

Stormwater Management Plan Memorandum



Public Service Electric and Gas Company

**West Orange 26kV Switching Station
Project No. 144507**

**Revision A
12/8/2025**

Stormwater Management Plan Memorandum

prepared for

**Public Service Electric and Gas Company
West Orange 26kV Switching Station
West Orange, New Jersey**

Project No. 144507

**Revision A
12/8/2025**

prepared by

**Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri**

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EXHIBITS

Exhibit A: Pre-Developed Watershed Plan

Exhibit B: Post-Developed Watershed Plan

1.0 SITE CONDITIONS

1.1 Site Description

Public Service Electric and Gas Company (PSE&G) proposes to expand the existing West Orange 26kV switching station, located in West Orange, Essex County, New Jersey. The property is designated by West Orange as Block 155, Lot 26.01 in the City of West Orange, New Jersey, which encompasses a total of 23.57 acres (refer to Figure 1-1 for the project's general vicinity map). The site is located at the corner of Prospect Avenue and Mt Pleasant Avenue. One access point to the station will be reconstructed at the south side of the station from Mt Pleasant Avenue. The expansion of the switching station, including the fence replacement, utility connections, and driveway updates, has an overall project disturbance of approximately 3.92 acres.

2.0 HYDROLOGY AND HYDRAULICS

2.1 Rainfall Data

Per the updated N.J.A.C. 7:8 regulations effective July 17, 2023, the Essex County adjustment factor is applied for both the current and future precipitation depth values for the 2-, 10-, and 100-year return frequencies used for stormwater design.

Table 2.1: Design Storm Frequency with Depth Precipitation Adjustment Factors (AF)

Return Frequency (yr)	24 Hour Depth				
	NOAA Atlas 14 (in)	Current AF	Current Adjusted (in)	Future AF	Future Adjusted (in)
Water Quality (WQ)	1.25 ^a				
2	3.42	1.01	3.45	1.19	4.07
10	5.20	1.03	5.37	1.22	6.36
100	8.71	1.06	9.23	1.33	11.58

^aN.J.A.C. 7:8-5.5 requires the WQ_v storm to be 1.25 inches of rainfall in two hours.

2.2 Runoff Data

HydroCAD-10 software was utilized to model the stormwater runoff by the SCS TR-55 methodology to calculate the pre- and post-developed runoff rates. Table 2.2 provides detailed information regarding curve numbers and land coverages for pre- and post-developed watersheds, respectively.

Table 2.2: Land Coverages

Land Coverage	CN	HSG	Area (acres)
Pre-Development			
Impervious, Pavement	98	D	0.973
>75% Grass cover, Good	80	D	1.345
Yard Stone/Gravel Pad	85	D	1.926
Brush, Good	73	D	1.261
Non-Contributory*	73-85	D	1.411
Post-Development			
Impervious, Pavement	98	D	1.373
>75% Grass cover, Good	80	D	2.102
Yard Stone/Gravel Pad	85	D	2.003
Brush, Good	73	D	0.000
Non-Contributory*	73-85	D	1.438

*Non-Contributory refers to areas that do not contribute to Underground Detention or the existing Aquashield system. Non-Contributory areas include the grassed slope areas and the transformer containment pits.

2.3 Stormwater Management Facilities

This project is considered a major development but is only required to address stormwater quantity and quality. A modular underground detention basin is proposed to mitigate the effects of higher runoff rates from the proposed switching station expansion. Stormwater will be routed to the underground detention basin via a 4 foot wide flat bottom grass swale running along the east edge of the switching station, discharging into a catch basin and through a stormwater pipe network. Stormwater quality will be addressed via the use of the grass swale BMP.

To prevent the non-contributory area drainage from reaching the switching station, and impacting the stormwater detention basin quantity control, an additional trench drain is proposed to the east of the grass swale. This trench drain will be connected to separate stormwater pipe network and shall connect to the existing stormwater infrastructure located within Mount Pleasant Avenue.

The underground detention basin is designed to attenuate the post-construction peak runoff rates for the current and future 2-, 10- and 100-year storm events to rates that are less than 50%, 75% and 80%, respectively, of the pre-construction peak runoff rates as shown in Table 2.3 below.

Table 2.3: Underground Detention System Discharge

Return Frequency (yr)	Inflow (cfs)	Discharge (cfs)	Stage Elevation (ft)	Max Available Storage (cf)	Bottom of Underground Detention Elevation (ft)
WQ	1.59	0.17	591.17	32,340	590.00
2 (Current)	3.14	0.64	592.14		
2 (Future)	4.07	1.48	592.29		
10 (Current)	5.61	3.66	592.59		
10 (Future)	7.14	4.92	592.85		
100 (Current)	10.65	7.15	593.55		
100 (Future)	14.18	8.71	594.19		

Table 2.4: Underground Detention Control Devices

Outlet Control Structure Name	Control Device Outlets
CS-01	(1) – 18" Concrete Pipe @ 590.00'
	(1) – 2.5" Circular Orifice @ 590.00'
	(1) – 30"W x 6"H Rectangular Orifice @ 592.00'

2.4 Results

The post-developed watersheds PO-DA A and PO-DA I, which discharge into the existing onsite stormwater pipe network that drains to the AquaShield, will be a reduction in size from the pre-developed watersheds PO-DA 6 and PO-DA 8, thus providing no adverse impact to the original AquaShield design or outfall.

As summarized in Section 2.3, an underground detention basin will be utilized to address the water quantity for the peak discharge for the newly developed areas associated with the switching station expansion, specifically post-developed watersheds PO-DA C, PO-DA D, PO-DA E, PO-DA F, and PO-DA H. The peak post-developed runoff rates do not exceed the peak pre-developed runoff rates for 50% of the 2-year, 75% of the 10-year, and 80% of the 100-year storm events.

