

Stormwater Management Measures Maintenance Plan & Field Manuals

Development Name: PSE&G Bennetts Lane Substation
Address: 160 South Middlebush Road

Block(s) / Lot(s): Block 84.03/Lots 1, 2.02

Township, County: Township of Franklin, Somerset County

Party Responsible for Maintenance:

_____ PSE&G _____

Address: 4000 Hadley Road, South Plainfield NJ 07080

Contact Person(s): _____ Phone: _____

Prepared by: Jason Ringer, PE Date: December 31, 2025

This plan is recorded in

Deed Book # _____ Page # _____ with _____ County Clerk on Date _____

Last Revised on 12 / 31 / 2025

NOTE

This Maintenance Plan is intended to be editable and adjustable in accordance with the design of stormwater management measures, the site conditions, and the special needs of responsible party. The Engineer should supplement information and best management practice to assist the responsible party to perform maintenance.

Table of Contents

Part I- Maintenance

List of Stormwater Management Measures	2
Location Map.....	3
Description of Stormwater Management Measures.....	4
Preventative and Corrective Maintenance Action Plan.....	5
Maintenance Personnel, Equipment, Tools, and Supplies	8
Cost Estimate.....	9
Training Plan and Records	11
Annual Evaluation of the Effectiveness of the Plan	13
Documents	15

Part II- Field Manuals and Maintenance Records

Field Manual for Bioretention System (Basin #1)
Maintenance Logs and Inspection Records

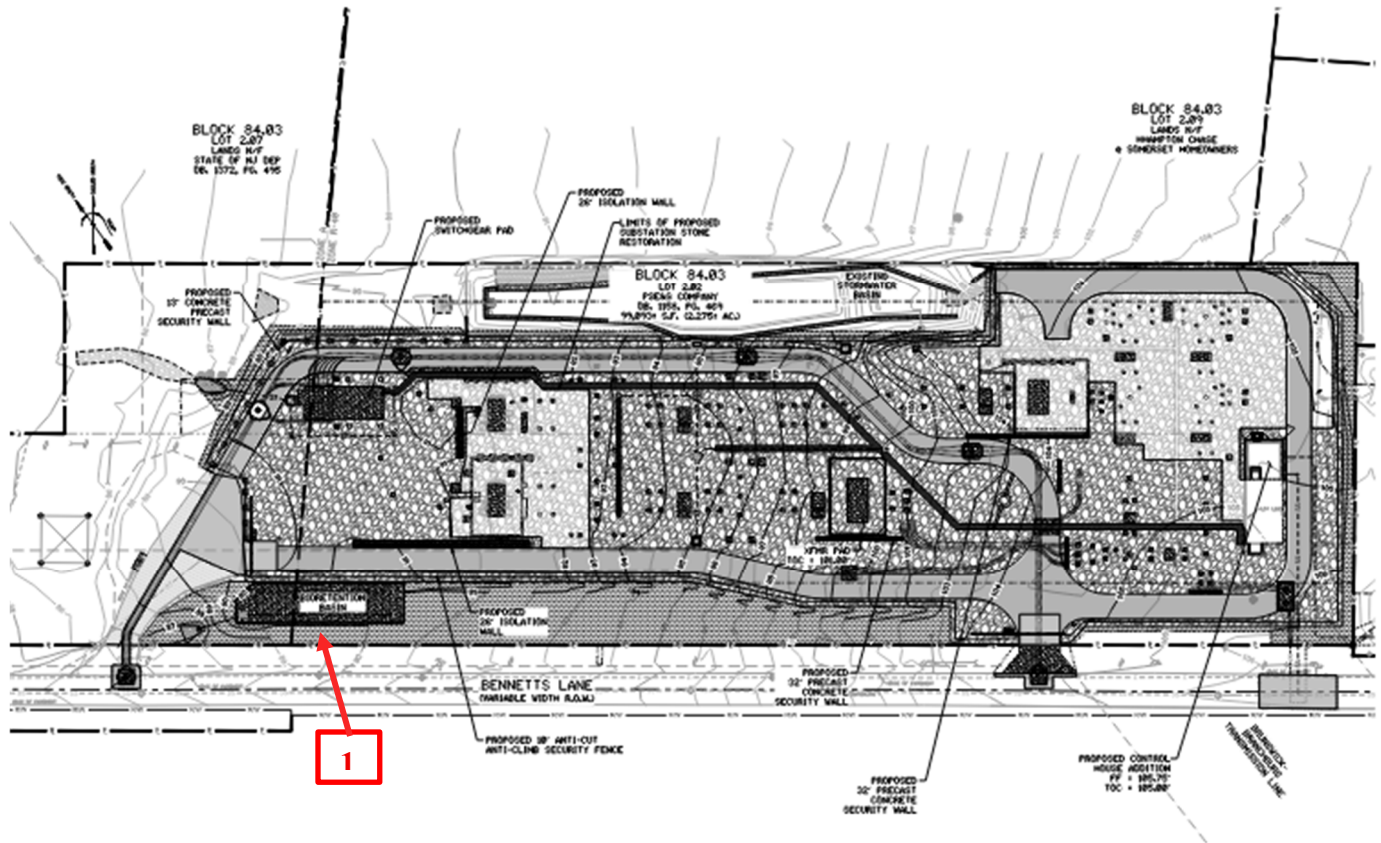
Part I- Maintenance Plan

List of Stormwater Management Measures

The stormwater management measures incorporated into this development are listed below. The corresponding Field Manuals for the stormwater management measures are located in Part II of the Maintenance Plan.

Type of Stormwater Management Measure	BMP No.	Location Description	State Plane Coordinates / Lat., Long.
Bioretention Basin with 6" Diameter Underdrains	1	Southwest side of site	Northing: 601870.71 Easting: 483447.97

Location Map



No.	Type of Stormwater Management Measure
1	Bioretention Basin with 6" Diameter Underdrains

Description of Stormwater Management Measures

Small Scale Bioretention Basin with Underdrains

Design storm:

- Design Purposes:
 - o Water Quality 1.25 inches in 2 hours
 - o 1-year storm (2.72 inches)
 - o 2-year storm (3.30 inches)
 - o 10-year storm (5.17 inches)
 - o 25-year storm (6.21 inches)
 - o 100-year storm (9.15 inches)
- Dimensions: 107' (Length) x 25' (Width) x 1.15' (Depth)

Preventative and Corrective Maintenance Action Plan

As per N.J.A.C. 7:8-5.8(b) & (e), preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure, including, but not limited to, repairs or replacement to the structure; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of non-vegetated linings.

The maintenance of access points to the stormwater management measures in accordance with the following:

- all components of the stormwater management measures must be readily accessible for inspection and maintenance;
- trees, shrubs, and underbrush must be pruned or trimmed as necessary to maintain access to the stormwater management measure via roadways, paths, and ramps, including paths through perimeter vegetation to permanent pools, aquatic benches, and safety ledges to allow for the inspection and control of mosquito breeding.

Preventative Maintenance Actions

The frequency of the preventative maintenance actions listed here is adopted from Chapter 9, BMP Manual of Structural Stormwater Management Measures. Design engineer and responsible party should adjust the frequency of preventative maintenance actions according to the situations of the stormwater management measures in the development.

Frequency	Preventative Maintenance Actions	Stormwater Measures/ No.
Quarterly	Sediment, trash and debris removal from bioretention basin, outlet control structure, underdrain and trash racks	Bioretention System with Underdrains
Annual	-Basic structural inspection for cracking, subsidence, spalling, erosion, and deterioration - Cleaning and infiltration rate test - Vegetation erosion, scour and unwanted growth inspection and removal	Bioretention System with Underdrains
Biennial	-Vegetation quality inspection (one per growing and one per non-growing seasons) - Inspection of planting bed	Bioretention System with Underdrains
Unscheduled	Vegetation Trimming	Bioretention System with Underdrains

Corrective Maintenance Actions

Depending on many factors, such as the performance of preventative maintenance actions, weather, or unexpected incidents, corrective maintenance requirements may not be precisely anticipated; however, a list of potential corrective maintenance actions is shown below.

Potential Corrective Maintenance Actions	Stormwater Management Measures/No.
<p>Example of corrective maintenance tasks</p> <ul style="list-style-type: none"> - Repair/replacement of eroded or damaged riprap apron - Repair/replacement of missing or damaged trash racks - Repair/replacement of outlet pipes or orifices - Revegetation of eroded side slope, aquatic bench, marsh, basin bottom, grass swales, etc. 	<p>Bioretention System with Underdrains</p>
<ul style="list-style-type: none"> - Repair/replacement of damaged PVC items. - Sediment and trash removal in filtration media. - Removal of any blockages or debris build-up in the bioretention basin trash racks and dispersion pipes. - Sediment removal gravel bottom. - Tilling of the sand layer using lightweight equipment to break up clogged surfaces. - Replacement of bolts in the orifice plate. - Repair/replacement of the trash rack. - Repair/replacement of riprap apron with aggregate. - Revegetation - Removal of sediment. - Check permeability of filter media layers and replace if necessary. - Check water table level. - Removal of sediment and leaves. 	<p>Bioretention System with Underdrains</p>

Inspection and Logs of All Preventative and Corrective Maintenance

As per N.J.A.C. 7:8-5.8(f), the person responsible for maintenance shall maintain a detailed log of all preventative and corrective maintenance for the structural stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders.

As per NJDEP BMP Manual Ch. 8 (Feb, 2004), a maintenance plan shall include a schedule of regular inspections and tasks, and detailed logs of all preventative and corrective maintenance performed on the stormwater management measure, including all maintenance-related work orders. The person with maintenance responsibility must retain and, upon request, make available the maintenance plan and associated logs and other records for review by a public entity with administrative, health, environmental, or safety authority over the site.

Inspection Checklists in the Field Manual for the stormwater management measures on this site include:

- Field Manual for Small-Scale Bioretention Systems with Underdrains

The logs of all inspections, and both preventative and corrective maintenance performed should be attached in the **“Maintenance Logs and Inspection Records”** section. See Part II of the Maintenance Plan

Maintenance Personnel, Equipment, Tools, and Supplies

As per NJDEP BMP Manual Ch. 8 (Feb. 2004), maintenance plans should include equipment, tools, and supplies necessary to perform the various preventative and corrective maintenance tasks specified in the plan. Sources of specialized, proprietary, and nonstandard equipment, tools, and supplies should also be provided.

