Bristol Landfill Solar Facility

Bristol, Rhode Island

January 2023

Stormwater Management Report

701 George Washington Hwy
Lincoln, Rhode Island 02865
401.333.2382
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APPENDICIES

INTRODUCTION

On behalf of NuGen Capital, BETA Group, Inc., (BETA) has prepared the following stormwater application for the proposed Bristol Landfill Solar Facility Project. This report has been prepared in accordance with the guidance provided in the 2015 Rhode Island Stormwater Design and Installation Standards Manual (hereafter referred to as the "RISDISM").

This project proposes the installation of a 6.88 MW AC Solar Facility on the capped Bristol Landfill. The solar array will be constructed using a ballasted system to minimize any disturbance to the landfill cap. There will be no proposed impervious area or land disturbance/excavation on top of the landfill.

GENERAL INFORMATION

The following general information is provided in accordance with Appendix Section A.1.1 of the RISDISM:

Applicant

NuGen Capital, LLC
267 Water Street, 2nd Floor
Warren, RI 02885
Project Contact: Laura Frazier
(401) 287-2642 Phone

Town of Bristol
10 Court Street
Bristol, RI 02809
Project Contact: Diane Williamson
(401) 253-7000 Phone

Site Plan / Stormwater Management Designer

BETA Group, Inc.
701 George Washington Highway
Lincoln, RI 02865
Project Manager: Nicole Iannuzzi, P.E.
(401) 333-2382 Phone
(401) 333-9225 Fax

Address of Site

The Bristol Landfill (Bristol Plat 171, Lot 25) is located at 6 Minturn Farm Road.

Vicinity Map

Please refer to Figure 1 – Vicinity Map:

BETA

BRISTOL LANDFILL SOLAR

FIGURE 1

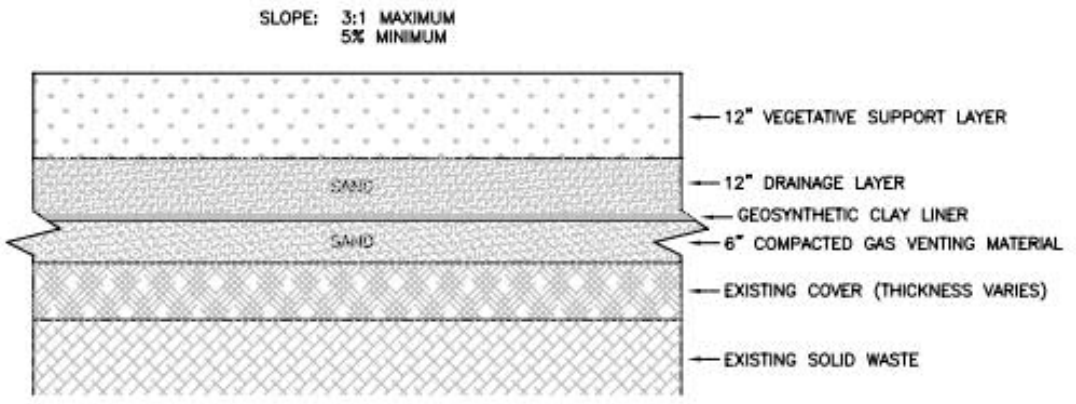
VICINITY MAP

K:\2796 Bristol Landfill\Solar\Permitting\RIDEM\Figures\Vicinity Map.dwg Plot Date: 1/20/2023 3:59 PM

EXISITNG CONDITIONS

The project site is the Bristol Landfill, located at 6 Minturn Farm Road Bristol, Rhode Island (the "Site"). The Bristol Assessor's Office identifies the previously developed Site as Lot 171-25 with an area of 91.54 acres. The area within and around the Site is zoned as Open Space and the land use is municipal consisting of the landfill itself, the Town's transfer station, animal shelter, the wastewater biosolids composting operation and the Town's yard waste management facilities. FEMA classifies the area as Zone X, which is determined to be outside of the 500-year flood. Facility components and associated work will take place outside of the wetland areas and their associated buffer zones.

