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ENGINEERING REPORT

600 & 650 College Road East
Block 701, Lot 11
Municipality of Princeton,
Mercer County, New Jersey

Prepared For:
SAFARI ENERGY
PO Box 446
Plainsboro Township

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Engineering for a Better Environment

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I. EXECUTIVE SUMMARY

Safari Energy (the applicant) is proposing the construction of a solar canopy system array over portions of the existing parking lots for Nuveen Real Estate (the owner) at 600 & 650 College Road East in Plainsboro Township. The project sites are located on Block 701, Lots 10 & 11 as shown on the Plainsboro tax map. The sites are bounded by woods to the west, 500 College Road to the north, College Road East to the east, and 700 College Road to the south. Both sites are currently developed and consist of office buildings and respective parking lots. Under the proposed conditions, the solar canopy array systems would be installed over the majority of the 650 College Road parking lot as well as the majority of the southern parking lot of 600 College Road. At this time, there is no plan to add the solar canopies in the northern parking lot of 600 College Road.

The solar canopy systems will be constructed using Seraphim Energy Group bi-facial solar modules and SMA America solar technology inverters. Seraphim and SMA are two of the largest solar panel and inverter manufacturing companies in the world who have found success thanks to their focus on equipment efficiency, durability, and most importantly safety. The canopy structure will be designed by United Structural using a cantilever tee-shaped design, an industry standard for large commercial solar systems nationwide. In accordance with the Section 85-34 of Plainsboro Township's Subdivision and Site Plan Review – Improvements and Design Standards, all columns and beams will be constructed with high quality components, and consist of boxed vertical and horizontal structural elements, with a white powder coated paint finish. The solar canopies will have a 3-degree pitch "tee" design as well as bi-facial panel design. The bi-facial panels are able to collect energy on both sides of the installation and while not covered to allow for sun exposure on both sides, do have a "finished" and clean look. This solar canopy system has the solar inverters mounted to the boxed vertical columns with underground conduits being run to the switchgear units. The switchgear units will be located in close proximity to the buildings in existing landscape areas. Under canopy lights will be utilized to replace the light pole fixtures that will be removed in order to install the solar canopy system.

The solar improvements associated with the Project will result in an area of disturbance of 0.27 acres for 600 College Road and 0.23 acres for 650 College Road sites.

II. SITE ENGINNERING

a. LAND USE/LAND COVER ANALYSIS

This section demonstrates the impacts from the proposed Project's improvements on the existing stormwater management system.

EXISTING PROJECT SITE DESCRIPTION AND METHODOLOGY

As described previously, the existing sites are fully developed and consist of office buildings and large parking lot areas. Block 701, Lot 10 (600 College Road) is a 21.358-acre site, while Block 701, Lot 11 (650 College Road) is a 12.789-acre site. Both sites are located within the PMUD Zoning District. Based on the site topography, a large majority of stormwater runoff from the parking lots currently flows towards the wooded areas. The project will not change the existing site topography or drainage patterns. According to the USDA/SCS's "Soil Survey of Middlesex County, NJ", the site consists of Downer Sandy loam and Nixon loam.

PROPOSED PROJECT SITE DESCRIPTION AND METHODOLOGY

As discussed, the proposed Project includes the construction of solar canopy array system over a majority of the existing parking lots. Other improvements include trenching for conduit installation, installation of a switchgear in landscape areas (one for each site), selective tree and light pole removal, as well as landscape screening for the switchgear and tree planting. The project will not impact or change the current runoff patterns of the site. As the solar canopy arrays will be constructed over the existing parking lot, only the proposed columns that are within existing landscape islands and the two (2) switchgear equipment will contribute towards any new impervious surfaces. Therefore, only a minimal amount of new impervious surface will be constructed as part of this project.

The columns for the solar array are 1.5-feet in diameter within a 24" concrete footing, which equates to approximately 3.14 square feet of impervious surface per column. At 600 College Road, there will be 18 columns installed within the landscape areas; therefore, the impervious increase associated with the columns will be 56.5 square feet (3.14sf/column X 18 columns). At 650 College Road, there will be 23 columns installed in the landscape islands; therefore, the impervious increase associated with the columns will be 72.2 square feet (3.14sf/column X 23 columns).