Maintenance Personnel/Equipment/Tools/Supplies

Personnel/Equipment/Tools Name	Quantity
General Maintenance Crew	1
Debris Removal Tools	2
Crowbar	2
Tape Measure	1
Safety Equipment (traffic cones)	5

Specialized, proprietary or nonstandard equipment, tools and supplies, if applicable

Name of the specialized, proprietary or nonstandard equipment, tools and supplies	Source
JetVac truck (w/ high pressure nozzle)	DigVac Rentals
Vacuum Sweeper	DigVac Rentals
Infiltration Testing	Varies, TBD

Cost Estimate

Cost Overview

Cost Type	Cost	Details
General cost for quarterly maintenance (sediment, trash, and debris removal)	\$1,045	Table A
General cost for annual maintenance	\$2,995	Table B
General cost for unscheduled maintenance (yearly)	\$500	Table C
Total cost	\$4,540	

Table A: General cost for quarterly maintenance

Cost Type	Required Quantity	Unit Price	Cost
Personnel			
Crew-Site Cleanup	1	\$500	\$500
Equipment			
Truck	1	\$200	\$200
Services			
Disposal	1	\$250	\$250
Subtotal		\$950	
Overhead		\$95	
Total Cost		\$1,045	

Table B: General cost – annual maintenance

Cost Type	Required Quantity	Unit Price	Cost
Personnel			
Crew-Site Cleanup	1	\$500	\$500
Crew-Inspection	1	\$200	\$200
Equipment			
Vacuum Truck	1	\$700	\$700
CCTV Camera	1	\$400	\$400
Traffic Cones	5	\$40	\$200
Services			
Disposal	1	\$250	\$250
Infiltration Testing	1	\$500	\$500
Subtotal		\$2,750	
Overhead		\$205	
Total Cost		\$2,955	

Table C: General cost – unscheduled maintenance in a year

Cost Type	Required Quantity	Unit Price	Cost
Personnel			
Crew	1	\$100	\$500
Visits	5		
Subtotal		\$500	
Overhead		N/A	
Total Cost		\$500	

Training Plan and Records

As per NJDEP BMP Manual Ch. 8 (February 2004), maintenance training begins with a basic description of the purpose and function of the overall stormwater management measure and its major components. Such understanding will enable maintenance personnel to provide more effective component maintenance and more readily detect maintenance-related problems. Depending on the size, character, location, and components of each stormwater management measure, maintenance personnel may also require training in specialized inspection and maintenance tasks and/or the operation and care of specialized maintenance equipment. Training should also be provided in the need for and use of all required safety equipment and procedures.

I. Training Plan

Types of Training

- Mandatory Stormwater Management Basic Training and Field Manual Usage Training for new maintenance crews
- Occupational Safety Training

Content of Training

- **Stormwater Management Basic Training**
 - Purposes and Functions of BMPs
 - NJDEP Stormwater BMP Manual, Chapter Nine: Structural Stormwater Management Measures
 - Chapter 9.1 Bioretention Systems

More training information is available at NJ Stormwater.org (<http://www.nj.gov/dep/stormwater/training.htm>)

- Field Manual Usage Training
- Equipment and Tools Operation Training
- Occupational Safety Training

II. Training Records

Class Title:			
Date:			
Contact Name:			
	Name(first, last) (Print)	Signature	Employee ID
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			

Annual Evaluation of the Effectiveness of the Plan

As per N.J.A.C. 7:8-5.8(g), the person responsible for maintenance shall evaluate the effectiveness of the maintenance plan at least once per year and adjust the plan and the deed as needed.

The responsible party should evaluate the effectiveness of the maintenance plan by comparing the maintenance plan with the actual performance of the maintenance. The items to evaluate may include, but not limited to,

- Whether the inspections have been performed as scheduled;
- Whether the preventive maintenance has been performed as scheduled;
- Whether the frequency of preventative maintenance needs to increase or decrease;
- Whether the planned resources were enough to perform the maintenance;
- Whether the repairs were completed on time;
- Whether the actual cost was consistent with the estimated cost;
- Whether the inspection, maintenance, and repair records have been kept.

If actual performance of those items has been deviated from the maintenance plan, the responsible party should find the causes and implement solutions in a revised maintenance plan.

Annual Evaluation Records

Evaluator(s)	Date of Evaluation	Decision
		<input type="checkbox"/> Maintain current version OR <input type="checkbox"/> Revise current version Revision date _____ (also update the last revision date on the cover page) <input type="checkbox"/> Requires a new deed recording (also update the last recording information on the cover page)
		<input type="checkbox"/> Maintain current version OR <input type="checkbox"/> Revise current version Revision date _____ (also update the last revision date on the cover page) <input type="checkbox"/> Requires a new deed recording (also update the last recording information on the cover page)
		<input type="checkbox"/> Maintain current version OR <input type="checkbox"/> Revise current version Revision date _____ (also update the last revision date on the cover page) <input type="checkbox"/> Requires a new deed recording (also update the last recording information on the cover page)

Evaluator(s)	Date of Evaluation	Decision
		<p><input type="checkbox"/> Maintain current version OR</p> <p><input type="checkbox"/> Revise current version Revision date _____ (also update the last revision date on the cover page)</p> <p><input type="checkbox"/> Requires a new deed recording (also update the last recording information on the cover page)</p>
		<p><input type="checkbox"/> Maintain current version OR</p> <p><input type="checkbox"/> Revise current version Revision date _____ (also update the last revision date on the cover page)</p> <p><input type="checkbox"/> Requires a new deed recording (also update the last recording information on the cover page)</p>
		<p><input type="checkbox"/> Maintain current version OR</p> <p><input type="checkbox"/> Revise current version Revision date _____ (also update the last revision date on the cover page)</p> <p><input type="checkbox"/> Requires a new deed recording (also update the last recording information on the cover page)</p>

Documents

Devices/Tools/Equipment Operation and Maintenance Manual and Warranties

As per NJDEP BMP Manual Ch. 8 (Feb., 2004), maintenance, repair, and replacement instructions for specialized, proprietary, and nonstandard equipment, tools, supplies, manufacturers' product instructions, and user manuals should be included in this Maintenance Plan.

Part II- Field Manuals

Attachment of Field Manuals for Stormwater Management Measures on this Site

As per N.J.A.C. 7:8-5.8(b)&(e), preventative and corrective maintenance shall be performed to maintain the function of stormwater management measures, including repair or replacement of the structure; removal of sediment, debris or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; repair or replacement of non-vegetated linings, and removal of rodent/wildlife and repair/restoration to damaged affected areas caused by them.

Each Field Manual attached to this Maintenance Plan is a separate document pertaining to one specific stormwater management measure, and should be used by inspections and maintenance crews in order to carry out the maintenance work required by N.J.A.C. 7:8-5.8(e). Design engineers should prepare the field manuals in accordance with the design of each measure and the specific requirements of the site. See the sample field manuals for further guidance.

Field Manual for Small-Scale Bioretention System with Underdrains

Maintenance Logs and Inspection Records

As per N.J.A.C. 7:8-5.8(e), preventative and corrective maintenance shall be performed to maintain the function of the stormwater management measure(s), including repairs or replacement to the structure; removal of sediment, debris, or trash; restoration of eroded areas; snow and ice removal; fence repair or replacement; restoration of vegetation; and repair or replacement of non-vegetated linings.

As per N.J.A.C. 7:8-5.8(f), the person responsible for maintenance shall maintain a detailed log of all preventative and corrective maintenance for the structural stormwater management measures incorporated into the design of the development, including a record of all inspections and copies of all maintenance-related work orders.

The responsible party shall maintain a record of all maintenance actions performed, including:

- Inspection checklists from each performed inspection
- Preventative maintenance logs
- Corrective maintenance logs, including work orders
- Other maintenance records

Bioretention System Basin #1 on the Location Map

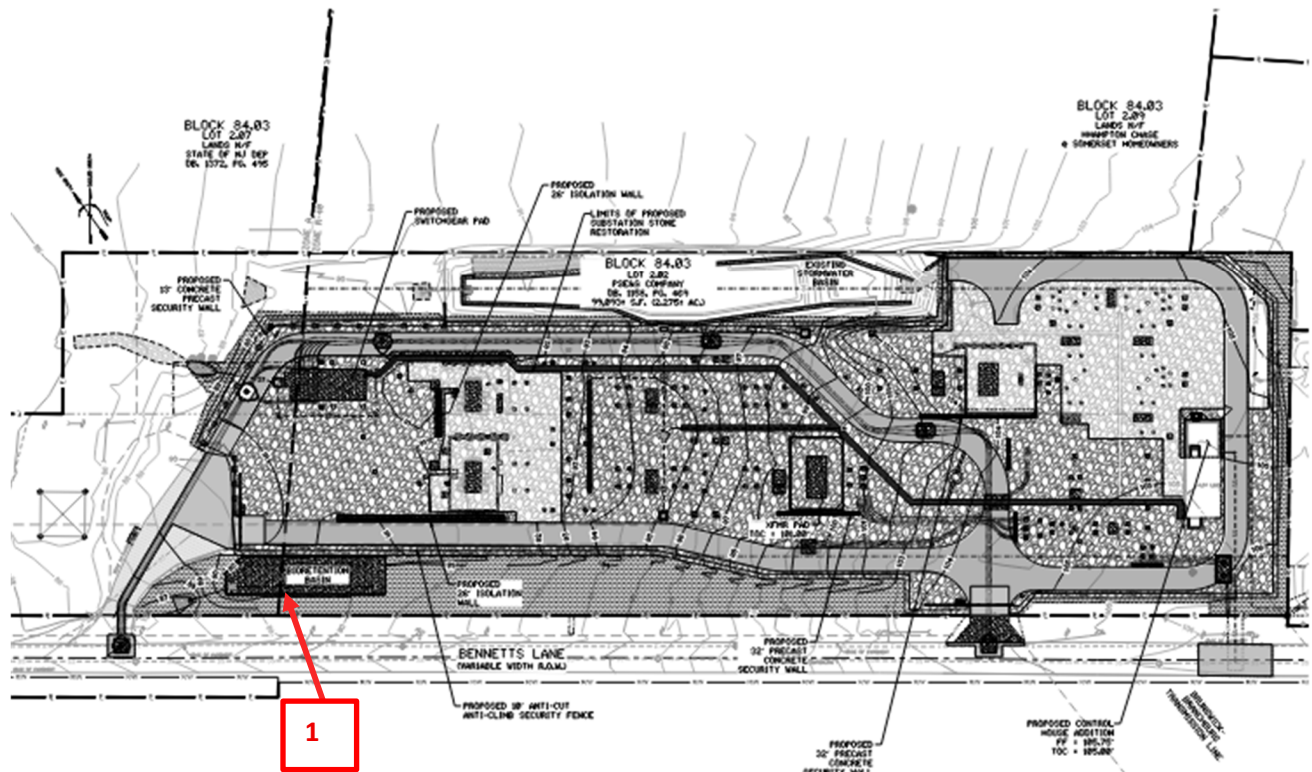
Development Name: PSE&G Bennetts Lane Substation

Township, County: Township of Franklin, Somerset County

Location of Basin: N: 601870.71; E: 483447.97

Location Description: Southwest side of site

Location Map



NOTE

This Field Manual is intended to be editable and adjustable in accordance with the design of stormwater management measures, the site conditions, and the special needs of responsible party. The Engineer should supplement information and best management practice to assist the responsible party to perform maintenance.

Table of Contents

Bioretention System Overview	4
Basic Design Information	5
Visual Aid for Bioretention System Inspection	7
Reference Documents.....	8
Inspection Checklist / Maintenance Actions	10
Preventative Maintenance Record	17
Corrective Maintenance Record	18

Bioretention System Overview

Functionality

Bioretention systems are used to remove a wide range of pollutants, such as suspended solids, nutrients, metals, hydrocarbons, and bacteria from stormwater runoff. They can also be used to reduce peak runoff rates and increase stormwater infiltration when designed as a multi-stage, multi-function facility.

A bioretention system can be configured as either a bioretention basin or a longer, narrower bioretention swale. In general, a bioretention basin has a flat bottom while a bioretention swale may have sloping bottom. Runoff storage depths above the soil bed surface are typically shallow. The TSS removal rate for bioretention systems is 80 or 90 percent, depending upon the thickness of the soil planting bed and the type of vegetation grown in the bed.

Proper care and attention in the long-term maintenance of the stormwater management measure is critically important to the safety and health of the public.