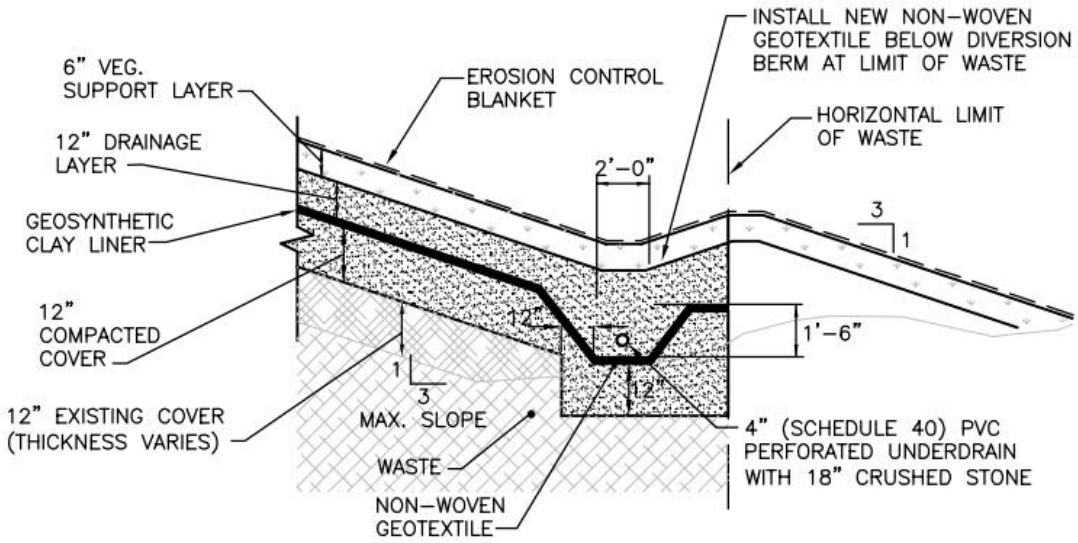
The Bristol Landfill is closed and capped. The landfill cap consists of four layers of material. The cap consists of a 12" vegetative layer, 12" sand drainage layer, the geosynthetic clay liner and 6" of compacted sand (gas venting detail).



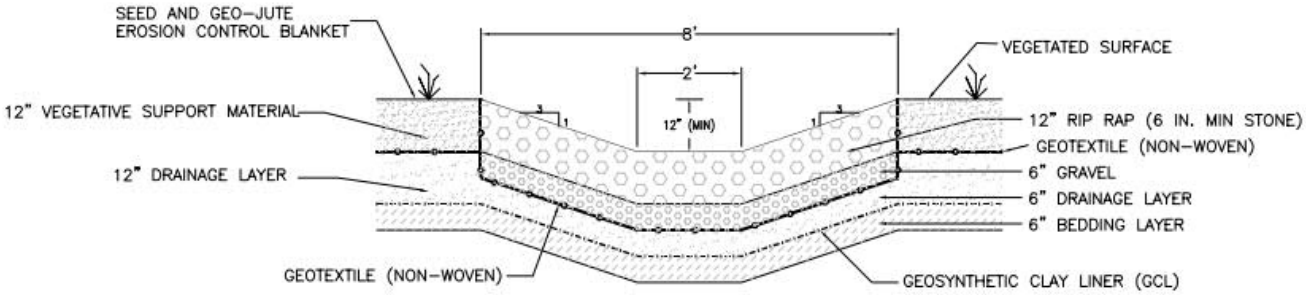
Landfill Cap Detail

Watershed

As depicted on the existing watershed map, the landfill is divided into two subwatersheds. The majority of the landfill and a portion of the residential area along Berry Lane drains to the wetland to the east (EX-WS-A). The southwestern portion of the landfill, a portion of the compost facility and the yard waste area drain to the wetland in the southwestern portion of the parcel (EX-WS-B). The northeastern portion of EX-WS-A contributes flow to a small wetland area which eventually discharges to the larger wetland area to the east. The eastern portion of EX-WS-A conveys flow to existing diversion berms with underdrains and existing drainage swales. The compost area and access road within EX-WS-B contribute flow to a closed drainage system which outfalls to the wetland in the southwestern corner of the subwatershed. The remaining area within EX-WS-B (including the landfill) conveys overland flow to the southwestern wetland.



Diversion Berm/Underdrain Detail



Drainage Swale Detail

Wetlands

BETA Group, Inc delineated the wetlands in the project area in October 2019. The entire Town of Bristol falls within the RIDEM River Protection Region 2. The following is a summary of the findings.

Wetland 1 (WFI Series – Flags WF1-100 to WF1-115; WF1-116 to WF1-138) A Buffer Zone of 75 feet has been assigned to this wetland area.

- WF1 Series wetland is separated into two (2) different wetland types.
- One of these wetland types, approximately from flags WF1-100 to WF1-115, can be described as a scrub-scrub wetland. Areas approx. 30 feet downgradient of the

boundary were flooded at the time of inspection. This area is mapped as a "Scrub-Shrub Wetland – Shrub Swamp" on the RIDEM Environmental Resources Map, which generally supports our findings. This area is unmapped by the National Wetlands Inventory (NWI).

- The wetland, approximately from flags WF1-116 to WF-138, can be described as a forested palustrine wetland system. Dominant vegetation included red maple (Acer rubrum), round- leaf greenbrier (Smilax rotundifolia), and cinnamon fern (Osmundastrum cinnamomeum). This area is mapped as a deciduous forested wetland, which generally supports our findings. This area is mapped as PFO1B by the National Wetlands Inventory (NWI), a seasonally saturated deciduous forested palustrine wetland system.

Wetland 2 (WF2 Series – Flags WF2-100 to WF2-150) A Buffer Zone of 75 feet has been assigned to this wetland area.