Each site will have one pad mounted switchgear installed in the landscape areas adjacent to the respective buildings. The pad for each switchgear is 12-foot x 4-foot or 48 square feet.

The table below provides a breakdown of the negligible increase in the impervious surface for each project site.

	600 College Rd	650 College Rd
# Canopy Columns in landscape islands	18	23
Area per column	3.14 sf	
Column Impervious	56.5 sf	72.2 sf
Switchgear Pad Impervious	48 sf	48sf
Total Site Increase in Impervious	104.5 sf (0.002 acres)	120.2 sf (0.003 acres)

b. STORMWATER QUANTITY CONTROL

The water quantity standard per N.J.A.C. 7:8-5.4(a)3 and the Township's ordinance 85-28.1D (6) [3b] applies for any project that disturbs at least one acre of land or increases impervious surface by 0.25 acres. As the site improvements disturb less than one acre of land and the negligible increase in impervious surface is less than 0.00 acres, the water quantity standards are not triggered.

The only centralized new impervious surface is from the two stand-alone concrete pads for the switchgear at each site. As noted above, the switchgear pads are only 48 square feet each and are located within landscape areas close to the building. Any runoff associated with the installation of the concrete pads, will have the ability to be absorbed into the soil of the landscape areas prior to any sheetflow over the existing paved surfaces. This matches existing conditions flow. The remaining new impervious surfaces are from the columns located over landscape islands. These columns will have minimal impact on any increase in runoff as the rain will be deflected by the solar panels themselves and splattering, prior to being hit by the rain themselves.

c. STORMWATER QUALITY

The runoff quality standards at N.J.A.C. and the Township's ordinance 85-28.1D (7) apply if there is a net increase in impervious surface of 0.25 acres or more. Even if the impervious coverages for each project were combined, the total increase in impervious surface would be 0.004 acres. This increase is orders of magnitude less than the 0.25 acres threshold. The Project does not propose any new drivable impervious surfaces, which are the only surfaces that generate "dirty" runoff requiring quality treatment. As the project does not increase the impervious surface by more than 0.00 acres and no new vehicular impervious is proposed, the runoff quality standards have been addressed.

d. GROUNDWATER RECHARGE

The groundwater recharge standards at N.J.A.C. 7:8-5.5 and the Township's ordinance 85-28.1D (6) [2] applies for any project that disturbs at least one acre of land or increases impervious surface by 0.25 acres. As indicated in section II-A, above, the proposed project will have no net increase in impervious area exceeding 0.00 acres nor disturb more than one acre of land. Therefore, groundwater recharge standards do not apply.

e. NON-STRUCTURAL STORMWATER MANAGEMENT STRATEGIES

In accordance with N.J.A.C. 7:8-5.2(a) and the Township's ordinance 85-28.1D (5b), the design of any development that disturbs at least one acre of land or increases impervious surface by 0.25 acres must incorporate non-structural stormwater management strategies. Since this project will not disturb more than one acre of land and does not have an increase in impervious area greater than 0.00 acres, non-structural stormwater management strategies are not required to be incorporated in to the design of the site.

f. SOIL EROSION AND SEDIMENT CONTROL

The site disturbance at both sites will be limited to the trench work associated with connecting the electrical lines to the switchgear, the installation of two concrete pads for the switchgear, as well as for the installation of the solar canopy support columns. As previously noted in section IIa above, the support columns/footings are 24" in diameter. It is VNHA understanding the support columns only require coring at the individual column locations. The coring will require a 30" diameter core for each column. At 600 College Road, there are a total of 66 columns, which equates to a total column disturbance area of 330 sq.ft. (4.9 sq.ft./footing x 84 footings). The trenching, switchgear pad, access to the pad, and disturbance at each landscape island with tree/light removal will be approximately 11,568 square feet. The total square footage of disturbance at the 600 College Road site will be approximately 11,900 square feet (rounding up to nearest 100 square feet). The 650 College Road site will have a total of 64 columns/footings for a total column disturbance of 320 sq.ft (4.9 sq.ft./footing x 64 footings). The trenching, switchgear pad, access to the pad, and disturbance at each landscape island with tree/light removal will be approximately 9,645 sq.ft. The total square footage of disturbance at the 600 College Road site will be approximately 9,600 square feet (rounding up to nearest 100 square feet).