Type of BMP – Dry Basin / Infiltration

A bioretention system is a type of **dry** basin. Dry basins must fully drain within 72 hours of the most recent rainfall. Standing water in excess of 72 hours is a sign of basin failure. It may also contribute to mosquito breeding and other health and safety issues. The design drain time shall be closely monitored to ensure that potential failure is recognized early.

A bioretention system with infiltration can also be designed for extended detention, in which case it will attenuate peak flows from storms larger than the Water Quality Design Storm.

Basic Design Information

Hydrology Design Targets

1. The bioretention system is designed as an online system.
2. The design drain time is 72 hours.
3. Due to the water-tight, concrete cell the bioretention is located inside, along with underdrains in the gravel layer, the seasonal high-water table does not exceed beyond 1' in elevation above the inside bottom of the bioretention cell.
4. Due to the water-tight, concrete cell the bioretention is located inside, along with underdrains in the gravel layer, the field soil permeability is not a factor in the design.

Hydraulic Design Targets

1. Design parameters

	Water Quality Design Storm	2-year storm	10-year storm	100-year storm
Rainfall Depth (inches)	1.25 inch in 2 hours	3.30 inches in 24 hours	5.17 inches In 24 hours	9.15 inches In 24 hours
Runoff Volume (ac-ft)	0.018	0.090	0.173	0.365
Peak Flow Rate (cfs)	0.48	1.10	2.13	4.44
Water Surface Elevation (feet)	86.75	89.36	89.49	89.83

Note: The design engineer shall fill out the table in accordance with the design of the stormwater management measure. If the item is not applicable, enter **N/A** in the table.

2. The emergency overflow grate is at EL. 90.12 feet

Basin Configuration Targets

1. Pretreatment is not provided. A concrete outlet structure is used.
2. Planting Soil Bed
 - The depth of the soil planting bed is 1.50 feet.
 - Mixture of the planting soil consists of 85-95% of sand. (with no more than 25% of the sands as fine or very fine sands; no more than 15% silt and clay with 2% to 5% clay content). The organic matter shall be within 3% to 7%.
 - The pH of the planting soil should be in the range of 5.5 and 6.5.
 - Filter fabric is not placed along the sides of the soil planting bed.
 - The system is designed with a planting soil permeability rate of 1 inches/hour (pre-construction) and _____ inches/hour (post-construction – tested on (MM) / (DD) / (YYYY)).

3. Outlet Information:

Outlet Description	Outlet Type	Orifice Size / Weir Length	Invert Elevation
Outlet #1	Rectangular Orifice (qty=2)	3" x 30"	89.35
Overflow Grate	Grate Inlet	48" x 48"	90.12
Outlet Pipe	Round Pipe	12"	86.26

4. Vegetation

- The vegetation type to be used in this bioretention system is site-tolerant grasses. A Landscaping Plan should be included in the Reference Documents section of this field manual.

5. Underdrain

- The perforated laterals are 6 inches in diameter, at a slope of 0.30%.
- There are 2 lateral pipes in the basin. Each lateral is 90 feet long.
- The perforations are 0.25 inches in diameter and are designed per ASTM D2729. (Note: The cleanout pipe shall NOT be perforated.)
- The gravel layer surrounding the underdrain consists of 3 inches of gravel above the underdrain and 3 inches of gravel below the underdrain.

Critical Maintenance Features

1. No heavy equipment on the basin surface.
2. Remove vegetation strictly in accordance with the landscaping plan.
3. Grass clippings shall be collected from the basin and properly disposed.
4. Keep the appearance of the basin aesthetic.

Visual Aid for Bioretention System Inspection

Reference Documents

Documents to be placed in this field manual should include the following:

- Soil Boring Logs

Attach Reference Documents Here



Known for excellence.
Built on trust.

SOILS AND FOUNDATION INVESTIGATION

Bennetts Lane Substation Upgrades Franklin Township, Somerset County, New Jersey PSE&G

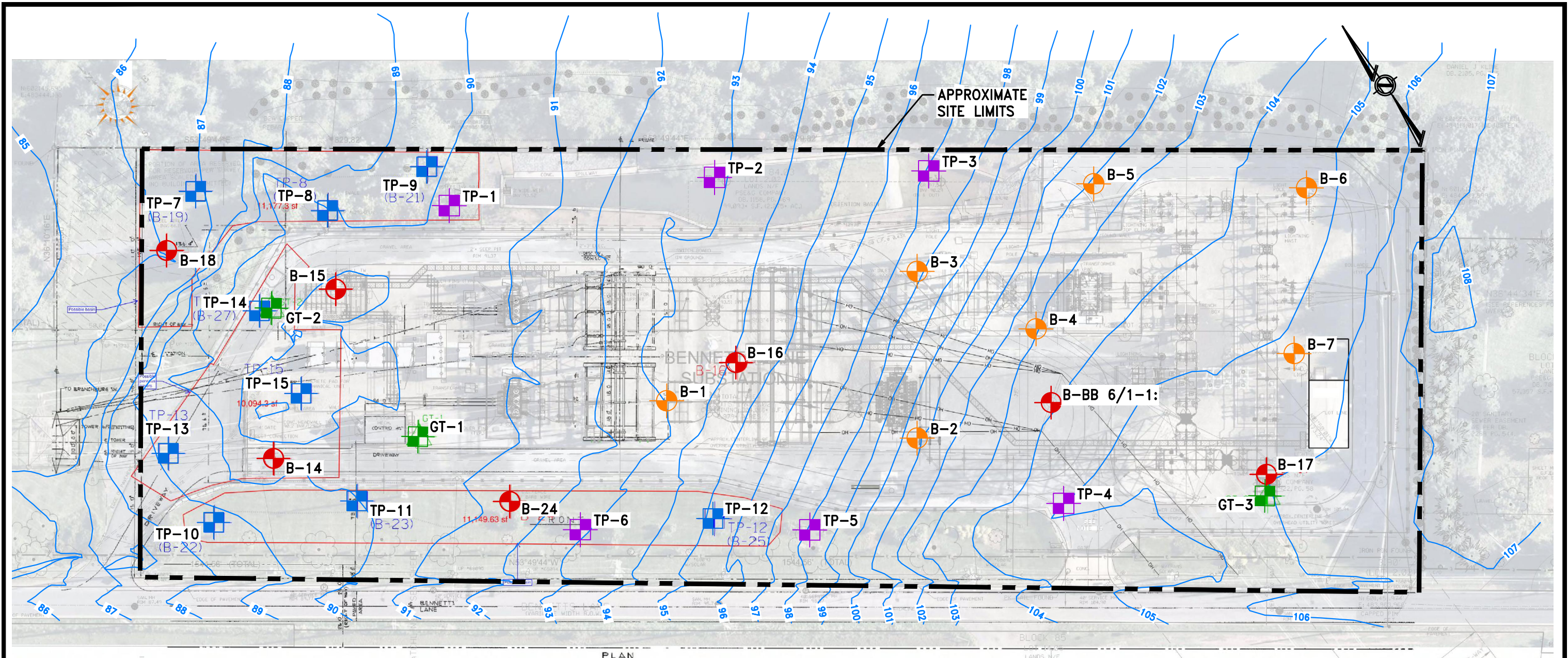
August 5, 2024
File No. 26.0093098.00

PREPARED FOR:
PSE&G
80 Park Plaza
Newark, New Jersey 07101

GZA GeoEnvironmental, Inc.
27 Worlds Fair Drive | Somerset, NJ 08873
732-356-3400

GZA has 32 Offices Nationwide
www.gza.com

Copyright© 2024 GZA GeoEnvironmental, Inc..








DCK 85
 IT 14.05
 NDS N/F
 USH FARMS, INC.

PLAN

BLOCK 85
 LANDS N/F
 MIDDLEBUSH FARMS, INC.


KEY:

-  B-14 NUMBER AND APPROXIMATE LOCATION OF SOIL BORINGS PERFORMED FOR THIS STUDY
-  TP-1 NUMBER AND APPROXIMATE LOCATION OF STORMWATER TEST PITS PERFORMED FOR THIS STUDY
-  GT-1 NUMBER AND APPROXIMATE LOCATION OF TEST PITS AND/OR BORINGS PERFORMED FOR THIS STUDY (NOTE: A BORING AND TEST PIT WERE PERFORMED AT GT-1)

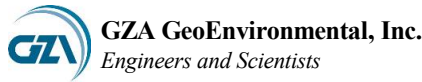
-  B-1 NUMBER AND APPROXIMATE LOCATION OF BORINGS PERFORMED BY MTA FOR THEIR 2009 STUDY
-  TP-1 NUMBER AND APPROXIMATE LOCATION OF TEST PITS PERFORMED BY MTA FOR THEIR 2009 STUDY

NOTES:

1. This drawing is part of GZA GeoEnvironmental, Inc. Report No. 26.0093098.00 and should be read together with the report for complete evaluation.
2. General layout was obtained from a drawing prepared by PSE&G, entitled "Bennetts Lane Substation 230/69KV Substation Boring Plan" dated 1/23/24, scale 1"= 30'.

PLOT PLAN				
PROPOSED BENNETTS LANE SUBSTATION UPGRADES FRANKLIN TOWNSHIP, NEW JERSEY PSE&G				
		GZA GeoEnvironmental, Inc. Engineers and Scientists <small>Known for excellence. Built on trust. www.gza.com</small>		
JOB NO. 26.0093098.00		FILE NO. -		
DR. BY VJD	CHK. BY CDM	DATE 4/19/24	SCALE 1"= 60'	PLATE 2

TEST BORING LOG



PSE&G
Franklin Township, NJ

EXPLORATION NO.: B-14
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes	Type of Rig: ATV	Boring Location: See Plan	Final Boring Depth (ft.): 25
Drilling Co.: Craig Test Borings	Rig Model: CME 55	Ground Surface Elev. (ft.): +90.5	
Driller: Mark & Matt	Drilling Method: Mud Rotary	Date Start - Finish: 6/7/2024 - 6/7/2024	

Hammer Type: Automatic	Groundwater Depth (ft.)		
Hammer Weight (lb.): 140	Hammer Fall (in.): 30	Date	Time
Auger or Casing O.D./I.D Dia (in.): 4.5/4.25	Rock Core Size: NX	6/7/24	
			Water Depth
			ND
			Stab. Time

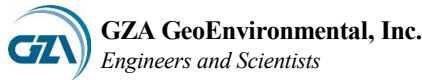
Depth (ft)	Sample				Coring Time (min/ft)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
	No.	Depth (ft.)	Blows (per 6 in.)	SPT Value						
5	S1	0-1.5	*			1" Crushed stone and sand	5	3.8	*	
	S2	1.5-3.5	15 11 5 9	16		Fill - Brown fine gravel, and fine to coarse sand, little silt (slightly moist)				
	S3	3.5-4.7	30 52 50/2"	102/8"		- sampler refusal atop shale bedrock @ approx. 4.7'				
10					4.7	Dark red-brown highly weathered/fractured shale, very close joint spacing, very poor quality ROCK CORE RUN NO. 1: 5' to 10' REC = 100% RQD = 0%	10			
					6.3					
					6.0					
					5.7					
					6.9					
					6.8					
					6.8					
					14.2					
15					4.7	ROCK CORE RUN NO. 2: 10' to 15' REC = 95% RQD = 8%	15			
					2.9					
					3.5					
					3.4					
					3.6					
20					3.4	ROCK CORE RUN NO. 3: 15' to 20' REC = 97% RQD = 47% - grading poor quality	20			
					3.9					
					3.6					
					3.6					
					4.2					
25					5.8	ROCK CORE RUN NO. 4: 20' to 25' REC = 98% RQD = 42%	25			
					7.2					
						End of exploration at 25 feet. Groundwater not determined				