- The WF2 Series wetland is a large seasonally flooded, forested wetland system. Dominant vegetation included American elm (Ulmnus americana), Eastern skunk cabbage (Symplocarpus foetidus), Northern spicebush (Lindera benzoin), and red maple (Acer rubrum).
- Portions of this wetland are mapped as a deciduous forested wetland on the RIDEM Environmental Resources Map, which generally supports our findings.
- Portions of this wetland are mapped as PFO1E by the NWI, a seasonally saturated deciduous forested palustrine wetland system. This generally supports our findings.

Wetland 3 (WF3 Series – Flags WF3-85 to WF3-107) A Buffer Zone of 25 feet has been assigned to this wetland area.

- The WF3 Series wetland is a small forested wetland system. Dominant vegetation included red maple, round-leaf greenbrier, and glossy buckthorn (Frangula alnus). The area between flags WF3-95 to WF3-99 was dominated with phragmites and appeared to flood/be saturated frequently.
- This wetland area is primarily mapped as a deciduous forested wetland on the RIDEM Environmental Resources Map with a small portion (along the edge of the landfill) mapped as an emergent wetland, marsh/wet meadow. This generally supports our findings.
- This wetland is unmapped by the NWI.

PROPOSED CONDITIONS

This project proposes the installation of an approximately 6.88 MW AC Solar Facility on the capped landfill. The solar array will be constructed using a ballasted system to minimize any disturbance to the landfill cap. There will be minimal land disturbance/excavation on top of the landfill to install electrical cable. The access road

will be constructed of washed, crushed stone with a non-compacted subbase. The road will be approximately 20 feet wide at the entrance and transition to 10 feet wide as it reaches the top of the landfill. Proposed impervious areas will be limited to the small pads beneath transformers and inverters.

Watershed

The proposed watershed delineation will not change from the existing conditions. As noted previously, the array will utilize a ballasted system.

- The ballast blocks will be tubs with a diameter of 3.88 feet (11.8 square feet).
- Total number of ballast tubs will be 3,904.
- 3,904 tubs x 11.8 square feet per tub = 46,067 square feet = 1.06 acres.
- Area on top of landfill with panels = 903,659 square feet = 20.75 acres
- 1.06 acres/20.75 acres = 5.1% of overall solar array is comprised of ballast tubs.

Based on discussions with RIDEM, if the percent of ballast tub area is less than 10% of the overall array area, the array will have an insignificant impact on the stormwater characteristics of the site. Therefore, there will be no required water quality volume based on the proposed conditions. The minimum water quality volume of 0.2 watershed inches (0.2 inches over the disturbed areas) will also be waived as no fertilizer, herbicides or pesticides will be used on the landfill.

The proposed watershed analysis was performed by taking 5.1% of the capped landfill area with a CN of 80 (from existing conditions) and designating that as "Ballast" area with a CN of 98. The proposed conditions peak flows for the 1, 10 and 100 year design storms are the same as the existing conditions peak flows. See results in Appendix B.

Watershed	1 Year Storm Peak Flow (cfs)		10 Year Storm Peak Flow (cfs)		100 Year Storm Peak Flow (cfs)	
	Existing	Proposed	Existing	Proposed	Existing	Proposed
EX-WS-A	28.28	28.28	73.82	73.82	160.82	160.82
EX-WS-B	15.08	15.08	33.83	33.83	67.30	67.30

Wetlands

Facility components and associated work will take place outside of the wetland areas and their associated buffer zones. There will be no adverse impacts to the resource areas within the project area.

MINIMUM STANDARDS

The following narrative provides more detailed information for each of the individual

Minimum Standards from Chapter 3 and summarizes the Stormwater Management Checklist. As stated previously, the proposed project is below the 10 percent threshold (ballast block to overall array area) and does not propose any other impervious area. Therefore, there is no requirement to meet the eleven (11) Minimum Standards. However, all eleven (11) Minimum Standards have been addressed to the maximum extent practicable.

Standard 1 – LID Design

This standard has been met; applicable LID strategies to avoid, minimize, or mitigate stormwater impacts have been incorporated in the project design to some degree.

Specifically:

Avoiding Impacts

- A major goal of this project is to avoid the delineated wetlands and associated buffer zones. The limit of disturbance has been minimized to the greatest extent possible to achieve this goal.

Reducing Impacts

- The access road has been minimized to the maximum extent practicable while still providing access to the site, the access road will be clean, washed crushed stone as to not increase the impervious area of the site.

Therefore, it is our opinion, the project does consider and incorporate LID measures to the maximum extent practicable

Standard 2 – Groundwater Recharge

Groundwater recharge is not required as part of this project. The landfill is capped. Therefore, recharge is not possible.

