | 0 | 0 | 100 | 100 | 85-100 | 30-45 | 20-38 | 4-15 |
| Ellabelle | 0-27 | *Loamy sand | SM, SP-SM | A-1, A-2 | 0 | 0 | 100 | 95-100 | 48-75 | 11-26 | — | NP |
| | 27-64 | *Sandy clay loam | SC | A-6, A-7 | 0 | 0 | 100 | 95-100 | 65-90 | 36-47 | 32-46 | 15-25 |
| | 64-72 | *Sandy clay loam, Sandy clay | CL, SC | A-6, A-7 | 0 | 0 | 100 | 95-100 | 55-85 | 38-55 | 36-46 | 15-25 |
| Pelham | 0-27 | *Loamy sand | SM | A-2 | 0 | 0 | 100 | 95-100 | 75-90 | 15-30 | — | NP |
| | 27-56 | *Sandy clay loam, Sandy loam, fine sandy loam | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 95-100 | 65-90 | 27-50 | 15-30 | 2-12 |
| | 56-68 | *Sandy clay loam, Sandy loam, sandy clay | CL, ML, SC, SM | A-2, A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 65-90 | 27-65 | 20-45 | 3-20 |

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| Engineering Properties— Bryan and Chatham Counties, Georgia | | | | | | | | | | | | |
|---|-----------|---|--------------------------|--------------------|------------|-------------|----------------------------------|--------|--------|--------|--------------|------------------|
| Map unit symbol and soil name | Depth | USDA texture | Classification | | Fragments | | Percentage passing sieve number— | | | | Liquid limit | Plasticity index |
| | | | Unified | AASHTO | >10 inches | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | <i>In</i> | | | | <i>Pct</i> | <i>Pct</i> | | | | | <i>Pct</i> | |
| PI—Pelham loamy sand | | | | | | | | | | | | |
| Pelham | 0-27 | *Loamy sand | SM | A-2 | 0 | 0 | 100 | 95-100 | 75-90 | 15-30 | — | NP |
| | 27-56 | *Sandy clay loam, Sandy loam, fine sandy loam | SC, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 95-100 | 65-90 | 27-50 | 15-30 | 2-12 |
| | 56-68 | *Sandy clay loam, Sandy loam, sandy clay | CL, ML, SC, SM | A-2, A-4, A-6, A-7 | 0 | 0 | 100 | 95-100 | 65-90 | 27-65 | 20-45 | 3-20 |
| Pn—Pooler fine sandy loam | | | | | | | | | | | | |
| Pooler | 0-6 | *Fine sandy loam | SC, CL-ML, ML, SC-SM, SM | A-2, A-4, A-6 | 0 | 0 | 100 | 95-100 | 51-98 | 20-75 | 15-40 | NP-20 |
| | 6-12 | *Sandy clay loam, Sandy loam | SC, SC-SM, SM | A-2, A-4 | 0 | 0 | 100 | 95-100 | 55-95 | 25-50 | 20-35 | 4-10 |
| | 12-52 | *Clay, Sandy clay | CH, CL, MH | A-7 | 0 | 0 | 100 | 95-100 | 70-100 | 50-95 | 45-65 | 20-40 |
| | 52-72 | *Sandy clay loam, Sandy loam, clay loam | CL, SC | A-2, A-6, A-7 | 0 | 0 | 100 | 85-100 | 60-80 | 25-75 | 30-50 | 11-25 |
| Tmh—Tidal marsh, fresh | | | | | | | | | | | | |
| Tidal marsh, fresh | 0-8 | *Silty clay loam | CH, CL | A-6, A-7 | 0 | 0 | 100 | 100 | 98-100 | 85-100 | 30-65 | 12-35 |
| | 8-60 | *Silty clay, Clay, silty clay loam | CH, CL | A-6, A-7 | 0 | 0 | 100 | 100 | 98-100 | 85-100 | 35-65 | 15-35 |
| W—Water | | | | | | | | | | | | |
| Water | — | — | — | — | — | — | — | — | — | — | — | — |