All soil erosion and sediment control measures are shown graphically on the associated project site plans, including tree protection, inlet protection, and the project site limit of disturbance. All soil erosion control measures will be implemented in accordance with the current Standards for Soil Erosion and Sediment Control of New Jersey

g. REVIEW AGENCIES

1. Plainsboro Township Planning Board – Minor Site Plan
2. Delaware and Raritan Canal Commission (DRCC) – Jurisdictional Determination
3. Middlesex County Planning Board (MCPB)
4. Freehold Soil Conservation District (FSCD) – Certification for Soil Disturbance. RFA not required.

h. PROJECT SITE SOIL TYPES

1. DoeB Downer Sandy loam, 2 to 5 percent slopes; Type A Soil

2. NknA Nixon loam, 0 to 2 percent slopes; Type B Soil.
3. NknB Nixon loam, 2 to 5 percent slopes; Type B Soil.
4. NkrA Nixon moderately well drained loam, 0 to 2 percent slopes; Type C Soil.

i. UTILITY SERVICES

All existing utility services that supply the existing buildings are to remain and not be impacted by this project. The solar canopy system will be implemented in accordance with the current New Jersey State Standards. Coordination with Public Service Electric and Gas (PSE&G) will be handled by Safari Energy as required by PSE&G requirements.

j. REFERENCES

1. Blick, S.A., F. Kelly, and J.J. Skupien. April 2004. New Jersey Stormwater Best Management Practices Manual. New Jersey Department of Environmental Protection, Division of Watershed Management. Trenton, New Jersey.

2. New Jersey Department of Agriculture. November 2000. Standards for Soil Erosion and Sediment Control in New Jersey. State Soil Conservation Committee. Trenton, New Jersey.

3. Plainsboro Township, Code of the Township of Plainsboro.

4. United States Department of Agriculture, Natural Resource Conservation Service. May 24, 1999. Soil Survey Geographic (SSURGO) Database for Middlesex County, New Jersey. United States Department of Agriculture, Natural Resource Conservation Service. Fort Worth, Texas.