Standard 3 – Water Quality
Standard 4 – Conveyance and Natural Channel Protection
Standard 5 – Overbank Flood Protection

Standards 3, 4 and 5 are not required as part of this project as the proposed project results in 5.1 % change in surface cover which is below the 10 percent threshold (ballast tub to overall array area) and does not propose any other impervious area. Therefore, it is assumed that the project will have an insignificant impact on the hydrologic and hydraulic characteristics of the site.

Standard 6 – Redevelopment & Infill Projects

This standard is not applicable, as the project does not qualify as a redevelopment or an infill project.

Standard 7 – Pollution Prevention

This standard has been met; the proposed project will not introduce any pollutants to the landfill or surrounding wetlands.

Standard 8 – LUHPPL's

This standard has been met, no portion of the project area is classified as a LUHPPL, nor are there any LUHPPL's in the vicinity of the project area.

Standard 9 – Illicit Discharges

This standard has been met; the Town of Bristol asserts that there are no, nor shall there be, any known existing or planned illicit discharges to or through any of the proposed stormwater facilities within the project area.

Standard 10 – Construction Erosion and Sedimentation Control

This standard has been met; erosion and sedimentation control (ESC) measures have been incorporated into the project design plans. During construction, straw wattles will be put in place at the limit of work as depicted on the Construction Plan. Disturbed areas will be treated with loam and seed as indicated on the Construction Plan.

Standard 11 – Stormwater Management System Operation and Maintenance

This standard has been met; a detailed Stormwater Management System Long-Term Operation and Maintenance Plan, prepared in accordance with guidance provided in Appendix E of the RISDISM, is included under separate cover. As part of the Operations and Maintenance Plan, regular inspections will be performed to ensure that the drip edge from the panels does not cause any erosion.

CONCLUSIONS

The Town of Bristol and NuGen Capital are proposing to install a solar array on top of the Bristol Landfill.

The work being proposed is outside of the wetlands and associated buffer zones. The project will have an insignificant impact on the hydrologic and hydraulic characteristics of the site.

All work being proposed satisfies the intent of the Wetland regulations and NuGen is requesting RIDEM approval for the project.

APPENDIX A

WETLAND REPORT

Bristol Landfill Wetlands Delineation
Bristol Landfill - Off Minturn Farm Rd, Bristol, RI

Wetland 1 (WFI Series – Flags WF1-100 to WF1-115; WF1-116 to WF1-138)

- WF1 Series wetland is separated into two (2) different wetland types.
- One of these wetland types, approximately from flags WF1-100 to WF1-115, can be described as a scrub-scrub wetland. Areas approx. 30 feet downgradient of the boundary were flooded at the time of inspection. This area is mapped as a "Scrub-Shrub Wetland – Shrub Swamp" on the RIDEM Environmental Resources Map, which generally supports our findings. This area is unmapped by the National Wetlands Inventory (NWI).
- The wetland, approximately from flags WF1-116 to WF-138, can be described as a forested palustrine wetland system. Dominant vegetation included red maple (*Acer rubrum*), round-leaf greenbrier (*Smilax rotundifolia*), and cinnamon fern (*Osmundastrum cinnamomeum*). This area is mapped as a deciduous forested wetland, which generally supports our findings. This area is mapped as PFO1B by the National Wetlands Inventory (NWI), a seasonally saturated deciduous forested palustrine wetland system.

Wetland 2 (WF2 Series – Flags WF2-100 to WF2-150)

- The WF2 Series wetland is a large seasonally flooded, forested wetland system. Dominant vegetation included American elm (*Ulmnus americana*), Eastern skunk cabbage (*Symplocarpus foetidus),* Northern spicebush (*Lindera benzoin*), and red maple (*Acer rubrum*).
- Portions of this wetland are mapped as a deciduous forested wetland on the RIDEM Environmental Resources Map, which generally supports our findings.
- Portions of this wetland are mapped as PFO1E by the NWI, a seasonally saturated deciduous forested palustrine wetland system. This generally supports our findings.

Wetland 3 (WF3 Series – Flags WF3-85 to WF3-107)

- The WF3 Series wetland is a small forested wetland system. Dominant vegetation included red maple, round-leaf greenbrier, and glossy buckthorn (*Frangula alnus*). The area between flags WF3-95 to WF3-99 was dominated with phragmites and appeared to flood/be saturated frequently.
- This wetland area is primarily mapped as a deciduous forested wetland on the RIDEM Environmental Resources Map with a small portion (along the edge of the landfill) mapped as an emergent wetland, marsh/wet meadow. This generally supports our findings.
- This wetland is unmapped by the NWI.