REMARKS
* - Hand excavated

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3A

TEST BORING LOG



PSE&G
Franklin Township, NJ

EXPLORATION NO.: B-15
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes	Type of Rig: ATV	Boring Location: See Plan	Final Boring Depth (ft.): 28
Drilling Co.: Craig Test Borings	Rig Model: CME 55	Ground Surface Elev. (ft.): +91	
Driller: Mark & Matt	Drilling Method: Mud Rotary	Date Start - Finish: 6/10/2024 - 6/10/2024	

Hammer Type: Automatic	Groundwater Depth (ft.)			
Hammer Weight (lb.): 140	Hammer Fall (in.): 30	Date	Time	Water Depth
Auger or Casing O.D./I.D Dia (in.): 4.5/4.25	Rock Core Size: NX	6/10/24		ND

Depth (ft)	Sample				Coring Time (min/ft)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
	No.	Depth (ft.)	Blows (per 6 in.)	SPT Value						
5	S1	0-1	*			2" Gravel/crushed stone	5	5.5	*	
	S2	1-3	8 5 3 7	8		Fill - Yellowish brown and gray fine to medium sand, some fine to coarse gravel, little silt (slightly moist)		17.0		
	S3	3-5	17 15 30 22	45		Fill - Gray/reddish brown fine to coarse sand, and silty clay, little fine gravel (moist)				
	S4	5-6.3	24 53 50/3"	103/9"	CL	Reddish brown silty clay, some fine to coarse gravel (shale fragments), little fine to medium sand (moist)(hard)				
	S5	7-7.8	34 50/3"	50/3"		- sampler refusal atop shale bedrock @ approx. 7.8'				
10				4.5		Dark red-brown highly weathered/fractured shale, very close joint spacing, very poor quality	10			
15					4.5	ROCK CORE RUN NO. 1: 8' to 13'	15			
					5.0	REC = 100%				
					6.2	RQD = 0%				
					3.2	ROCK CORE RUN NO. 2: 13' to 18'				
					4.3	REC = 98%				
					4.3	RQD = 27%				
					3.5	- grading poor quality				
20					3.2	ROCK CORE RUN NO. 3: 18' to 23'	20			
					3.7	REC = 100%				
					4.3	RQD = 53%				
					4.4	- grading fair quality				
					3.7					
25					3.2	ROCK CORE RUN NO. 4: 23' to 28'	25			
					4.1	REC = 95%				
					4.4	RQD = 53%				
					4.5					
30						End of exploration at 28 feet. Groundwater not determined				
35										

REMARKS
* - Hand excavated

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3B

TEST BORING LOG



PSE&G
Franklin Township, NJ

EXPLORATION NO.: B-16
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes	Type of Rig: ATV	Boring Location: See Plan
Drilling Co.: Craig Test Borings	Rig Model: CME 55	Final Boring Depth (ft.): 31
Driller: Mark & Matt	Drilling Method: Mud Rotary	Ground Surface Elev. (ft.): +94
		Date Start - Finish: 6/6/2024 - 6/6/2024

Hammer Type: Automatic	Groundwater Depth (ft.)			
Hammer Weight (lb.): 140	Hammer Fall (in.): 30	Date	Time	Water Depth
Auger or Casing O.D./I.D Dia (in.): 4.5/4.25	Rock Core Size: NX	6/6/24		ND
				Stab. Time

Depth (ft)	Sample				Coring Time (min/ft)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
	No.	Depth (ft.)	Blows (per 6 in.)	SPT Value						
5	S1	0-3	*			2" of 3/4" clean stone	5	20.3	*	
			6 3	7		Fill - Dark reddish brown silty clay, little fine to coarse gravel, little fine to medium sand (very moist)				
	S2	3-5	4 21		SM	Dark reddish brown fine to coarse sand, some fine to coarse gravel, some clayey silt (wet)(loose)				
10	S3	5-6.2	24 46	96/8"		Dark red-brown fine to coarse gravel (highly weathered shale), and clayey silt, little fine to coarse sand (moist)(very dense)	10	27.1		
			50/2"		GM	ROCK CORE RUN NO. 1: 8' to 11' REC = 0% RQD = 0%				
	S4	11-13	3 11	24		- core barrel clogged. Resumed SPT sampling @ 11'				
15	S5	13-14.8	13 15	88		Dark reddish brown/purple silty clay, some fine to coarse gravel (shale fragments), trace fine to medium sand (wet)(very stiff to hard)	15			
	S6	15-15.1	52 50/3"	50/1"		Weathered shale - Dark reddish brown fine to coarse gravel (shale fragments), some silt, trace fine to coarse sand (moist)(very dense)				
			50/1"		CL	Dark red-brown highly weathered/fractured shale, very close joint spacings, very poor quality				
20						ROCK CORE RUN NO. 2: 16' to 21' REC = 73% RQD = 7%	20			
						ROCK CORE RUN NO. 3: 21' to 26' REC = 100% RQD = 7%				
						ROCK CORE RUN NO. 4: 26' to 31' REC = 95% RQD = 88%				
25						- grading to good quality	25			
30							30			
35						End of exploration at 31 feet. Groundwater not determined				

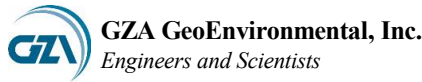
REMARKS
* - Hand excavated

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3C

2 - MTA BORING LOG WITH CORES; 8/5/2024; 10:09:00 AM

TEST BORING LOG



PSE&G
Franklin Township, NJ

EXPLORATION NO.: B-17
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes	Type of Rig: ATV	Boring Location: See Plan
Drilling Co.: Craig Test Borings	Rig Model: CME 55	Final Boring Depth (ft.): 27
Driller: Mark & Matt	Drilling Method: Mud Rotary	Ground Surface Elev. (ft.): +106
		Date Start - Finish: 6/5/2024 - 6/5/2024

Hammer Type: Automatic Hammer Weight (lb.): 140 Auger or Casing O.D./I.D Dia (in.): 4.5/4.25	Groundwater Depth (ft.)			
	Date	Time	Water Depth	Stab. Time
	6/5/24		ND	

Hammer Fall (in.): 30
Rock Core Size: NX

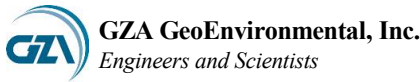
Depth (ft)	Sample				Coring Time (min/ft)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
	No.	Depth (ft.)	Blows (per 6 in.)	SPT Value						
5	S1	0-3	*	16	4.6	2" of 3/4" clean stone	5	26.2	*	
			6 8							DGA Fill - Gray fine to coarse gravel, and fine to coarse sand, trace silt (dry)
	S2	3-5	8 14			CL				Reddish brown silty clay, and fine to coarse sand, some fine to coarse gravel (very moist)(very stiff)
10	S3	5-5.8	50/3"	50/3"	6.9	Reddish brown fine to coarse gravel (shale fragments), some silty clay, little fine to medium sand (Decomposed/weathered shale)(moist)(very dense) - sampler refusal atop shale bedrock @ 5.8'	10	19.2		
			48			GC				Red-brown highly weathered/fractured shale, very close joint spacing, very poor quality
15					1.3	ROCK CORE RUN NO. 1: 7' to 12'	15			
					1.0	REC = 33%				
					2.3	RQD = 0%				
					2.2	ROCK CORE RUN NO. 2: 12' to 17'				
20					5.3	REC = 33%	20			
					3.4	RQD = 0%				
					3.6	ROCK CORE RUN NO. 3: 17' to 22'				
					3.0	REC = 80%				
25					3.0	RQD = 10%	25			
					6.0	ROCK CORE RUN NO. 4: 22' to 27'				
					6.7	REC = 85%				
					8.3	RQD = 17%				
30					9.7	End of exploration at 27 feet. Groundwater not determined				

REMARKS
* - Hand excavated

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3D

TEST BORING LOG



PSE&G
Franklin Township, NJ

EXPLORATION NO.: B-18
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes	Type of Rig: ATV	Boring Location: See Plan	Final Boring Depth (ft.): 27
Drilling Co.: Craig Test Borings	Rig Model: CME 55	Ground Surface Elev. (ft.): +86	
Driller: Mark & Matt	Drilling Method: Mud Rotary	Date Start - Finish: 6/10/2024 - 6/10/2024	

Hammer Type: Automatic	Groundwater Depth (ft.)		
Hammer Weight (lb.): 140	Hammer Fall (in.): 30	Date	Time
Auger or Casing O.D./I.D Dia (in.): 4.5/4.25	Rock Core Size: NX	6/10/24	
		Water Depth	Stab. Time
		ND	

Depth (ft)	Sample				Coring Time (min/ft)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
	No.	Depth (ft.)	Blows (per 6 in.)	SPT Value						
	S1	0-1	*			8" Topsoil			*	
	S2	1-3	23 40 40 32	80		Dark reddish brown fine to coarse sand, some silty clay, little fine gravel (moist)(very dense)	7.5			
	S3	3-3.7	52	50/2"		Reddish brown fine to coarse gravel (shale fragments), some silt, little fine to medium sand (decomposed/weathered shale)(moist)(very dense) - sampler refusal atop shale bedrock @ 5.3'	9.4			
5	S4	5-5.3	50/2" 50/4"	50/4"				5		
10					3.5 5.2 4.3 13.7 6.7	Red-brown highly weathered/fractured shale, very close joint spacing, very poor quality ROCK CORE RUN NO. 1: 7' to 12' REC = 83% RQD = 0%	10			
15					6.0 3.3 3.2 2.8	ROCK CORE RUN NO. 2: 12' to 17' REC = 100% RQD = 42% - grading poor quality	15			
20					3.2 3.0 3.3 3.2 3.5 5.3	ROCK CORE RUN NO. 3: 17' to 22' REC = 97% RQD = 53% - grading fair quality	20			
25					3.9 3.8 3.8 3.9 3.8	ROCK CORE RUN NO. 4: 22' to 27' REC = 100% RQD = 47% - grading poor quality	25			
30						End of exploration at 27 feet. Groundwater not determined				
35										

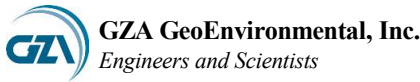
REMARKS
* - Hand excavated

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3E

2 - MTA BORING LOG WITH CORES; 8/5/2024; 10:09:01 AM

TEST BORING LOG



PSE&G
Franklin Township, NJ

EXPLORATION NO.: B-24
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes	Type of Rig: ATV	Boring Location: See Plan	Final Boring Depth (ft.): 27
Drilling Co.: Craig Test Borings	Rig Model: CME 55	Ground Surface Elev. (ft.): +91.5	
Driller: Mark & Matt	Drilling Method: Mud Rotary	Date Start - Finish: 6/11/2024 - 6/11/2024	

Hammer Type: Automatic	Groundwater Depth (ft.)			
Hammer Weight (lb.): 140	Hammer Fall (in.): 30	Date	Time	Water Depth
Auger or Casing O.D./I.D Dia (in.): 4.5/4.25	Rock Core Size: NX	6/11/24		ND