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| Engineering Properties— Bryan and Chatham Counties, Georgia | | | | | | | | | | | | |
|---|-----------|---|--------------------------|---------------|------------|-------------|----------------------------------|--------|--------|-------|--------------|------------------|
| Map unit symbol and soil name | Depth | USDA texture | Classification | | Fragments | | Percentage passing sieve number— | | | | Liquid limit | Plasticity index |
| | | | Unified | AASHTO | >10 inches | 3-10 inches | 4 | 10 | 40 | 200 | | |
| | <i>In</i> | | | | <i>Pct</i> | <i>Pct</i> | | | | | <i>Pct</i> | |
| Waf—Wahee sandy loam | | | | | | | | | | | | |
| Wahee | 0-11 | *Sandy loam | SC-SM, SM | A-2, A-4 | 0 | 0 | 100 | 95-100 | 50-98 | 30-50 | 15-28 | NP-7 |
| | 11-56 | *Clay, Clay loam, silty clay | CH, CL | A-6, A-7 | 0 | 0 | 100 | 100 | 85-100 | 51-92 | 38-81 | 16-54 |
| | 56-65 | *Sandy clay loam, Sandy clay, clay | MH, ML, SM | A-4, A-6, A-7 | 0 | 0 | 90-100 | 65-100 | 50-100 | 36-90 | 30-60 | 7-25 |
| Pooler | 0-6 | *Fine sandy loam | CL-ML, ML, SC-SM, SM, SC | A-2, A-4, A-6 | 0 | 0 | 100 | 95-100 | 51-98 | 20-75 | 15-40 | NP-20 |
| | 6-12 | *Sandy clay loam, Sandy loam | SC, SC-SM, SM | A-2, A-4 | 0 | 0 | 100 | 95-100 | 55-95 | 25-50 | 20-35 | 4-10 |
| | 12-52 | *Clay, Sandy clay | CH, CL, MH | A-7 | 0 | 0 | 100 | 95-100 | 70-100 | 50-95 | 45-65 | 20-40 |
| | 52-72 | *Sandy clay loam, Sandy loam, clay loam | CL, SC | A-2, A-6, A-7 | 0 | 0 | 100 | 85-100 | 60-80 | 25-75 | 30-50 | 11-25 |

Physical Soil Properties

This table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity (*K_{sat}*), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Saturated hydraulic conductivity (K_{sat}) refers to the ease with which pores in a saturated soil transmit water. The estimates in the table are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (*K_{sat}*) is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In this table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained by returning crop residue to the soil.

Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in the table as the K factor (K_w and K_f) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and K_{sat} . Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor K_w indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor K_f indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook."

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion.

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There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Reference:

United States Department of Agriculture, Natural Resources Conservation Service.
National soil survey handbook, title 430-VI. (<http://soils.usda.gov>)