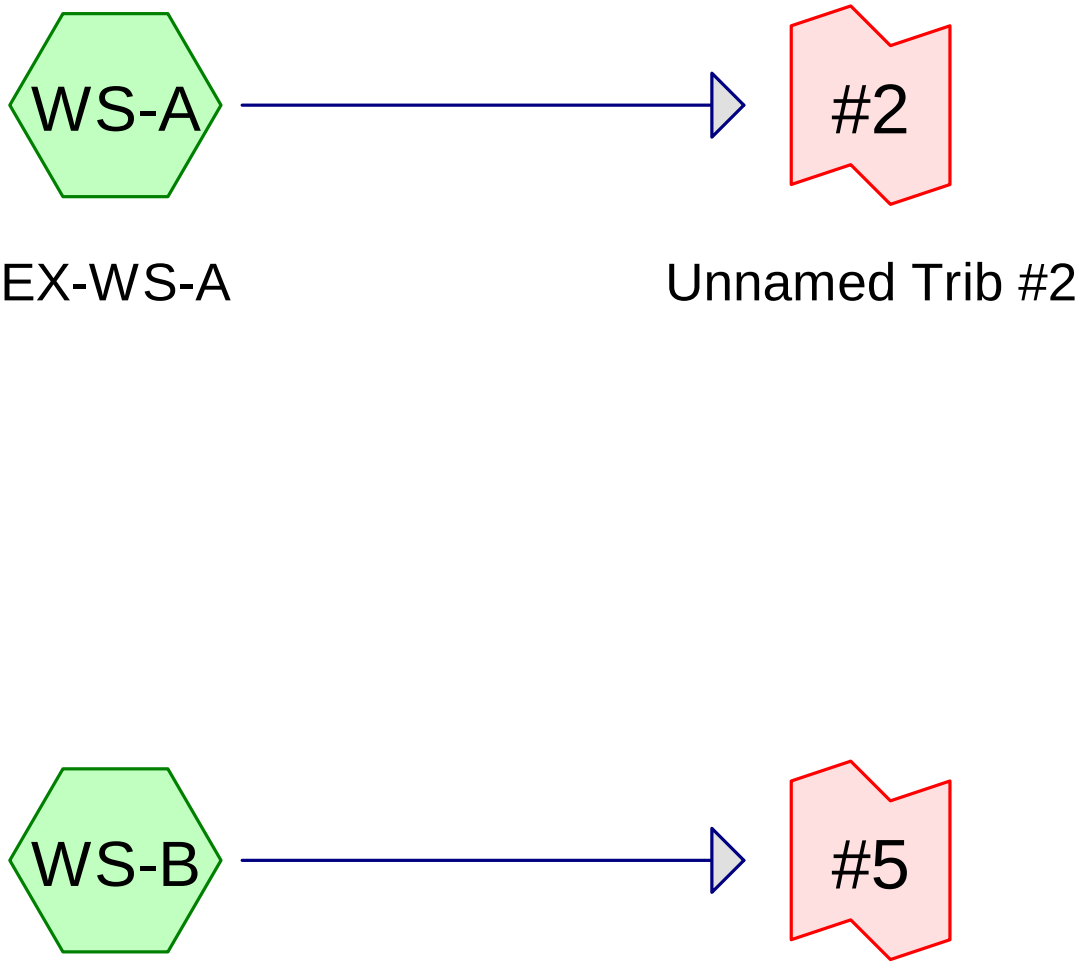

WF3-85 to WF3-107
WF2-100 to WF2-150
WF1-100 to WF1-138
• WF3-85 connects to WF3-107
• WF2-114 connects to culvert outlet
• WF2-138 connects to culvert

Source: http://ridemgis.maps.arcgis.com/apps/

Source: https://www.fws.gov/wetlands/data/mapper.html

APPENDIX B

HYDROLOGIC ANALYSIS



Subcat Reach Pond Link

Routing Diagram for 2796 - Prop Conditions
Prepared by {enter your company name here}, Printed 1/15/2023

Summary for Subcatchment WS-A: EX-WS-A

Runoff = 28.28 cfs @ 12.47 hrs, Volume= 161,574 cf, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.80"

	Area (sf)	CN	Description
*	1,378,386	80	Capped Landfill
	350,723	80	1/2 acre lots, 25% imp, HSG C
*	30,189	98	Ballast
	1,759,298	80	Weighted Average
	1,641,428		93.30% Pervious Area
	117,870		6.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0210	0.12		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.30"
10.1	567	0.0353	0.94		**Shallow Concentrated Flow, Shallow Woodlands** Woodland Kv= 5.0 fps
4.2	885	0.0486	3.55		**Shallow Concentrated Flow, Shallow Unpaved/Gravel** Unpaved Kv= 16.1 fps
3.0	217	0.0600	1.22		**Shallow Concentrated Flow, Shallow Woodland** Woodland Kv= 5.0 fps
31.1	1,769	Total			

Summary for Subcatchment WS-B: EX-WS-B

Runoff = 15.08 cfs @ 12.23 hrs, Volume= 64,694 cf, Depth= 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.80"