Runoff from the noncontributory post-developed watershed PO-DA J drains to the same outfall, O-2, as pre-developed watershed PO-DA 1 and should result in minimal change of the peak flowrates.

Table 2.5 below summarizes the stormwater flow conditions for the project.

Table 2.5: Site Flow Results

Outfall Discharge Point		Q(2-YR) Current (cfs)	Q(2-YR) Future (cfs)	Q(10-YR) Current (cfs)	Q(10-YR) Future (cfs)	Q(100-YR) Current (cfs)	Q(100-YR) Future (cfs)
O-AquaShield (PO-DA 6 / A, DA 8 / I)	Pre	4.09	5.27	7.37	9.33	14.11	18.67
	Post	3.60<4.09 OK	4.62<5.27 OK	6.46<7.37 OK	8.15<9.33 OK	12.29<14.11 OK	16.20<18.67 OK
O-1A (PO-DA B, PO- DA G)	Pre	2.09	2.84	4.20	5.49	8.61	11.65
	Post	2.09	2.84	4.20	5.49	8.61	11.65
O-1B ^b (Detention Basin Areas (PO-DA 7 / C, D, E, F, H))	Pre	2.66*50% = 1.33	3.49*50% = 1.75	5.20*75% = 3.90	6.61*75% = 4.96	10.52*80% = 8.42	13.89*80% = 11.11
	Post	0.64<1.33 OK	1.48<1.75 OK	3.66<3.90 OK	4.92<4.96 OK	7.15<8.42 OK	8.71<11.11 OK
O-2 (PO-DA 1 / J)	Pre	2.45	3.19	4.81	6.07	9.80	12.86
	Post	2.36<2.45 OK	3.10<3.19 OK	4.48<4.81 OK	5.72<6.07 OK	8.86<9.80 OK	11.77<12.86 OK

^bN.J.A.C. 7:8-5.6 requires post-construction peak runoff rates for the 2-, 10-, and 100-year storm events to be 50%, 75%, and 80%, respectively, of the pre-construction peak runoff rates.

3.0 SOIL EROSION AND SEDIMENT CONTROL MEASURES

A soil erosion and sediment control plan and associated details have been developed to control sediment during construction activities. Silt sock and/or silt fence will be installed around the perimeter of the areas to be disturbed prior to beginning construction. Newly graded areas will be stabilized with erosion control blanket during construction, and the project entrance will be stabilized with 1.5” to 2.5” stone tracking pads. Filter protection will be provided at existing and proposed inlets to minimize sediment from entering the subsurface storm drainage system. Upon completion of earthwork activities, the station yard within the fenced area will be rocked with a sacrificial rock working surface to temporarily stabilize the site.

4.0 CONCLUSIONS

Because this project disturbs more than one acre, it is classified as a Major Development. However, as it is located within an urban redevelopment area, the project is not required to provide groundwater recharge. The underground detention basin system will address the stormwater quantity requirements while the grass swale addresses stormwater quality. Eventually, the treated stormwater is to be released into the existing municipal storm drain infrastructure, located within Mount Pleasant Avenue. There is no anticipated adverse impact to the public or private lands adjacent to the site. Temporary on-site erosion control measures have been designed in accordance with the New Jersey Department of Environmental Protection's standards set forth in the New Jersey Stormwater BMP Manual and the New Jersey Department of Agriculture's Standards for Soil Erosion and Sediment Control.

EXHIBIT A - PRE-DEVELOPED WATERSHED PLAN



LEGEND

BASIN DELINEATION
--- --

TIME OF CONCENTRATION
--- --

NON-CONTRIBUTORY AREAS
X X X X

no.	date	by	ckd	description
A	05/07/24	SJM	MJB	ISSUED FOR REVIEW
A	12/08/25	SJM	MJB	ISSUED FOR REVIEW



9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400

date
3/22/24

designed
S. MACALUSO

detailed
S. MACALUSO

checked
M. BLAKE

WEST ORANGE SWITCHING STATION
230/26/4KV OUTDOOR SUBSTATION

PRE-DEVELOPED WATERSHED MAP

WEST ORANGE, NJ



PUBLIC SERVICE ELECTRIC AND GAS COMPANY
ELECTRIC DELIVERY COMPANY-ASSET RELIABILITY, NEWARK, NJ

project
144507

contract

drawing
EXHIBIT A—

rev.
A

sheet
file

of
sheets

MICHAEL J. BLAKE
LIC NO. 24GE05521600
COA NO. 24GA2806400

EXHIBIT B - POST-DEVELOPED WATERSHED PLAN



LEGEND

BASIN DELINEATION

TIME OF CONCENTRATION

NON-CONTRIBUTORY AREAS

no.	date	by	ckd	description
A	05/07/24	SJM	MJB	ISSUED FOR REVIEW
B	12/08/25	SJM	MJB	ISSUED FOR REVIEW



9400 WARD PARKWAY
KANSAS CITY, MO 64114
816-333-9400

date
3/22/24

designed
S. MACALUSO

detailed
S. MACALUSO

checked
M. BLAKE

WEST ORANGE SWITCHING STATION
230/26/4KV OUTDOOR SUBSTATION

POST-DEVELOPED WATERSHED MAP

WEST ORANGE, NJ



PUBLIC SERVICE ELECTRIC AND GAS COMPANY
ELECTRIC DELIVERY COMPANY-ASSET RELIABILITY, NEWARK, NJ

project
144507

contract

drawing
EXHIBIT B—

rev.
A

sheet
file

of
sheets

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