Depth (ft)	Sample				Coring Time (min/ft)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
	No.	Depth (ft.)	Blows (per 6 in.)	SPT Value						
5	S1	0-1	*			10" Topsoil	5	15.8	*	
	S2	1-3	14 17 26 27	43		SM Reddish brown fine to coarse sand, and clayey silt, trace fine gravel (moist)(dense)				
	S3	3-4.2	43 36 50/2"	86/8"		CL Dark reddish brown silty clay, some fine to coarse gravel (shale fragments), trace fine sand (moist)(hard)				
	S4	5-6.3	17 48 50/3"	98/9"		- sampler refusal atop shale bedrock @ 6.3'				
10					3.5	Red-brown highly weathered/fractured shale, very close joint spacing, very poor quality	10			
					4.0	ROCK CORE RUN NO. 1: 7' to 12'				
					3.0	REC = 97% RQD = 0%				
					2.5					
15					2.8	ROCK CORE RUN NO. 2: 12' to 17'	15			
					3.6	REC = 100%				
					3.2	RQD = 43%				
					2.3	- grading poor quality				
20					3.3	ROCK CORE RUN NO. 3: 17' to 22'	20			
					4.2	REC = 97%				
					3.3	RQD = 52%				
					4.6	- grading fair quality				
25					3.5	ROCK CORE RUN NO. 4: 22' to 27'	25			
					4.5	REC = 100%				
					3.9	RQD = 55%				
					6.2					
					5.0					
					5.5					
					7.0					
					6.9					
						End of exploration at 27 feet. Groundwater not determined				

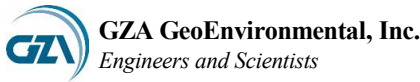
REMARKS
* - Hand excavated

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3F

2 - MTA BORING LOG WITH CORES; 8/5/2024; 10:09:02 AM

TEST BORING LOG



PSE&G
Franklin Township, NJ

EXPLORATION NO.: BB 6/1-1
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes	Type of Rig: ATV	Boring Location: See Plan
Drilling Co.: Craig Test Borings	Rig Model: CME 55	Final Boring Depth (ft.): 27
Driller: Mark & Matt	Drilling Method: Mud Rotary	Ground Surface Elev. (ft.): +104
Date Start - Finish: 6/5/2024 - 6/5/2024		

Hammer Type: Automatic	Groundwater Depth (ft.)			
Hammer Weight (lb.): 140	Hammer Fall (in.): 30	Date	Time	Water Depth
Auger or Casing O.D./I.D Dia (in.): 4.5/4.25	Rock Core Size: NX	6/5/24		ND
		Stab. Time		

Depth (ft)	Sample				Coring Time (min/ft)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
	No.	Depth (ft.)	Blows (per 6 in.)	SPT Value						
5	S1	0-3	*			2" of 3/4" clean stone				
						DGA Fill - Gray fine to coarse gravel, some fine to coarse sand, trace silt (moist)	12.9		*	
	S2	3-4.3	19 50 50/4"	100/10"		SC Reddish brown fine to coarse sand, some silty clay, trace fine gravel (moist)(very dense)	10.1			
10	S3	5-5.3	50/3"	50/3'		GM Red-brown fine to coarse gravel (shale fragments), some silt, little fine to medium sand (decomposed/highly weathered shale)(slightly moist)(very dense)	5			
					5.6	Red-brown fractured shale, very close joint spacing, poor quality	10			
15					3.9	ROCK CORE RUN NO. 1: 7' to 12'				
					3.6	REC = 98%				
					4.7	RQD = 30%				
					8.2	ROCK CORE RUN NO. 2: 12' to 17'				
20					3.8	REC = 98%				
					3.2	RQD = 43%				
25					4.5	ROCK CORE RUN NO. 3: 17' to 22'				
					3.3	REC = 92%				
					7.2	RQD = 32%				
					5.0	ROCK CORE RUN NO. 4: 22' to 27'				
30					4.7	REC = 100%				
					6.0	RQD = 75%				
					3.8	- grading fair to good quality				
35					3.4	End of exploration at 27 feet.				
					3.2	Groundwater not determined				
					3.4					
					3.5					
					4.7					

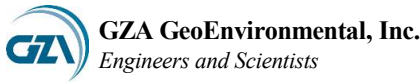
REMARKS
* - Hand excavated

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3G

2 - MTA BORING LOG WITH CORES; 8/5/2024; 10:09:03 AM

TEST BORING LOG



PSE&G
Franklin Township, NJ

EXPLORATION NO.: GT-1
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes	Type of Rig: ATV	Boring Location: See Plan	Final Boring Depth (ft.): 9
Drilling Co.: Craig Test Borings	Rig Model: CME 55	Ground Surface Elev. (ft.): +90.5	
Driller: Mark & Matt	Drilling Method: Mud Rotary	Date Start - Finish: 6/10/2024 - 6/10/2024	

Hammer Type: Automatic Hammer Weight (lb.): 140 Auger or Casing O.D./I.D Dia (in.): 4.5/4.25	Groundwater Depth (ft.)			
	Date	Time	Water Depth	Stab. Time
	6/10/24		ND	

Hammer Fall (in.): 30
Rock Core Size: NX

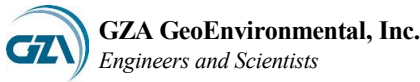
Depth (ft)	Sample				Coring Time (min/ft)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
	No.	Depth (ft.)	Blows (per 6 in.)	SPT Value						
5	S1	0-1.5	*		4.4	CL	4" of 3/4" clean stone	5		*
						GM	Reddish brown silty clay, some fine to coarse gravel (shale fragments), little fine to medium sand (moist)			
							Red-brown fine to coarse gravel (shale fragments), some silt, little fine to coarse sand (decomposed/weathered shale)(moist)			
							Red-brown highly weathered/fractured shale, very close joint spacing, very poor quality ROCK CORE RUN NO. 1: 4' to 9' REC = 100% RQD = 0%			
10						End of exploration at 9 feet. Groundwater not determined				
15										
20										
25										
30										
35										

REMARKS
* - Hand excavated

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3H

TEST BORING LOG



PSE&G
Franklin Township, NJ

EXPLORATION NO.: GT-2
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes	Type of Rig: ATV	Boring Location: See Plan	Final Boring Depth (ft.): 13
Drilling Co.: Craig Test Borings	Rig Model: CME 55	Ground Surface Elev. (ft.): +90.5	
Driller: Mark & Matt	Drilling Method: Mud Rotary	Date Start - Finish: 6/10/2024 - 6/10/2024	

Hammer Type: Automatic	Groundwater Depth (ft.)		
Hammer Weight (lb.): 140	Hammer Fall (in.): 30	Date	Time
Auger or Casing O.D./I.D Dia (in.): 4.5/4.25	Rock Core Size: NX	6/10/24	
		Water Depth	Stab. Time
		ND	

Depth (ft)	Sample				Coring Time (min/ft)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
	No.	Depth (ft.)	Blows (per 6 in.)	SPT Value						
5	S1	0-1	*		6.0 4.4 1.8 2.6 3.5	SC	DGA Fill - Dark gray fine to coarse gravel, and fine to coarse sand, trace silt (dry)	5	14.3 13.6	*
	S2	1-3	16 7 7 5	14			Reddish brown fine to coarse sand, some silty clay (very moist)(medium dense)			
	S3	3-5	31 34 35 22	69			- grading with some fine to coarse gravel (shale fragments)(very dense)			
	S4	5-6.8	63 50/3"	100+			- sampler refusal @ approximately 6.8' atop shale bedrock			
10							10			
15										
20										
25										
30										
35										

REMARKS
* - Hand excavated

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 3I

TEST PIT LOG



GZA GeoEnvironmental, Inc.
Engineers and Scientists

PSE&G
Franklin Township, NJ

EXPLORATION NO.: TP-7
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes
Contractor: Furino & Sons
Operator: Frank/Ron

Test Pit Location: See Plan

Final Test Pit Depth (ft.): 3.5

Ground Surface Elev. (ft.): +87

Date Start - Finish: 4/17/2024 - 4/17/2024

Type of Excavator: Track Excavator

Groundwater Depth (ft.)

Excavator Model: Komatsu PC 45MR

Date	Time	Water Depth	Stab.Time
4/17/24		2.5	NA

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1	S1	2	0-13	Topsoil - Reddish brown (5YR, 4/4) silty clay loam, weak medium subangular blocky, very moist, plastic, clear abrupt boundary, many fine to medium roots	1	13.2	
2			13-42	Black (5YR, 2.5/1) shale - plates typically 4" x 2" x 1" with 20% silty clay loam, wet, many coarse distinct reddish brown (5YR, 4/4) and light gray (5YR, 7/2) mottles encountered throughout layer	2		
3	3				3		
4				End of exploration at 3.5 feet. Rapid groundwater seepage encountered @ 2.5			
5							
6							
7							
8							
9							
10							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 4A

TEST PIT LOG



GZA GeoEnvironmental, Inc.
Engineers and Scientists

PSE&G
Franklin Township, NJ

EXPLORATION NO.: TP-8
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes
Contractor: Furino & Sons
Operator: Frank/Ron

Test Pit Location: See Plan

Final Test Pit Depth (ft.): 4.2

Ground Surface Elev. (ft.): +90

Date Start - Finish: 4/17/2024 - 4/17/2024

Type of Excavator: Track Excavator

Groundwater Depth (ft.)

Excavator Model: Komatsu PC 45MR

Date	Time	Water Depth	Stab.Time
4/17/24		3	NA

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1	S1, T1	2	0-11	Topsoil - Brown (7.5YR, 4/3) silty clay loam, weak medium subangular blocky, moist, plastic, gradual smooth boundary, many fine to medium roots	1	26.7	
2			11-36	Buried Topsoil - Brown (7.5YR, 4/3) silty clay, moderate fine subangular blocky, very moist, common fine to medium roots	2		
3			36-50	Reddish brown (5YR, 4/4) shale - plates typically 6" x 2" x 1/2" with 20% silty clay loam, wet	3		
4				End of exploration at 4.2 feet. Moderate groundwater seepage encountered @ 3'	4		
5				Tube Permeameter Test Results: <0.06 in/hr @ 2'			
6							
7							
8							
9							
10							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 4B

TEST PIT LOG



GZA GeoEnvironmental, Inc.
Engineers and Scientists

PSE&G
Franklin Township, NJ

EXPLORATION NO.: TP-9
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes
Contractor: Furino & Sons
Operator: Frank/Ron

Test Pit Location: See Plan

Final Test Pit Depth (ft.): 3.5

Ground Surface Elev. (ft.): +90

Date Start - Finish: 4/17/2024 - 4/17/2024

Type of Excavator: Track Excavator

Groundwater Depth (ft.)

Excavator Model: Komatsu PC 45MR

Date	Time	Water Depth	Stab.Time
4/17/24		2	NA

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1			0-16	Topsoil - Brown (7.5YR, 4/3) silty clay loam, 20% gravel, weak medium crumb, moist, friable, clear smooth boundary, many fine to medium roots	1		
2	S1, T1	2	16-32	Pale brown (10YR, 6/3) gravelly silty clay, 20% gravel, moderate fine subangular blocky, very moist, firm, abrupt wavy boundary, common coarse distinct brown (7.5YR, 4/3) mottles throughout layer	2	25.2	
3			32-42	Reddish brown (5YR, 4/4) shale - plates typically 6" x 2" x 1/2" with 20% silty clay loam, wet, many medium distinct light gray (5YR, 7/1) mottles encountered throughout layer	3		
4				End of exploration at 3.5 feet. Moderate groundwater seepage encountered @ 2'			
5				Tube Permeameter Test Results: <0.06 in/hr @ 2'			
6							
7							
8							
9							
10							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 4C

TEST PIT LOG



GZA GeoEnvironmental, Inc.
Engineers and Scientists

PSE&G
Franklin Township, NJ

EXPLORATION NO.: TP-10
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes
Contractor: Furino & Sons
Operator: Frank/Ron

Test Pit Location: See Plan

Final Test Pit Depth (ft.): 4

Ground Surface Elev. (ft.): +88.5

Date Start - Finish: 4/17/2024 - 4/17/2024

Type of Excavator: Track Excavator

Groundwater Depth (ft.)