	Area (sf)	CN	Description
*	274,619	80	Capped Landfill
	133,492	98	Paved parking, HSG C
	102,910	86	<50% Grass cover, Poor, HSG C
*	9,131	98	Ballast
	520,152	86	Weighted Average
	377,529		72.58% Pervious Area
	142,623		27.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0400	0.16		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.30"
6.3	645	0.0600	1.71		**Shallow Concentrated Flow, Shallow Grass** Short Grass Pasture Kv= 7.0 fps
16.9	745	Total			

Summary for Link #2: Unnamed Trib #2

Inflow Area = 1,759,298 sf, 6.70% Impervious, Inflow Depth = 1.10" for 1-Year event
Inflow = 28.28 cfs @ 12.47 hrs, Volume= 161,574 cf
Primary = 28.28 cfs @ 12.47 hrs, Volume= 161,574 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs

Summary for Link #5: Unnamed Trib #5

Inflow Area = 520,152 sf, 27.42% Impervious, Inflow Depth = 1.49" for 1-Year event
Inflow = 15.08 cfs @ 12.23 hrs, Volume= 64,694 cf
Primary = 15.08 cfs @ 12.23 hrs, Volume= 64,694 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs

Summary for Subcatchment WS-A: EX-WS-A

Runoff = 73.82 cfs @ 12.43 hrs, Volume= 411,353 cf, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
*	1,378,386	80	Capped Landfill
	350,723	80	1/2 acre lots, 25% imp, HSG C
*	30,189	98	Ballast
	1,759,298	80	Weighted Average
	1,641,428		93.30% Pervious Area
	117,870		6.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0210	0.12		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.30"
10.1	567	0.0353	0.94		**Shallow Concentrated Flow, Shallow Woodlands** Woodland Kv= 5.0 fps
4.2	885	0.0486	3.55		**Shallow Concentrated Flow, Shallow Unpaved/Gravel** Unpaved Kv= 16.1 fps
3.0	217	0.0600	1.22		**Shallow Concentrated Flow, Shallow Woodland** Woodland Kv= 5.0 fps
31.1	1,769	Total			

Summary for Subcatchment WS-B: EX-WS-B

Runoff = 33.83 cfs @ 12.23 hrs, Volume= 146,240 cf, Depth= 3.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
*	274,619	80	Capped Landfill
	133,492	98	Paved parking, HSG C
	102,910	86	<50% Grass cover, Poor, HSG C
*	9,131	98	Ballast
	520,152	86	Weighted Average
	377,529		72.58% Pervious Area
	142,623		27.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0400	0.16		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.30"
6.3	645	0.0600	1.71		**Shallow Concentrated Flow, Shallow Grass** Short Grass Pasture Kv= 7.0 fps
16.9	745	Total			

Summary for Link #2: Unnamed Trib #2

Inflow Area = 1,759,298 sf, 6.70% Impervious, Inflow Depth = 2.81" for 10-Year event
Inflow = 73.82 cfs @ 12.43 hrs, Volume= 411,353 cf
Primary = 73.82 cfs @ 12.43 hrs, Volume= 411,353 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs

Summary for Link #5: Unnamed Trib #5

Inflow Area = 520,152 sf, 27.42% Impervious, Inflow Depth = 3.37" for 10-Year event
Inflow = 33.83 cfs @ 12.23 hrs, Volume= 146,240 cf
Primary = 33.83 cfs @ 12.23 hrs, Volume= 146,240 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs

Summary for Subcatchment WS-A: EX-WS-A

Runoff = 160.82 cfs @ 12.41 hrs, Volume= 907,449 cf, Depth= 6.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	1,378,386	80	Capped Landfill
	350,723	80	1/2 acre lots, 25% imp, HSG C
*	30,189	98	Ballast
	1,759,298	80	Weighted Average
	1,641,428		93.30% Pervious Area
	117,870		6.70% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0210	0.12		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.30"
10.1	567	0.0353	0.94		**Shallow Concentrated Flow, Shallow Woodlands** Woodland Kv= 5.0 fps
4.2	885	0.0486	3.55		**Shallow Concentrated Flow, Shallow Unpaved/Gravel** Unpaved Kv= 16.1 fps
3.0	217	0.0600	1.22		**Shallow Concentrated Flow, Shallow Woodland** Woodland Kv= 5.0 fps
31.1	1,769	Total			

Summary for Subcatchment WS-B: EX-WS-B

Runoff = 67.30 cfs @ 12.22 hrs, Volume= 299,700 cf, Depth= 6.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	274,619	80	Capped Landfill
	133,492	98	Paved parking, HSG C
	102,910	86	<50% Grass cover, Poor, HSG C
*	9,131	98	Ballast
	520,152	86	Weighted Average
	377,529		72.58% Pervious Area
	142,623		27.42% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0400	0.16		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.30"
6.3	645	0.0600	1.71		**Shallow Concentrated Flow, Shallow Grass** Short Grass Pasture Kv= 7.0 fps
16.9	745	Total			