Appendix A: Web Soil Survey Report

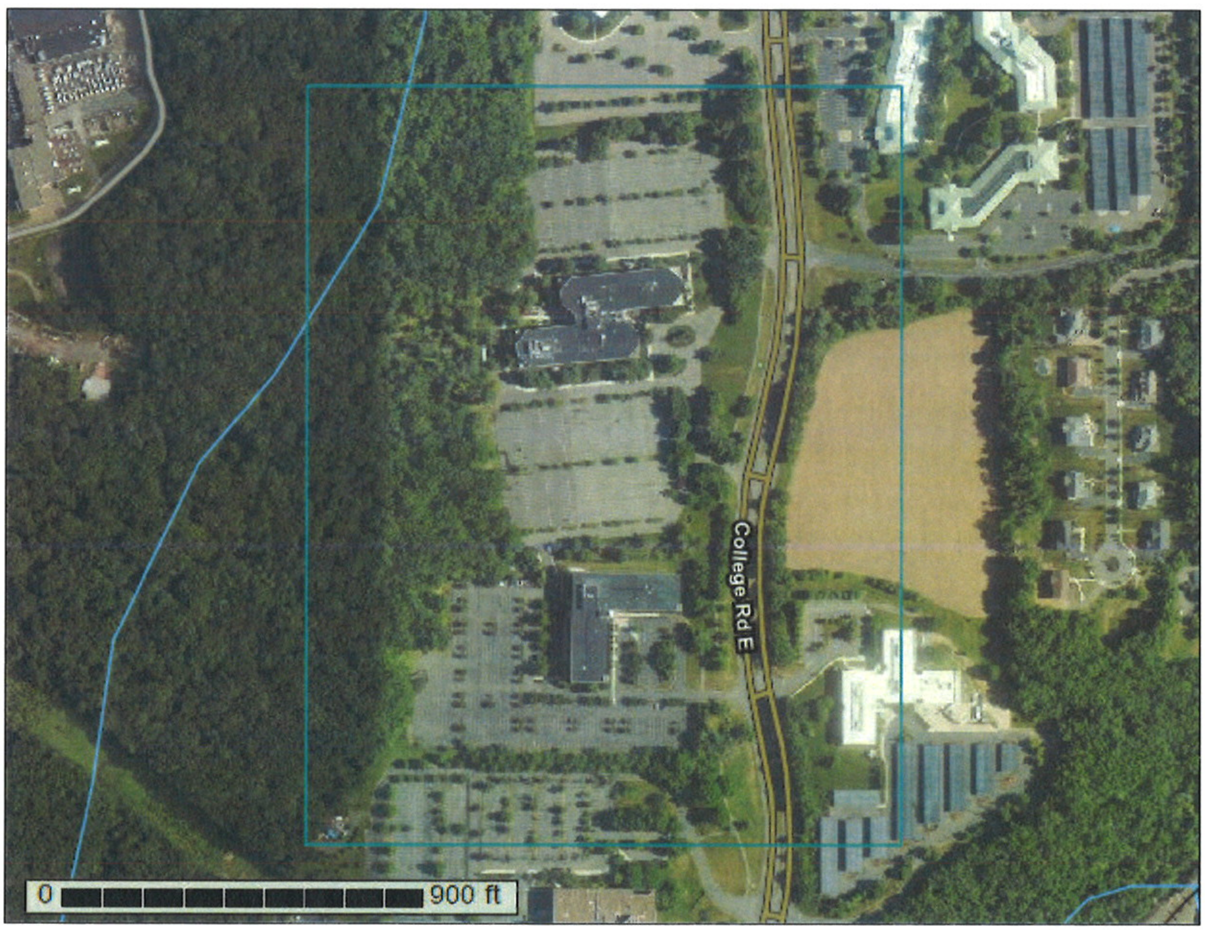
United States Department of Agriculture

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 Middlesex County, New Jersey



April 6, 2022

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://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

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 Web Soil Survey, the site for official soil survey information.

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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

Map Scale: 1:3,500 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 50, 100, 200, 300

Feet: 0, 150, 300, 600, 900

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features

- Streams and Canals

Transportation

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

Background

- Aerial Photography

MAP INFORMATION

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

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Middlesex County, New Jersey
Survey Area Data: Version 17, Aug 31, 2021

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

Date(s) aerial images were photographed: Sep 6, 2020—Sep 21, 2020

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DoeB	Downer sandy loam, 2 to 5 percent slopes, Northern Coastal Plain	8.2	12.7%
FavAr	Fallsington bedrock substratum variant loam, 0 to 2 percent slopes, rarely flooded	3.7	5.7%
NknA	Nixon loam, 0 to 2 percent slopes	16.7	25.8%
NknB	Nixon loam, 2 to 5 percent slopes	20.8	32.2%
NkrA	Nixon moderately well drained variant loam, 0 to 2 percent slopes	15.2	23.5%
SacC	Sassafras sandy loam, 5 to 10 percent slopes, Northern Coastal Plain	0.0	0.1%
Totals for Area of Interest		**64.7**	**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.

Middlesex County, New Jersey

DoeB—Downer sandy loam, 2 to 5 percent slopes, Northern Coastal Plain

Map Unit Setting

National map unit symbol: 2thwf
Elevation: 0 to 300 feet
Mean annual precipitation: 42 to 49 inches
Mean annual air temperature: 52 to 59 degrees F
Frost-free period: 190 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Downer and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Downer

Setting

Landform: Fluviomarine terraces, knolls, low hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Nose slope, riser
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Loamy fluviomarine deposits

Typical profile

Ap - 0 to 10 inches: sandy loam
BE - 10 to 16 inches: loamy sand
Bt - 16 to 28 inches: sandy loam
C1 - 28 to 48 inches: loamy sand
C2 - 48 to 80 inches: sand

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Phalanx

Percent of map unit: 10 percent
Landform: Hills, terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Riser, rise
Down-slope shape: Linear
Across-slope shape: Convex
Hydric soil rating: No

Russett

Percent of map unit: 5 percent
Landform: Broad interstream divides, flats, swales
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

Hammonton

Percent of map unit: 5 percent
Landform: Fluviomarine terraces, low hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Riser, dip
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

FavAr—Fallsington bedrock substratum variant loam, 0 to 2 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 1jz33
Elevation: 0 to 200 feet
Mean annual precipitation: 28 to 59 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 161 to 231 days
Farmland classification: Not prime farmland

Map Unit Composition

Fallsington, bedrock substratum, rarely flooded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fallsington, Bedrock Substratum, Rarely Flooded

Setting

Landform: Flats
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits over basalt