Excavator Model: Komatsu PC 45MR

Date	Time	Water Depth	Stab.Time
4/17/24		NE	NA

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1			0-16	Topsoil - Brown (7.5YR, 4/3) silty clay loam, 10% gravel, many fine roots	1		
2	S1	2	16-48	Reddish brown (5YR, 4/4) and black (5YR, 2.5/1) shale - plates typically 3" x 2" x 1" with 20% silt loam, moist, few fine roots, few coarse distinct light gray (5YR, 7/1) mottles encountered throughout layer	2	11.7	
3					3		
4					4		
5				End of exploration at 4 feet. Groundwater seepage not encountered			
6							
7							
8							
9							
10							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 4D

TEST PIT LOG



GZA GeoEnvironmental, Inc.
Engineers and Scientists

PSE&G
Franklin Township, NJ

EXPLORATION NO.: TP-11
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes
Contractor: Furino & Sons
Operator: Frank/Ron

Test Pit Location: See Plan

Final Test Pit Depth (ft.): 3

Ground Surface Elev. (ft.): +90

Date Start - Finish: 4/17/2024 - 4/17/2024

Type of Excavator: Track Excavator

Groundwater Depth (ft.)

Excavator Model: Komatsu PC 45MR

Date	Time	Water Depth	Stab. Time
4/17/24		NE	NA

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1	S1	2	0-18	Topsoil - Brown (7.5YR, 4/3) silty clay loam, 10% gravel, moderate fine subangular blocky, moist, friable, abrupt smooth boundary, many fine to medium roots	1		
2			18-36	Reddish brown (5YR, 4/4) and black (5YR, 2.5/1) shale - plates typically 4" x 2" x 1/2" with 10% silty clay loam	2		
3				End of exploration at 3 feet. Groundwater seepage not encountered	3		
4							
5							
6							
7							
8							
9							
10							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 4E

TEST PIT LOG



GZA GeoEnvironmental, Inc.
Engineers and Scientists

PSE&G
Franklin Township, NJ

EXPLORATION NO.: TP-12
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes
Contractor: Furino & Sons
Operator: Frank/Ron

Test Pit Location: See Plan

Final Test Pit Depth (ft.): 3.5

Ground Surface Elev. (ft.): +95

Date Start - Finish: 4/17/2024 - 4/17/2024

Type of Excavator: Track Excavator

Groundwater Depth (ft.)

Excavator Model: Komatsu PC 45MR

Date	Time	Water Depth	Stab. Time
4/17/24		NE	NA

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1			0-13	Topsoil - Dark brown (5YR, 3/3) silt loam, weak medium crumb, moist, friable, clear smooth boundary, many fine roots	1		
2	S1	2	13-42	Reddish brown (5YR, 4/4) shale - plates typically 2" x 3" x 1/2" with 30% silty clay loam, moist, common medium distinct light gray (5YR, 7/2) mottles encountered throughout layer	2	12.4	
3					3		
4				End of exploration at 3.5 feet. Groundwater seepage not encountered			
5							
6							
7							
8							
9							
10							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 4F

TEST PIT LOG



GZA GeoEnvironmental, Inc.
Engineers and Scientists

PSE&G
Franklin Township, NJ

EXPLORATION NO.: TP-13
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes
Contractor: Furino & Sons
Operator: Frank/Ron

Test Pit Location: See Plan

Final Test Pit Depth (ft.): 5

Ground Surface Elev. (ft.): +89

Date Start - Finish: 4/17/2024 - 4/17/2024

Type of Excavator: Track Excavator

Groundwater Depth (ft.)

Excavator Model: Komatsu PC 45MR

Date	Time	Water Depth	Stab.Time
4/17/24		NE	NA

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1	S1	1	0-10	4" Stone atop 6" DGA	1	9.7	
2			10-24	Fill - Reddish brown (5YR, 4/4) shale fragments with 45% silty clay loam, strong fine crumb, moist, firm, clear smooth boundary	2		
3	T1	3	24-47	Fill - Brown (7.5YR, 4/3) silty clay loam, 10% gravel (shale fragments), moderate fine subangular blocky, very moist, firm, abrupt smooth boundary	3		
4			47-60	Reddish brown (5YR, 4/4) shale - 4" x 2" x 1/2" with 20% sandy loam, moist	4		
5				- excavator refusal @ 5'	5		
6				End of exploration at 5 feet. Groundwater seepage not encountered			
7							
8							
9							
10							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 4G

TEST PIT LOG



GZA GeoEnvironmental, Inc.
Engineers and Scientists

PSE&G
Franklin Township, NJ

EXPLORATION NO.: TP-14
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes
Contractor: Furino & Sons
Operator: Frank/Ron

Test Pit Location: See Plan
Ground Surface Elev. (ft.): +90.5

Final Test Pit Depth (ft.): 4.5
Date Start - Finish: 4/16/2024 - 4/16/2024

Type of Excavator: Track Excavator

Excavator Model: Komatsu PC 45MR

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab.Time
4/16/24		4	NA

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1	S1, T1	1	0-4	4" Clean stone	1		
			4-32	Fill - Reddish yellow (7.5YR, 6/6) gravelly sandy loam, 25% gravel, moderate medium crumb, moist, friable, abrupt smooth boundary			
3	S2, T2	3	32-45	Dark reddish brown (5YR, 3/4) gravelly clay loam, 20% gravel, strong medium subangular blocky, moist, firm, gradual smooth boundary, common medium distinct light gray (5YR, 7/1) mottles encountered throughout layer	3	18.2	
4			45-54	Dark reddish brown (5YR, 3/4) shale - plates typically 4" x 2" x 1/4" with 20% sandy loam, wet, few coarse distinct light gray (5YR, 7/1) mottles encountered from 48 inches to 54 inches	4		
5				End of exploration at 4.5 feet. Slight groundwater seepage encountered @ 4'			
6				Tube Permeameter Test Results: <0.06 in/hr @ 3'			
7							
8							
9							
10							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 4H

TEST PIT LOG



GZA GeoEnvironmental, Inc.
Engineers and Scientists

PSE&G
Franklin Township, NJ

EXPLORATION NO.: TP-15
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes
Contractor: Furino & Sons
Operator: Frank/Ron

Test Pit Location: See Plan

Final Test Pit Depth (ft.): 4

Ground Surface Elev. (ft.): +91

Date Start - Finish: 4/16/2024 - 4/16/2024

Type of Excavator: Track Excavator

Groundwater Depth (ft.)

Excavator Model: Komatsu PC 45MR

Date	Time	Water Depth	Stab.Time
4/16/24		4	NA

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (in.)	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1	S1, T1	1	0-10	6" of 3/4" Stone atop 4" DGA	1	10.8	
2			10-32	Fill - Yellowish red (5YR, 4/6) gravelly silty clay loam, 30% gravel, 25% cobbles, strong medium crumb, firm, clear smooth boundary	2		
3			32-48	Dark reddish brown (5YR, 3/4) shale - plates typically 4" x 2" x 1/2" with 20% sandy loam, moist, few coarse distinct light gray (5YR, 7/1) mottles encountered throughout layer	3		
4				End of exploration at 4 feet. Slight groundwater seepage encountered @ 4'	4		
5				Tube Permeameter Test Results: <0.06 in/hr @ 1'			
6							
7							
8							
9							
10							

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 4I

TEST PIT LOG



GZA GeoEnvironmental, Inc.
Engineers and Scientists

PSE&G
Franklin Township, NJ

EXPLORATION NO.: GT-1
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes
Contractor: Furino & Sons
Operator: Frank/Ron

Test Pit Location: See Plan
Ground Surface Elev. (ft.): +90.5

Final Test Pit Depth (ft.): 3
Date Start - Finish: 4/16/2024 - 4/16/2024

Type of Excavator: Track Excavator

Excavator Model: Komatsu PC 45MR

Groundwater Depth (ft.)

Date	Time	Water Depth	Stab. Time
4/16/24		NE	

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (ft.)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1			0-0.2		2" of 3/4" Stone	1		
			0.2-1		DGA Fill - Gray fine to coarse gravel, some fine to coarse sand, trace silt (moist)			
			1-3		Reddish brown fractured shale, little fine to medium sand, trace silt in seams (moist)(very dense)			
2						2		
3					- excavator refusal @ 3'	3		
4					End of exploration at 3 feet. Groundwater seepage not encountered			
5								
6								
7								
8								
9								
10								

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 4J

TEST PIT LOG



GZA GeoEnvironmental, Inc.
Engineers and Scientists

PSE&G
Franklin Township, NJ

EXPLORATION NO.: GT-3
SHEET: 1 of 1
PROJECT NO: 26.0093098.00
REVIEWED BY: Chris McLaughlin

Logged By: Cody Lynes
Contractor: Furino & Sons
Operator: Frank/Ron

Test Pit Location: See Plan

Final Test Pit Depth (ft.): 7

Ground Surface Elev. (ft.): +105

Date Start - Finish: 4/16/2024 - 4/16/2024

Type of Excavator: Track Excavator

Groundwater Depth (ft.)

Excavator Model: Komatsu PC 45MR

Date	Time	Water Depth	Stab.Time
4/16/24		NE	

Depth (ft)	Sample No.	Sample Depth (ft.)	Stratum Depth (ft.)	Symbol	Sample Description and Identification	Depth (ft)	Water Content (%)	Remark
1 2 3 4 5 6 7	Geo 1	3	0-0.2		2" of 3/4" Stone	1 2 3 4 5 6 7		
			0.2-1.5		DGA Fill - Gray fine to coarse gravel, little fine to coarse sand, trace silt (moist)			
			1.5-4	CL	Reddish brown silty clay, trace fine sand (very stiff)(moist)			
			4-7		Red-brown fractured shale, little fine to medium sand, trace silt in seams (moist)(very dense)			
7					- excavator refusal @ 7'	7		
8 9 10					End of exploration at 7 feet. Groundwater seepage not encountered			

REMARKS

See Log Key for exploration of sample description and identification procedures. Stratification lines represent approximate boundaries between soil and bedrock types. Actual transitions may be gradual. Water level readings have been made at the times and under the conditions stated. Fluctuations of groundwater may occur due to other factors than those present at the times the measurements were made.