Summary for Link #2: Unnamed Trib #2

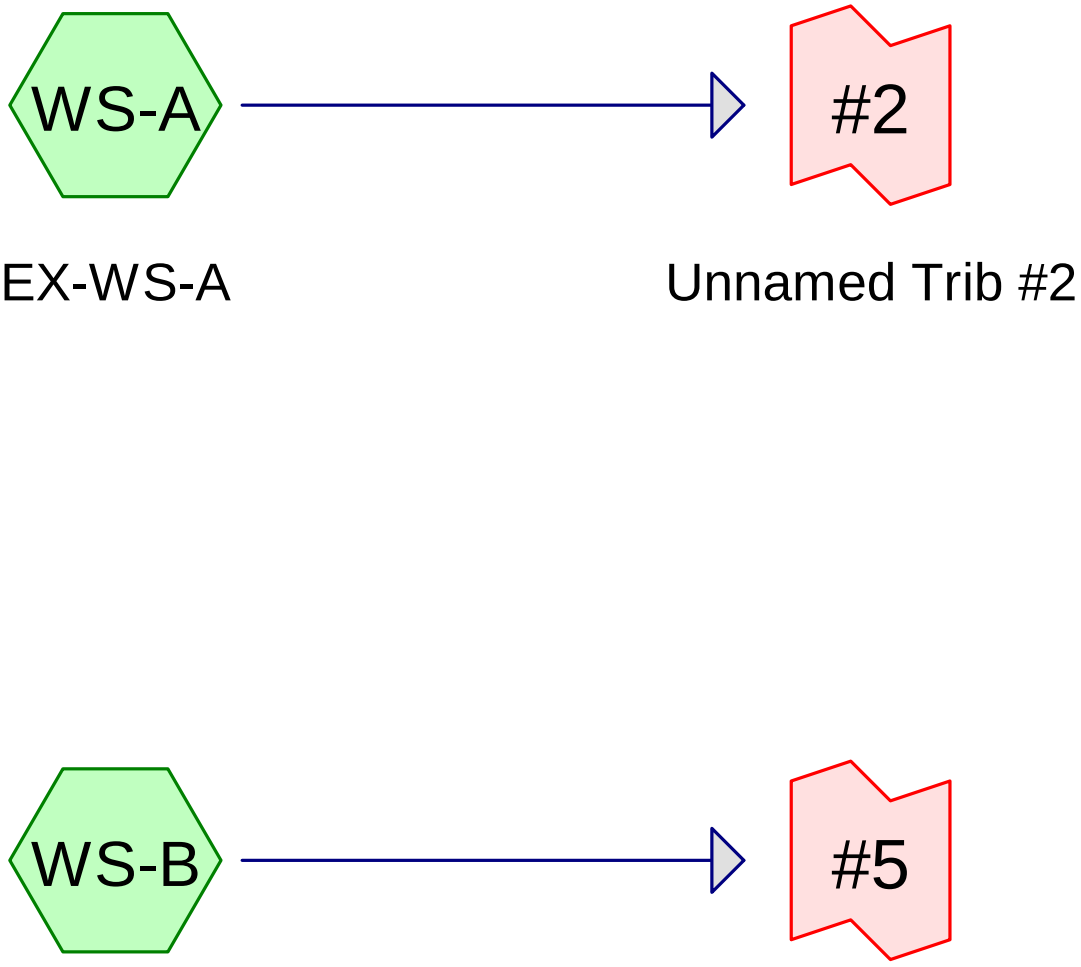
Inflow Area = 1,759,298 sf, 6.70% Impervious, Inflow Depth = 6.19" for 100-Year event
Inflow = 160.82 cfs @ 12.41 hrs, Volume= 907,449 cf
Primary = 160.82 cfs @ 12.41 hrs, Volume= 907,449 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs

Summary for Link #5: Unnamed Trib #5

Inflow Area = 520,152 sf, 27.42% Impervious, Inflow Depth = 6.91" for 100-Year event
Inflow = 67.30 cfs @ 12.22 hrs, Volume= 299,700 cf
Primary = 67.30 cfs @ 12.22 hrs, Volume= 299,700 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs



Subcat Reach Pond Link

Routing Diagram for 2796 - Ex Conditions
Prepared by {enter your company name here}, Printed 1/15/2023

Summary for Subcatchment WS-A: EX-WS-A

Runoff = 28.28 cfs @ 12.47 hrs, Volume= 161,574 cf, Depth= 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.80"

	Area (sf)	CN	Description
*	1,408,575	80	Capped Landfill
	350,723	80	1/2 acre lots, 25% imp, HSG C
	1,759,298	80	Weighted Average
	1,671,617		95.02% Pervious Area
	87,681		4.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0210	0.12		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.30"
10.1	567	0.0353	0.94		**Shallow Concentrated Flow, Shallow Woodlands** Woodland Kv= 5.0 fps
4.2	885	0.0486	3.55		**Shallow Concentrated Flow, Shallow Unpaved/Gravel** Unpaved Kv= 16.1 fps
3.0	217	0.0600	1.22		**Shallow Concentrated Flow, Shallow Woodland** Woodland Kv= 5.0 fps
31.1	1,769	Total			