Typical profile
A - 0 to 5 inches: loam
Bt - 5 to 26 inches: silty clay loam
2BC - 26 to 30 inches: sandy clay loam
2C - 30 to 60 inches: sandy loam

Properties and qualities
Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Rare
Frequency of ponding: Rare
Available water supply, 0 to 60 inches: Moderate (about 8.2 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Elkton
Percent of map unit: 10 percent
Landform: Marine terraces
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Nixon, moderately well drained
Percent of map unit: 5 percent
Landform: Flats
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

NknA—Nixon loam, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: 4jx8
Elevation: 10 to 330 feet
Mean annual precipitation: 28 to 59 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 161 to 231 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Nixon and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nixon

Setting

Landform: Flats
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Old fine-loamy alluvium derived from arkose and/or shale

Typical profile

A - 0 to 8 inches: loam
AB - 8 to 11 inches: loam
B - 11 to 30 inches: loam
2BC - 30 to 40 inches: sandy loam
2C - 40 to 60 inches: stratified loamy sand to gravelly sandy loam to sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 1
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Lansdowne

Percent of map unit: 5 percent
Landform: Flats
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Woodstown

Percent of map unit: 5 percent
Landform: Flats, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, talf

Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

Sassafras

Percent of map unit: 5 percent
Landform: Flats, knolls, low hills
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope, rise
Down-slope shape: Linear, convex
Across-slope shape: Linear
Hydric soil rating: No

NknB—Nixon loam, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: 4jx9
Elevation: 10 to 330 feet
Mean annual precipitation: 28 to 59 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 161 to 231 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Nixon and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nixon

Setting

Landform: Flats
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Old fine-loamy alluvium derived from arkose and/or shale

Typical profile

A - 0 to 8 inches: loam
AB - 8 to 11 inches: loam
B - 11 to 30 inches: loam
2BC - 30 to 40 inches: sandy loam
2C - 40 to 60 inches: stratified loamy sand to gravelly sandy loam to sandy clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Woodstown
Percent of map unit: 5 percent
Landform: Low hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Sassafras
Percent of map unit: 5 percent
Landform: Knolls, hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Lansdowne
Percent of map unit: 5 percent
Landform: Flats
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

NkrA—Nixon moderately well drained variant loam, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: 1jwqj
Elevation: 0 to 330 feet
Mean annual precipitation: 28 to 59 inches
Mean annual air temperature: 46 to 79 degrees F
Frost-free period: 161 to 231 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Nixon, moderately well drained, and similar soils: 85 percent

Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nixon, Moderately Well Drained

Setting

Landform: Flats
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Old fine-loamy alluvium derived from arkose and/or shale

Typical profile

A - 0 to 8 inches: loam
AB - 8 to 16 inches: loam
Bt - 16 to 30 inches: loam
BC - 30 to 38 inches: sandy loam
C - 38 to 60 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 12 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Fallsington, bedrock substratum, rarely flooded

Percent of map unit: 5 percent
Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Woodstown

Percent of map unit: 5 percent
Landform: Flats, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, talf
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: No

Sassafras

Percent of map unit: 5 percent

Landform: Flats, knolls, low hills
Landform position (two-dimensional): Summit, backslope
Landform position (three-dimensional): Interfluve, side slope, rise
Down-slope shape: Linear, convex
Across-slope shape: Linear
Hydric soil rating: No

SacC—Sassafras sandy loam, 5 to 10 percent slopes, Northern Coastal Plain

Map Unit Setting

National map unit symbol: 2thxs
Elevation: 0 to 470 feet
Mean annual precipitation: 41 to 49 inches
Mean annual air temperature: 53 to 58 degrees F
Frost-free period: 190 to 250 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Sassafras and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sassafras

Setting

Landform: Flats, fluviomarine terraces
Landform position (three-dimensional): Riser, rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits

Typical profile

Ap - 0 to 9 inches: sandy loam
Bt1 - 9 to 18 inches: sandy loam
Bt2 - 18 to 28 inches: sandy clay loam
BC - 28 to 40 inches: loamy sand
C1 - 40 to 58 inches: sand
C2 - 58 to 80 inches: sand

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Fallsington, drained

Percent of map unit: 4 percent
Landform: Flats, depressions, swales
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Talf, dip
Down-slope shape: Linear, concave
Across-slope shape: Linear, concave
Hydric soil rating: Yes