Plate No.: 4K

APPENDIX II - Copies of MTA Exploration Logs

LOG OF BORING

BORING NO. 1

COMPLETION DATE: 6/1/09
JOB NUMBER: 5165-178*1D

SURFACE ELEVATION: +93 ft (±)

WATER LEVEL: *
READING DATE: 6/1/09

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	CORING TIME (MIN/FT)	SYMBOL	DESCRIPTION	DEPTH (ft.)
						7" Topsoil	
	S1	22			ML	Red-brown clayey silt, some fine to medium sand, with some distinct gray mottling (slightly moist)(very stiff)	
	S2	165			GM	Red-brown fine to coarse sand, and gravel sized shale fragments, and clayey silt, many prominent gray mottles (moist)(very dense)	
5	S3	100/3"				Red-brown weathered shale bedrock (slightly moist)(very dense)	5
10	S4	100/3"					10
15						Boring completed @ 10'-9"	15
						*Groundwater not encountered	
20							20

NOTES FOR COLUMNS:

1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:

- TRACE 0 - 10%
- LITTLE 10 - 20%
- SOME 20 - 35%
- AND OVER 35%

Typist/Date: mrd/mh 6/09



LOG OF BORING

BORING NO. 2

COMPLETION DATE: 6/1/09
JOB NUMBER: 5165-178*1D

SURFACE ELEVATION: +101 ft (±)

WATER LEVEL: *
READING DATE: 6/1/09

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	CORING TIME (MIN/FT)	SYMBOL	DESCRIPTION	DEPTH (ft.)
						6" Topsoil	
	S1	21	23.1		ML/SM	Red-brown clayey silt, and fine to coarse sand (moist)(very stiff)	
	S2	139				Red-brown highly weathered shale (slightly moist)(very dense)	
5	S3	100/5"				- augered to 9'	5
10	CORE RUN NO. 1			8.2		Red-brown weathered and fractured shale bedrock CORE RUN NO. 1: 9' to 11' REC = 100% RQD = 17%	10
	CORE RUN NO. 2			12.5		CORE RUN NO. 2: 11' to 14' REC = 100% RQD = 30%	
	CORE RUN NO. 3			6.5		CORE RUN NO. 3: 14' to 19' REC = 100% RQD = 29%	
15				7.5			15
				5.8			
				5.7			
				6.0			
				6.5			
				6.4			
				5.8			
20						Boring completed @ 19' *Groundwater not encountered	20

NOTES FOR COLUMNS:

1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:

- TRACE 0 - 10%
- LITTLE 10 - 20%
- SOME 20 - 35%
- AND OVER 35%

Typist/Date: mrd/mh 6/09



LOG OF BORING

BORING NO. 3

COMPLETION DATE: 6/2/09

SURFACE ELEVATION: +98 ft (±)

WATER LEVEL: *

JOB NUMBER: 5165-178*1D

READING DATE: 6/2/09

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	CORING TIME (MIN/FT)	SYMBOL	DESCRIPTION	DEPTH (ft.)
						8" Topsoil	
	S1	16			ML	Gray and red-brown clayey silt, and fine to coarse sand (moist)(very stiff)	
	S2	28				Red-brown highly weathered shale bedrock (slightly moist)(medium dense to very dense)	
5	S3	172				- augered to 8'	5
	CORE RUN NO. 1			4.5 6.3 7.0 7.2		Red-brown weathered and fractured shale bedrock CORE RUN NO. 1: 8' to 12' REC = 100% RQD = 17%	10
10	CORE RUN NO. 2			5.5 6.5 9.4 6.7 5.8		CORE RUN NO. 2: 12' to 17' REC = 100% RQD = 30%	15
15						Boring completed @ 7'	
						*Groundwater not encountered	
20							20

NOTES FOR COLUMNS:

1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:

- TRACE 0 - 10%
- LITTLE 10 - 20%
- SOME 20 - 35%
- AND OVER 35%

Typist/Date: mrd/mh 6/09



LOG OF BORING

BORING NO. 4

COMPLETION DATE: 6/1/09
JOB NUMBER: 5165-178*1D

SURFACE ELEVATION: +103.5 ft (±)

WATER LEVEL: *
READING DATE: 6/1/09

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	CORING TIME (MIN/FT)	SYMBOL	DESCRIPTION	DEPTH (ft.)
						6" Topsoil	
	S1	14			ML	Red-brown clayey silt, and fine to coarse sand, few distinct gray mottles (slightly moist)(stiff)	
	S2	100/5"				Red-brown weathered shale bedrock, few faint light brown mottles (slightly moist)(very dense)	
5	S3	70/2"					5
10	S4	100/4"					10
15						Boring completed @ 10'-4"	15
						*Groundwater not encountered	
20							20

NOTES FOR COLUMNS:

1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:

- TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: mrd/mh 6/09



LOG OF BORING

BORING NO. 5

COMPLETION DATE: 6/1/09
JOB NUMBER: 5165-178*1D

SURFACE ELEVATION: +102.5 ft (±)

WATER LEVEL: *
READING DATE: 6/1/09

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	CORING TIME (MIN/FT)	SYMBOL	DESCRIPTION	DEPTH (ft.)
						8" Topsoil	
	S1	31			GM	Red-brown fine to coarse sand, and gravel sized shale fragments, some clayey silt, few faint light brown mottles (slightly moist)(dense)	
	S2	169				Red-brown highly weathered shale bedrock (moist)(very dense)	
5	S3	100/3"					5
10	S4	100/3"					10
15						Boring completed @ 10'-9"	15
20						*Groundwater not encountered	20

NOTES FOR COLUMNS:
 1. SAMPLE AT AVERAGE SAMPLING DEPTH
 2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:
 TRACE 0 - 10%
 LITTLE 10 - 20%
 SOME 20 - 35%
 AND OVER 35%

Typist/Date: mrd/mh 6/09



LOG OF BORING

BORING NO. 6

COMPLETION DATE: 6/2/09
JOB NUMBER: 5165-178*1D

SURFACE ELEVATION: +104.5 ft (±)

WATER LEVEL: *
READING DATE: 6/2/09

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	CORING TIME (MIN/FT)	SYMBOL	DESCRIPTION	DEPTH (ft.)
						8" Topsoil	
	S1	14	20.2		ML	Red-brown clayey silt, some fine to medium sand (moist)(stiff) PL = 27%, LL = 41%, PI = 14%	
	S2	110				Red-brown highly weathered shale bedrock (slightly moist)(very dense)	
5							5
	S3	188					
						Red-brown highly fractured shale bedrock	
10							10
	S4	100/3"					
						Boring completed @ 10'-9"	
						*Groundwater not encountered	
15							15
20							20

NOTES FOR COLUMNS:
 1. SAMPLE AT AVERAGE SAMPLING DEPTH
 2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:
 TRACE 0 - 10%
 LITTLE 10 - 20%
 SOME 20 - 35%
 AND OVER 35%

Typist/Date: mrd/mh 6/09



LOG OF BORING

BORING NO. 7

COMPLETION DATE: 6/2/09
JOB NUMBER: 5165-178*1D

SURFACE ELEVATION: +105.5 ft (±)

WATER LEVEL: *
READING DATE: 6/2/09

DEPTH (ft.)	SAMPLES	N-VALUE	MOISTURE CONTENT (%)	CORING TIME (MIN/FT)	SYMBOL	DESCRIPTION	DEPTH (ft.)
						9" Topsoil	
	S1	14	21.4		ML	Red-brown clayey silt, some fine to medium sand (moist)(very stiff) - grading to gravel sized shale fragments, and fine to coarse sand, little silt	
	S2	110	14.5				
5	S3	188				Red-brown highly weathered fractured shale bedrock	5
	CORE RUN NO. 1			3.8 4.3 6.2 6.7 6.3		CORE RUN NO. 1: 6' to 11' REC = 75% RQD = 0%	
10							10
15						Boring completed @ 11' *Groundwater not encountered	15
20							20

NOTES FOR COLUMNS:

1. SAMPLE AT AVERAGE SAMPLING DEPTH
2. INDICATES THE NUMBER OF BLOWS TO ADVANCE A 2" OD SAMPLER A DISTANCE OF 12 INCHES USING A 140 POUND WEIGHT FALLING 30 INCHES

SOIL DESCRIPTION MODIFIERS:

- TRACE 0 - 10%
- LITTLE 10 - 20%
- SOME 20 - 35%
- AND OVER 35%

Typist/Date: mrd/mh 6/09



LOG OF TEST PIT

TEST PIT NO: 1 (B-8)

COMPLETION DATE: 6/01/09
JOB NUMBER: 5165-178*1D

SURFACE ELEVATION: +90.5 ft (±)

WATER LEVEL: 3'
READING DATE: 6/01/09

DEPTH	SAMPLES (1)	MOISTURE CONTENT (%)	DEPTH (INCHES)	DESCRIPTION	DEPTH
	S1		0-21	Topsoil	
	S2		21-36	Weak red (10R, 4/4) fine to coarse gravel sized shale fragments, with 10% clay loam, moderate medium subangular blocky, moist, firm, with many coarse prominent gray (10YR, 6/1) mottles	
5			36-76	Weak red (10R, 4/4) weathered shale, plates typically 1.5" x 4" x 6" in dimension, wet	5
10				Test pit completed @ 6.3' due to refusal Moderate groundwater seepage encountered @ 3' Soil mottling observed @ 1.75' Preliminary pit bail test results: 1.3 in/hr @ 6'	10

NOTES FOR COLUMNS:

1. SAMPLE AT AVERAGE SAMPLING DEPTH

SOIL DESCRIPTION MODIFIERS:

TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: mrd/mh 06/09

Sheet: 1 of 1

PLATE: 4A



LOG OF TEST PIT

TEST PIT NO: 2 (B-9)

COMPLETION DATE: 6/01/09
JOB NUMBER: 5165-178*1D

SURFACE ELEVATION: +93 ft (±)

WATER LEVEL: 3.3'
READING DATE: 6/01/09

DEPTH	SAMPLES (1)	MOISTURE CONTENT (%)	DEPTH (INCHES)	DESCRIPTION	DEPTH
	S1		0-15	Topsoil	
			15-36	Weak red (10R, 5/4) fine to coarse gravel sized shale fragments, with 10% clay loam, moderate medium subangular blocky, moist, firm, with many coarse prominent gray (10YR, 6/1) mottles	
5		S2		36-72	Weak red (10R, 5/4) weathered shale, plates typically 1.5" x 4" x 5" in dimension, very moist to wet, with many coarse prominent gray (10YR, 6/1) mottles
10				Test pit completed @ 6' due to refusal Slight groundwater seepage encountered @ 3.3' Soil mottling encountered @ 1.3' In-place permeability test results: 0.14 in/hr @ 3'	10

NOTES FOR COLUMNS:

1. SAMPLE AT AVERAGE SAMPLING DEPTH

SOIL DESCRIPTION MODIFIERS:

TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: mrd/mh 06/09

Sheet: 1 of 1

PLATE: 4B



LOG OF TEST PIT

TEST PIT NO: 3 (B-10)

COMPLETION DATE: 6/01/09

SURFACE ELEVATION: +97 ft (±)

WATER LEVEL: 5.3'

JOB NUMBER: 5165-178*1D

READING DATE: 6/01/09

DEPTH	SAMPLES (1)	MOISTURE CONTENT (%)	DEPTH (INCHES)	DESCRIPTION	DEPTH
	S1		0-4	Topsoil	
			4-18	Reddish brown (5YR, 4/4) silt loam, 10% gravel, moderate medium subangular blocky, moist, firm	
	18-48		Weak red (10R, 4/2) fine to coarse gravel sized shale fragments, with 45% clay loam, moderate medium subangular blocky, moist, firm, with few fine faint gray (10YR, 6/1) mottles		
5	S2		48-84	Weak red (10R, 4/2) weathered shale, plates typically 1.5" x 7" x 7" in dimension, moist to wet, with few fine faint gray (10YR, 6/1) mottles	5
			Test pit completed @ 7' due to refusal Slight groundwater seepage encountered @ 5.3' Soil mottling encountered @ 1.5' In-place permeability test results: No drop in water level in 2 hours @ 1' No drop in water level in 45 minutes @ 3'		
10					10