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| Physical Soil Properties– Bryan and Chatham Counties, Georgia | | | | | | | | | | | | | | |
|---|-----------|------------|------------|------------|--------------------------|--|--------------------------------|-------------------------|-------------------|-----------------|-----|---|------------------------------|------------------------------|
| Map symbol and soil name | Depth | Sand | Silt | Clay | Moist bulk density | Saturated hydraulic conductivity | Available water capacity | Linear extensibility | Organic matter | Erosion factors | | | Wind erodibility group | Wind erodibility index |
| | | | | | | | | | | Kw | Kf | T | | |
| | <i>In</i> | <i>Pct</i> | <i>Pct</i> | <i>Pct</i> | <i>g/cc</i> | <i>micro m/sec</i> | <i>In/In</i> | <i>Pct</i> | <i>Pct</i> | | | | | |
| As—Albany fine sand | | | | | | | | | | | | | | |
| Albany | 0-48 | -93- | - 1- | 1- 6- 10 | 1.40-1.55 | 42.00-141.00 | 0.02-0.04 | 0.0-2.9 | 1.0-2.0 | .10 | .10 | 5 | 1 | 220 |
| | 48-56 | -66- | -23- | 1-11- 20 | 1.50-1.70 | 14.00-42.00 | 0.08-0.10 | 0.0-2.9 | 0.0-0.5 | .20 | .20 | | | |
| | 56-88 | -58- | -18- | 13-24- 35 | 1.55-1.65 | 1.40-14.00 | 0.10-0.16 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |
| Pelham | 0-27 | -84- | - 9- | 5- 8- 10 | 1.50-1.70 | 42.00-141.00 | 0.05-0.08 | 0.0-2.9 | 1.0-2.0 | .10 | .10 | 5 | 2 | 134 |
| | 27-56 | -60- | -18- | 15-23- 30 | 1.30-1.60 | 4.00-14.00 | 0.10-0.13 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |
| | 56-68 | -55- | -17- | 15-28- 40 | 1.30-1.60 | 1.40-14.00 | 0.10-0.16 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |
| Cc—Cape Fear soils | | | | | | | | | | | | | | |
| Cape fear | 0-16 | -46- | -44- | 5-10- 15 | 1.30-1.50 | 4.00-42.00 | 0.15-0.22 | 0.0-2.9 | 5.0-15.0 | .15 | .15 | 5 | 5 | 56 |
| | 16-52 | -23- | -29- | 35-48- 60 | 1.25-1.40 | 0.42-1.40 | 0.12-0.22 | 3.0-5.9 | 0.0-0.5 | .32 | .32 | | | |
| | 52-62 | -78- | -16- | 2- 6- 10 | 1.50-1.70 | 42.00-141.00 | 0.04-0.08 | 0.0-2.9 | 0.5-3.0 | .17 | .17 | | | |
| Cx—Craven loamy fine sand | | | | | | | | | | | | | | |
| Craven | 0-13 | -84- | - 7- | 5-10- 15 | 1.50-1.60 | 42.00-141.00 | 0.06-0.09 | 0.0-2.9 | 0.5-2.0 | .15 | .15 | 5 | 2 | 134 |
| | 13-48 | -50- | -12- | 35-39- 45 | 1.50-1.70 | 1.40-4.00 | 0.12-0.16 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |
| | 48-58 | -57- | -18- | 15-25- 35 | 1.50-1.70 | 4.00-14.00 | 0.10-0.14 | 0.0-2.9 | 0.0-0.5 | .20 | .20 | | | |
| | 58-80 | -61- | -19- | 5-20- 35 | 1.35-1.60 | 1.40-42.00 | 0.08-0.14 | 0.0-2.9 | 0.0-0.5 | .32 | .32 | | | |
| Pelham | 0-27 | -84- | - 9- | 5- 8- 10 | 1.50-1.70 | 42.00-141.00 | 0.05-0.08 | 0.0-2.9 | 1.0-2.0 | .10 | .10 | 5 | 2 | 134 |
| | 27-56 | -60- | -18- | 15-23- 30 | 1.30-1.60 | 4.00-14.00 | 0.10-0.13 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |
| | 56-68 | -55- | -17- | 15-28- 40 | 1.30-1.60 | 1.40-14.00 | 0.10-0.16 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |

Custom Soil Resource Report

| Physical Soil Properties– Bryan and Chatham Counties, Georgia | | | | | | | | | | | | | | |
|---|-----------|------------|------------|------------|--------------------|----------------------------------|--------------------------|----------------------|----------------|-----------------|-----|---|------------------------|------------------------|
| Map symbol and soil name | Depth | Sand | Silt | Clay | Moist bulk density | Saturated hydraulic conductivity | Available water capacity | Linear extensibility | Organic matter | Erosion factors | | | Wind erodibility group | Wind erodibility index |
| | | | | | | | | | | Kw | Kf | T | | |
| | <i>In</i> | <i>Pct</i> | <i>Pct</i> | <i>Pct</i> | <i>g/cc</i> | <i>micro m/sec</i> | <i>In/in</i> | <i>Pct</i> | <i>Pct</i> | | | | | |
| Oj—Ocilla complex | | | | | | | | | | | | | | |
| Ocilla | 0-28 | -86- | - 7- | 4- 7- 10 | 1.45-1.65 | 14.00-141.00 | 0.05-0.08 | 0.0-2.9 | 1.0-2.0 | .10 | .10 | 5 | 2 | 134 |
| | 28-59 | -57- | -18- | 15-25- 35 | 1.55-1.70 | 4.00-14.00 | 0.09-0.12 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |
| | 59-67 | -55- | -17- | 15-28- 40 | 1.55-1.70 | 1.40-14.00 | 0.09-0.12 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |
| Ellabelle | 0-27 | -84- | - 9- | 5- 8- 10 | 1.40-1.70 | 14.00-42.00 | 0.05-0.08 | 0.0-2.9 | 1.0-5.0 | .10 | .10 | 5 | 2 | 134 |
| | 27-64 | -56- | -18- | 18-27- 35 | 1.30-1.50 | 4.00-14.00 | 0.12-0.18 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| | 64-72 | -54- | -14- | 20-33- 45 | 1.30-1.50 | 1.40-14.00 | 0.12-0.18 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| Pelham | 0-27 | -84- | - 9- | 5- 8- 10 | 1.50-1.70 | 42.00-141.00 | 0.05-0.08 | 0.0-2.9 | 1.0-2.0 | .10 | .10 | 5 | 2 | 134 |
| | 27-56 | -60- | -18- | 15-23- 30 | 1.30-1.60 | 4.00-14.00 | 0.10-0.13 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |
| | 56-68 | -55- | -17- | 15-28- 40 | 1.30-1.60 | 1.40-14.00 | 0.10-0.16 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |
| Ojc—Ocilla-Urban land complex | | | | | | | | | | | | | | |
| Ocilla | 0-28 | -86- | - 7- | 4- 7- 10 | 1.45-1.65 | 14.00-141.00 | 0.05-0.08 | 0.0-2.9 | 1.0-2.0 | .10 | .10 | 5 | 2 | 134 |
| | 28-59 | -57- | -18- | 15-25- 35 | 1.55-1.70 | 4.00-14.00 | 0.09-0.12 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |
| | 59-67 | -55- | -17- | 15-28- 40 | 1.55-1.70 | 1.40-14.00 | 0.09-0.12 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |
| Urban land | — | — | — | — | — | — | — | — | — | | | | | |
| Ogeechee | 0-8 | -86- | - 7- | 5- 8- 10 | 1.40-1.50 | 14.00-42.00 | 0.03-0.05 | 0.0-2.9 | 1.0-2.0 | .10 | .10 | 5 | 2 | 134 |
| | 8-23 | -55- | -17- | 20-28- 35 | 1.55-1.65 | 4.00-14.00 | 0.08-0.14 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| | 23-42 | -51- | -12- | 30-38- 45 | 1.60-1.70 | 4.00-14.00 | 0.10-0.14 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| | 42-60 | -60- | -18- | 15-23- 30 | 1.55-1.65 | 4.00-14.00 | 0.10-0.14 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| Pelham | 0-27 | -84- | - 9- | 5- 8- 10 | 1.50-1.70 | 42.00-141.00 | 0.05-0.08 | 0.0-2.9 | 1.0-2.0 | .10 | .10 | 5 | 2 | 134 |
| | 27-56 | -60- | -18- | 15-23- 30 | 1.30-1.60 | 4.00-14.00 | 0.10-0.13 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |
| | 56-68 | -55- | -17- | 15-28- 40 | 1.30-1.60 | 1.40-14.00 | 0.10-0.16 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |

Custom Soil Resource Report

| Physical Soil Properties– Bryan and Chatham Counties, Georgia | | | | | | | | | | | | | | |
|---|-----------|------------|------------|------------|--------------------|----------------------------------|--------------------------|----------------------|----------------|-----------------|-----|---|------------------------|------------------------|
| Map symbol and soil name | Depth | Sand | Silt | Clay | Moist bulk density | Saturated hydraulic conductivity | Available water capacity | Linear extensibility | Organic matter | Erosion factors | | | Wind erodibility group | Wind erodibility index |
| | | | | | | | | | | Kw | Kf | T | | |
| | <i>In</i> | <i>Pct</i> | <i>Pct</i> | <i>Pct</i> | <i>g/cc</i> | <i>micro m/sec</i> | <i>In/in</i> | <i>Pct</i> | <i>Pct</i> | | | | | |
| Ok—Ogeechee loamy fine sand | | | | | | | | | | | | | | |
| Ogeechee | 0-8 | -86- | - 7- | 5- 8- 10 | 1.40-1.50 | 14.00-42.00 | 0.03-0.05 | 0.0-2.9 | 1.0-2.0 | .10 | .10 | 5 | 2 | 134 |
| | 8-23 | -55- | -17- | 20-28- 35 | 1.55-1.65 | 4.00-14.00 | 0.08-0.14 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| | 23-42 | -51- | -12- | 30-38- 45 | 1.60-1.70 | 4.00-14.00 | 0.10-0.14 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| | 42-60 | -60- | -18- | 15-23- 30 | 1.55-1.65 | 4.00-14.00 | 0.10-0.14 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| Ol—Olustee fine sand | | | | | | | | | | | | | | |
| Olustee | 0-7 | -95- | - 1- | 1- 5- 8 | 1.10-1.40 | 42.00-141.00 | 0.05-0.10 | 0.0-2.9 | 2.0-4.0 | .10 | .10 | 5 | 1 | 160 |
| | 7-15 | -94- | - 1- | 2- 5- 8 | 1.35-1.65 | 4.00-14.00 | 0.10-0.15 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| | 15-38 | -94- | - 1- | 2- 5- 8 | 1.35-1.50 | 42.00-141.00 | 0.03-0.08 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | |
| | 38-80 | -57- | -18- | 15-25- 35 | 1.45-1.65 | 4.00-14.00 | 0.10-0.15 | 0.0-2.9 | 0.0-0.5 | .20 | .20 | | | |
| Ellabelle | 0-27 | -84- | - 9- | 5- 8- 10 | 1.40-1.70 | 14.00-42.00 | 0.05-0.08 | 0.0-2.9 | 1.0-5.0 | .10 | .10 | 5 | 2 | 134 |
| | 27-64 | -56- | -18- | 18-27- 35 | 1.30-1.50 | 4.00-14.00 | 0.12-0.18 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| | 64-72 | -54- | -14- | 20-33- 45 | 1.30-1.50 | 1.40-14.00 | 0.12-0.18 | 0.0-2.9 | 0.0-0.5 | .15 | .15 | | | |
| Pelham | 0-27 | -84- | - 9- | 5- 8- 10 | 1.50-1.70 | 42.00-141.00 | 0.05-0.08 | 0.0-2.9 | 1.0-2.0 | .10 | .10 | 5 | 2 | 134 |
| | 27-56 | -60- | -18- | 15-23- 30 | 1.30-1.60 | 4.00-14.00 | 0.10-0.13 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |
| | 56-68 | -55- | -17- | 15-28- 40 | 1.30-1.60 | 1.40-14.00 | 0.10-0.16 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |
| Pl—Pelham loamy sand | | | | | | | | | | | | | | |
| Pelham | 0-27 | -84- | - 9- | 5- 8- 10 | 1.50-1.70 | 42.00-141.00 | 0.05-0.08 | 0.0-2.9 | 1.0-2.0 | .10 | .10 | 5 | 2 | 134 |
| | 27-56 | -60- | -18- | 15-23- 30 | 1.30-1.60 | 4.00-14.00 | 0.10-0.13 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |
| | 56-68 | -55- | -17- | 15-28- 40 | 1.30-1.60 | 1.40-14.00 | 0.10-0.16 | 0.0-2.9 | 0.0-0.5 | .24 | .24 | | | |