Ingleside

Percent of map unit: 4 percent
Landform: Flats
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Aura

Percent of map unit: 4 percent
Landform: Low hills, fluviomarine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Nose slope, side slope, riser
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Woodstown

Percent of map unit: 4 percent
Landform: Depressions, flats, fluviomarine terraces, broad interstream divides
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: No

Downer

Percent of map unit: 4 percent
Landform: Flats, knolls, fluviomarine terraces
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, riser, rise
Down-slope shape: Linear, convex
Across-slope shape: Linear
Hydric soil rating: No

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Appendix B: Impervious Area Maps

NOTES:

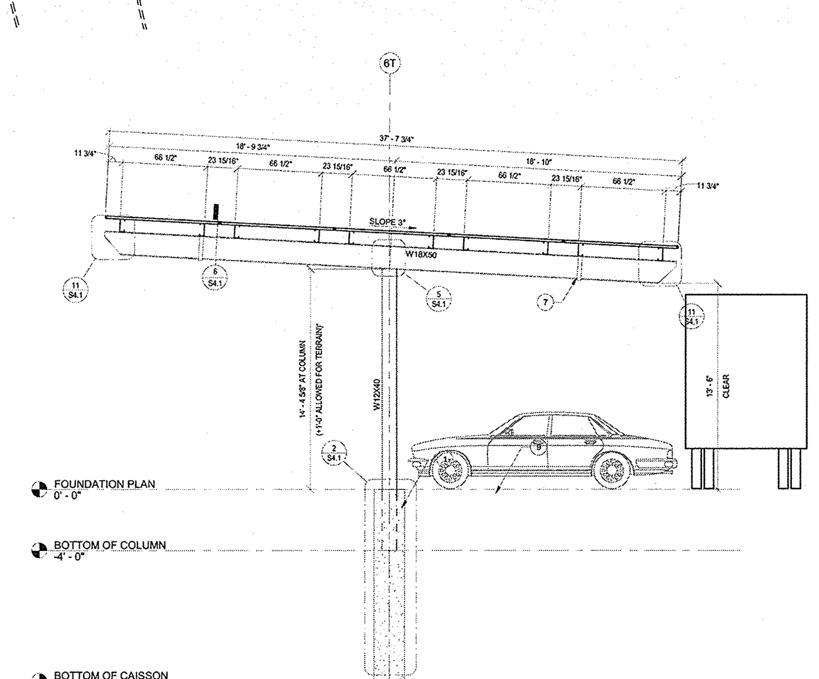
1. 24 EXISTING TREES TO BE REMOVED/RELOCATED WITH THE CONSTRUCTION OF THE SOLAR CANOPIES.
2. 4 EXISTING LIGHT POLES TO BE REMOVED/RELOCATED WITH THE CONSTRUCTION OF THE SOLAR CANOPIES.

ABBREVIATIONS

TW	= TOP OF WALL
BW	= BOTTOM OF WALL
CONC.	= CONCRETE
TC	= TOP OF CURB
BC	= BOTTOM OF CURB
DC	= DEPRESSED CURB

LEGEND:

- MAJOR CONTOUR
- MINOR CONTOUR
- 87.8 GROUND SPOT ELEVATION
- 87.40 GROUND SPOT ELEVATION
- STORMWATER INLETS
- DRAINAGE/STORMWATER MANHOLE
- SANITARY MANHOLE
- LIGHT POLE W/BASE (TYP.)
- 6" TREE LOCATION W/DIMATER BREAST HEIGHT (DBH)



ELEVATION VIEW
SCALE: 1"=10'

IMPERVIOUS SURFACE:

CANOPY COLUMNS IN LANDSCAPE ISLANDS	18
AREA PER COLUMN	3.14 SF
COLUMN IMPERVIOUS	56.5 SF
SWITCHGEAR PAD IMPERVIOUS	48 SF
TOTAL SITE INCREASE IN IMPERVIOUS	104.5 SF -- 0.002 AC

REV.	DESCRIPTION	DATE	DFT.BY	CKD.BY

09/09/2022
DATE OF SIGN.