NOTES FOR COLUMNS:

1. SAMPLE AT AVERAGE SAMPLING DEPTH

SOIL DESCRIPTION MODIFIERS:

TRACE 0 - 10%

LITTLE 10 - 20%

SOME 20 - 35%

AND OVER 35%

Typist/Date: mrd/mh 06/09

Sheet: 1 of 1

PLATE: 4C



LOG OF TEST PIT

TEST PIT NO: 5 (B-12)

COMPLETION DATE: 6/01/09
JOB NUMBER: 5165-178*1D

SURFACE ELEVATION: +98.5 ft (±)

WATER LEVEL: *
READING DATE: 6/01/09

DEPTH	SAMPLES (1)	MOISTURE CONTENT (%)	DEPTH (INCHES)	DESCRIPTION	DEPTH
	S1		0-12	Topsoil	
			12-21	Reddish brown (2.5YR, 4/3) silt loam, 30% gravel sized shale fragments, weak fine angular blocky, moist, firm	
			21-78	Weak red (10YR, 5/4) weathered shale, plates typically 1" x 4" x 5" in dimension, moist	
5	S2				
10				<p style="text-align: center;">Test pit completed @ 6.5' due to refusal</p> <p style="text-align: center;">*Groundwater not encountered</p> <p style="text-align: center;">Soil mottling not observed</p> <p style="text-align: center;">Tube Permeameter test results: <0.1 in/hr @ 1'</p> <p style="text-align: center;">In-place permeability test results: 0.9 in/hr @ 3'</p>	10

NOTES FOR COLUMNS:

1. SAMPLE AT AVERAGE SAMPLING DEPTH

SOIL DESCRIPTION MODIFIERS:

TRACE 0 - 10%
LITTLE 10 - 20%
SOME 20 - 35%
AND OVER 35%

Typist/Date: mrd/mh 06/09

Sheet: 1 of 1

PLATE: 4E



MELICK-TULLY AND ASSOCIATES, P.C.
Geotechnical Engineers and Environmental Consultants

LOG OF TEST PIT

TEST PIT NO: 6 (B-13)

COMPLETION DATE: 6/01/09

SURFACE ELEVATION: +93 ft (±)

WATER LEVEL: *

JOB NUMBER: 5165-178*1D

READING DATE: 6/01/09

DEPTH	SAMPLES (1)	MOISTURE CONTENT (%)	DEPTH (INCHES)	DESCRIPTION	DEPTH
	S1		0-8	Topsoil	
			8-30	Reddish brown (2.5YR, 5/4) fine to coarse gravel sized shale fragments, with 40% clay loam, moderate medium subangular blocky, moist, firm	
5	S2		30-76	Reddish brown (2.5YR, 4/4) weathered shale, plates typically 1" x 4" x 6" in dimension, with few fine faint mottles @ 40", moist	5
10				<p>Test pit completed @ 6.3' due to refusal</p> <p>*Groundwater not encountered</p> <p>Soil mottling observed @ 3.3'</p> <p>In-place permeability test results: 1.2 in/hr @ 3'</p>	10

NOTES FOR COLUMNS:

1. SAMPLE AT AVERAGE SAMPLING DEPTH

SOIL DESCRIPTION MODIFIERS:

TRACE 0 - 10%

LITTLE 10 - 20%

SOME 20 - 35%

AND OVER 35%

Typist/Date: mrd/mh 06/09

Sheet: 1 of 1

PLATE: 4F



Inspection Checklist / Maintenance Actions Bioretention System

Checklist (circle one): Quarterly / Annual / Monthly / Special Event Inspection

Checklist No. _____ **Inspection Date:** _____

Date of most recent rain event: _____

Rain Condition (circle one):

Drizzle / Shower / Downpour / Other _____

Ground Condition (circle one):

Dry / Moist / Ponding / Submerged / Snow accumulation

The inspection items and preventative/corrective maintenance actions listed below represent general requirements. The design engineer and/or responsible party shall adjust the items and actions to better meet the conditions of the site, the specific design targets, and the requirements of regulatory authorities.

Component No. Component Name	For Inspector		For Maintenance Crew
	Inspection Item and Inspection Item No.	Result	Preventative / Corrective Maintenance Actions
A1 Pretreatment (Forebay)	1	Scouring or erosion is present at inlet structure and/or riprap apron	Y__ N__ Work Order # _____
	2	Clogged pipes or excessive sediment in the forebay	Y__ N__ Remove sediment or debris
	3	Damaged outlet structure (e.g., cracking, subsidence, spalling, erosion, or deterioration)	Y__ N__ Work Order # _____
A2 Pretreatment (MTD)	1	MTD inspection (if installed)	Y__ N__ (If a MTD is used for pretreatment, see Maintenance Manual Provided by the manufacturer)
A3 Pretreatment (Structural BMP)	1	BMP inspection	Y__ N__ (See BMP No. _____ Field Manual)

Note:

Component No. Component Name	For Inspector		For Maintenance Crew
	Inspection Item and Inspection Item No.	Result	Preventative / Corrective Maintenance Actions
B Basin Bed	1	Standing water is present after the design drain time The observed drain time is approximately _____ hours.	Y__ N__ Recheck to determine if there is standing water after 72 hours If standing water is present longer than 5 days, report to mosquito commission. Remove any sediment buildup Check the soil permeability Till the soil bed with rotary tiller or disc harrow Replace the planting soil, if necessary Work Order # _____
	2	Excessive sediment, silt, or trash accumulation on basin bed	Y__ N__ Clean pretreatment system Remove silt, sediment, and trash
	3	Erosion or channelization is present	Y__ N__ Check whether the flow bypass or diversion device is clogged Re-grade the infiltration bed Work Order # _____
	4	Animal burrows/rodents are present	Y__ N__ Pest control Work Order # _____

Note:

Component No. Component Name	For Inspector		For Maintenance Crew	
	Inspection Item and Inspection Item No.	Result	Preventative / Corrective Maintenance Actions	
B Basin Bed	5	Uneven bed	Y__ N__	Use light equipment to resurface the bed Work Order # _____
	6	Evidence of sinkholes or subsidence	Y__ N__	Monitor for sinkhole development
C Vegetation	1	Large spot(s) showing bare soil	Y__ N__	Vegetative cover must be maintained at 85%. Revegetate the entire basin if 50% or more vegetation has been lost. Check Landscaping plan for guidance (if available) Work Order # _____
	2	Invasive plants are present	Y__ N__	Remove the invasive plants and restore the vegetation in accordance with the landscaping plan Work Order # _____
	3	The vegetation in the basin has been mowed or removed	Y__ N__	Revegetate the system in accordance with the vegetation plan Work Order # _____ Note: The vegetation in a bioretention system should not be mowed or removed
Note:				

Component No. Component Name	For Inspector		For Maintenance Crew
	Inspection Item and Inspection Item No.	Result	Preventative / Corrective Maintenance Actions
D Bioretention System Embankment and Side Slopes	1	Signs of erosion, soil slide or bulges, seeps and wet spots, loss of vegetation, or erosion on the basin slope	Y__ N__ Check for excessive overland runoff flow through the embankment. Check for any sink hole development Direct the overland runoff to the forebay or pretreatment area Restabilize the bank Work Order # _____
	2	Overgrown perimeter vegetation	Y__ N__ Mow the vegetation on the perimeter of the embankment Work Order # _____ Note: Mowing of vegetation should only take place in the area outside the basin. Dense vegetation must be maintained in the basin.
E Outlet	1	Trash or debris accumulation more than 20%	Y__ N__ Clean and remove Determine source of trash and address to reduce future maintenance costs or basin failure
	2	Trash rack is damaged or rusted greater than 50%	Y__ N__ Repair or replace trash rack
		Trash rack is bent, loose, or missing parts	Y__ N__ Work Order # _____
	3	Outlet components (e.g., orifice plates or weir plate) skewed, misaligned, or missing	Y__ N__ Repair or replace component Work Order # _____
4	Discharge pipe apron is eroded or scoured	Y__ N__ Restabilize the discharge riprap apron Work Order # _____	
Note:			

Component No. Component Name	For Inspector		For Maintenance Crew	
	Inspection Item and Inspection Item No.	Result	Preventative / Corrective Maintenance Actions	
F Emergency Spillway	1	Trees or excessive vegetation present	Y__ N__	Remove trees and roots, and restore berms if necessary Work Order # _____
	2	Damaged structure	Y__ N__	Repair Work Order # _____
G Miscellaneous	1	Fence: broken or eroded parts	Y__ N__	Repair or replace Work Order # _____
	2	Gate: missing gate or lock	Y__ N__	Repair or replace Work Order # _____
	3	Sign/plate: tiled, missing, or faded	Y__ N__	Repair or replace Work Order # _____
	4	Excessive or overgrown vegetation blocking access to the basin	Y__ N__	Clear, trim, or prune the vegetation to allow access for inspection and maintenance Work Order # _____

Note:

Follow Up Items (Component No. / Inspection Item No.):

Associated Work Orders: # _____, # _____, # _____, # _____, # _____

Inspector Name

Signature

Date

Report issues to the local authority and mosquito commission as required by local ordinances and regulatory authorities.

File this checklist in the Maintenance Log after performing maintenance.

Preventative Maintenance Record

Corresponding Checklist No. _____
 Component No. _____, Inspection Item No. _____

Work Logs

Activities	Components	Date Completed
Sediment/debris removal Sediment removal should be taken place when the basin is thoroughly dry.	A1/A2/A3 – Pretreatment	
	B – Basin Bed	
	D – Bioretention System Embankment and Side Slopes	
	E – Outlet	
Vegetation removal	A1/A2/A3 – Pretreatment	
	B – Basin Bed	
	D – Basin Embankment and Side Slopes	
	E – Outlet	
	F – Emergency Spillway	

Vegetation is removed by _____ (type of equipment) with minimum disruption to the remaining vegetation.

All use of fertilizers, pesticides, mechanical treatments, and other means to ensure optimum vegetation health must not compromise the intended purpose of the stormwater management measure. The fertilizer applied is _____ (type), and _____ (quantity per usage) is applied _____ (frequency of use).

Debris, sediment, and trash are handled (onsite / by _____ (contractor name) to disposal site _____). (See Part I: Maintenance Plan – Disposal Plan Section)

Crew member: _____ / _____ **Date:** _____
(name/ signature)

Supervisor: _____ / _____ **Date:** _____
(name/ signature)

File this Preventative Maintenance Record in the Maintenance Log after performing maintenance.

Corrective Maintenance Record

1. **Work Order #** _____ **Date Issued** _____

2. **Issue to be resolved:**

3. The issue was from **Corresponding Checklist** _____, **Component No.** _____, **Inspection Item No.** _____.

4. Required Actions

Actions	Planned Date	Date Completed
Install new bolts to fix the orifice plate		
Repair/replace the trash rack		
Restabilize side slope (indicate location)		
Repair riprap apron with 100 cubic yards of aggregate		
Revegetate		

5. **Responsible person(s):**

6. Special requirements

- Time of the season or weather condition : _____
- Tools/equipment: _____
- Subcontractor (name or specific type): _____

Approved by _____ / _____ **Date** _____
(name/signature)

Verification of completion by _____ / _____ **Date** _____
(name/signature)

File this Corrective Maintenance Record in the Maintenance Log after performing maintenance.