Custom Soil Resource Report

| Physical Soil Properties– Bryan and Chatham Counties, Georgia | | | | | | | | | | | | | | |
|---|-----------|------------|------------|------------|--------------------|----------------------------------|--------------------------|----------------------|----------------|-----------------|-----|---|------------------------|------------------------|
| Map symbol and soil name | Depth | Sand | Silt | Clay | Moist bulk density | Saturated hydraulic conductivity | Available water capacity | Linear extensibility | Organic matter | Erosion factors | | | Wind erodibility group | Wind erodibility index |
| | | | | | | | | | | Kw | Kf | T | | |
| | <i>In</i> | <i>Pct</i> | <i>Pct</i> | <i>Pct</i> | <i>g/cc</i> | <i>micro m/sec</i> | <i>In/In</i> | <i>Pct</i> | <i>Pct</i> | | | | | |
| Pn—Pooler fine sandy loam | | | | | | | | | | | | | | |
| Pooler | 0-6 | -62- | -19- | 8-19- 30 | 1.40-1.60 | 4.00-14.00 | 0.10-0.16 | 0.0-2.9 | 2.0-3.0 | .24 | .24 | 5 | 3 | 86 |
| | 6-12 | -61- | -18- | 8-21- 30 | 1.40-1.60 | 4.00-14.00 | 0.11-0.17 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | |
| | 12-52 | -28- | -29- | 35-43- 50 | 1.25-1.45 | 0.42-1.40 | 0.12-0.18 | 3.0-5.9 | 0.0-0.5 | .10 | .10 | | | |
| | 52-72 | -60- | -18- | 15-23- 30 | 1.40-1.60 | 1.40-4.00 | 0.12-0.16 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | |
| Tmh—Tidal marsh, fresh | | | | | | | | | | | | | | |
| Tidal marsh, fresh | 0-8 | -17- | -49- | 20-34- 50 | 0.50-1.00 | 0.42-1.40 | 0.16-0.22 | 6.0-8.9 | 5.0-10.0 | .37 | .37 | 5 | 8 | 0 |
| | 8-60 | - 6- | -47- | 35-48- 60 | 0.50-1.10 | 0.42-1.40 | 0.16-0.22 | 6.0-8.9 | 2.0-8.0 | .32 | .32 | | | |
| W—Water | | | | | | | | | | | | | | |
| Water | — | — | — | — | — | — | — | — | — | | | | | |
| Waf—Wahee sandy loam | | | | | | | | | | | | | | |
| Wahee | 0-11 | -68- | -20- | 5-13- 20 | 1.30-1.60 | 4.00-14.00 | 0.10-0.15 | 0.0-2.9 | 0.5-5.0 | .24 | .24 | 5 | 3 | 86 |
| | 11-56 | -23- | -29- | 35-48- 60 | 1.40-1.60 | 0.42-1.40 | 0.12-0.20 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | |
| | 56-65 | -51- | -19- | 20-30- 50 | 1.40-1.60 | 0.42-4.00 | 0.12-0.18 | 3.0-5.9 | 0.0-0.5 | .28 | .28 | | | |
| Pooler | 0-6 | -62- | -19- | 8-19- 30 | 1.40-1.60 | 4.00-14.00 | 0.10-0.16 | 0.0-2.9 | 2.0-3.0 | .24 | .24 | 5 | 3 | 86 |
| | 6-12 | -61- | -18- | 8-21- 30 | 1.40-1.60 | 4.00-14.00 | 0.11-0.17 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | |
| | 12-52 | -28- | -29- | 35-43- 50 | 1.25-1.45 | 0.42-1.40 | 0.12-0.18 | 3.0-5.9 | 0.0-0.5 | .10 | .10 | | | |
| | 52-72 | -60- | -18- | 15-23- 30 | 1.40-1.60 | 1.40-4.00 | 0.12-0.16 | 0.0-2.9 | 0.0-0.5 | .10 | .10 | | | |

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