RALPH A. PETRELLA
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IMPERVIOUS AREA MAP
FOR
600 COLLEGE ROAD EAST
BEING
LOT 10, BLOCK 701
PREPARED FOR
SAFARI ENERGY
SITUATED IN
PLAINSBORO TOWNSHIP MIDDLESEX CO., N.J.
SCALE 1"= 30' SEPTEMBER 9, 2022

DRAWN BY WDV DATE 04/05/22	FIELD BK	ORDER No.	FILE No.	SHEET No.
CHECKED BY RAP DATE 04/05/22	PAGE	45582-400-21	206-E-4	IMP-1

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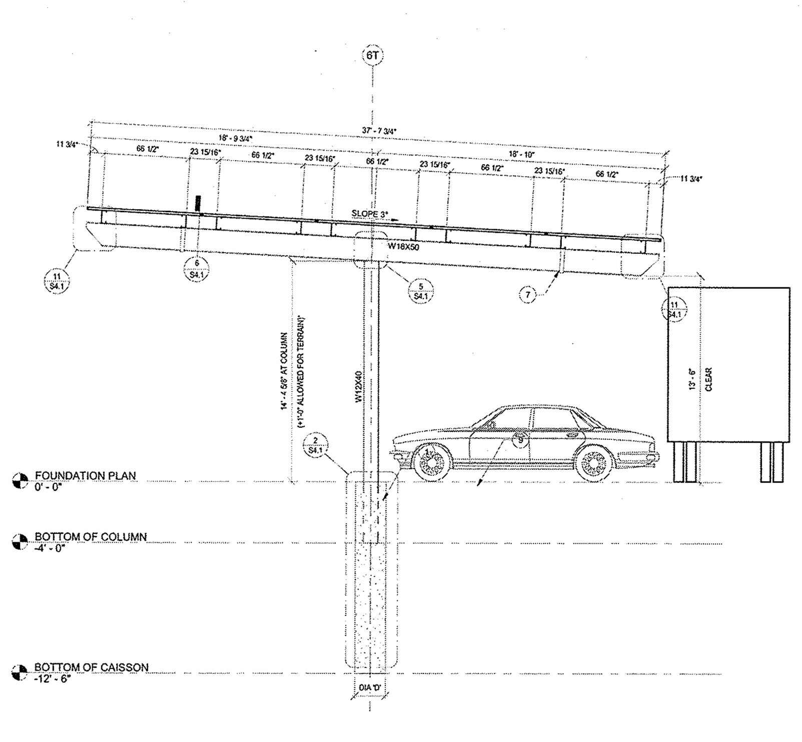

LEGEND:

- MAJOR CONTOUR
- MINOR CONTOUR
- 87.8 GROUND SPOT ELEVATION
- 87.40 GROUND SPOT ELEVATION
- STORMWATER INLETS
- DRAINAGE/STORMWATER MANHOLE
- SANITARY MANHOLE
- LIGHT POLE W/BASE (TYP.)
- 6" TREE LOCATION W/DIMATER BREAST HEIGHT (DBH)

ABBREVIATIONS

TW = TOP OF WALL
BW = BOTTOM OF WALL
CONC. = CONCRETE
TC = TOP OF CURB
BC = BOTTOM OF CURB
DC = DEPRESSED CURB
LS = LANDSCAPED AREA

IMPERVIOUS SURFACE:

CANOPY COLUMNS IN LANDSCAPE ISLANDS	23
AREA PER COLUMN	3.14 SF
COLUMN IMPERVIOUS	72.2 SF
SWITCHGEAR PAD IMPERVIOUS	48 SF
TOTAL SITE INCREASE IN IMPERVIOUS	120.2 SF -- 0.003 AC

PLAINSBORO TOWNSHIP TAX MAP INFORMATION

REV.	DESCRIPTION	DATE	DFT.BY	CKD.BY

09/09/2022
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IMPERVIOUS AREA MAP
FOR
650 COLLEGE ROAD EAST
BEING
LOT 11, BLOCK 701
PREPARED FOR
SAFARI ENERGY
SITUATED IN
PLAINSBORO TOWNSHIP MIDDLESEX CO., N.J.
SCALE 1"= 30' SEPTEMBER 9, 2022

DRAWN BY WDV DATE 04/05/22	FIELD BK	ORDER No.	FILE No.	SHEET No.
CHECKED BY RAP DATE 04/05/22	PAGE	45582-400-21	206-E-4	IMP-2

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