Summary for Subcatchment WS-B: EX-WS-B

Runoff = 15.08 cfs @ 12.23 hrs, Volume= 64,694 cf, Depth= 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs
Type III 24-hr 1-Year Rainfall=2.80"

	Area (sf)	CN	Description
*	283,750	80	Capped Landfill
	133,492	98	Paved parking, HSG C
	102,910	86	<50% Grass cover, Poor, HSG C
	520,152	86	Weighted Average
	386,660		74.34% Pervious Area
	133,492		25.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0400	0.16		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.30"
6.3	645	0.0600	1.71		**Shallow Concentrated Flow, Shallow Grass** Short Grass Pasture Kv= 7.0 fps
16.9	745	Total			

Summary for Link #2: Unnamed Trib #2

Inflow Area = 1,759,298 sf, 4.98% Impervious, Inflow Depth = 1.10" for 1-Year event
Inflow = 28.28 cfs @ 12.47 hrs, Volume= 161,574 cf
Primary = 28.28 cfs @ 12.47 hrs, Volume= 161,574 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs

Summary for Link #5: Unnamed Trib #5

Inflow Area = 520,152 sf, 25.66% Impervious, Inflow Depth = 1.49" for 1-Year event
Inflow = 15.08 cfs @ 12.23 hrs, Volume= 64,694 cf
Primary = 15.08 cfs @ 12.23 hrs, Volume= 64,694 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs

Summary for Subcatchment WS-A: EX-WS-A

Runoff = 73.82 cfs @ 12.43 hrs, Volume= 411,353 cf, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
*	1,408,575	80	Capped Landfill
	350,723	80	1/2 acre lots, 25% imp, HSG C
	1,759,298	80	Weighted Average
	1,671,617		95.02% Pervious Area
	87,681		4.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0210	0.12		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.30"
10.1	567	0.0353	0.94		**Shallow Concentrated Flow, Shallow Woodlands** Woodland Kv= 5.0 fps
4.2	885	0.0486	3.55		**Shallow Concentrated Flow, Shallow Unpaved/Gravel** Unpaved Kv= 16.1 fps
3.0	217	0.0600	1.22		**Shallow Concentrated Flow, Shallow Woodland** Woodland Kv= 5.0 fps
31.1	1,769	Total			

Summary for Subcatchment WS-B: EX-WS-B

Runoff = 33.83 cfs @ 12.23 hrs, Volume= 146,240 cf, Depth= 3.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.90"

	Area (sf)	CN	Description
*	283,750	80	Capped Landfill
	133,492	98	Paved parking, HSG C
	102,910	86	<50% Grass cover, Poor, HSG C
	520,152	86	Weighted Average
	386,660		74.34% Pervious Area
	133,492		25.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0400	0.16		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.30"
6.3	645	0.0600	1.71		**Shallow Concentrated Flow, Shallow Grass** Short Grass Pasture Kv= 7.0 fps
16.9	745	Total			

Summary for Link #2: Unnamed Trib #2

Inflow Area = 1,759,298 sf, 4.98% Impervious, Inflow Depth = 2.81" for 10-Year event
Inflow = 73.82 cfs @ 12.43 hrs, Volume= 411,353 cf
Primary = 73.82 cfs @ 12.43 hrs, Volume= 411,353 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs

Summary for Link #5: Unnamed Trib #5

Inflow Area = 520,152 sf, 25.66% Impervious, Inflow Depth = 3.37" for 10-Year event
Inflow = 33.83 cfs @ 12.23 hrs, Volume= 146,240 cf
Primary = 33.83 cfs @ 12.23 hrs, Volume= 146,240 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs

Summary for Subcatchment WS-A: EX-WS-A

Runoff = 160.82 cfs @ 12.41 hrs, Volume= 907,449 cf, Depth= 6.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	1,408,575	80	Capped Landfill
	350,723	80	1/2 acre lots, 25% imp, HSG C
	1,759,298	80	Weighted Average
	1,671,617		95.02% Pervious Area
	87,681		4.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.8	100	0.0210	0.12		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.30"
10.1	567	0.0353	0.94		**Shallow Concentrated Flow, Shallow Woodlands** Woodland Kv= 5.0 fps
4.2	885	0.0486	3.55		**Shallow Concentrated Flow, Shallow Unpaved/Gravel** Unpaved Kv= 16.1 fps
3.0	217	0.0600	1.22		**Shallow Concentrated Flow, Shallow Woodland** Woodland Kv= 5.0 fps
31.1	1,769	Total			

Summary for Subcatchment WS-B: EX-WS-B

Runoff = 67.30 cfs @ 12.22 hrs, Volume= 299,700 cf, Depth= 6.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=8.60"

	Area (sf)	CN	Description
*	283,750	80	Capped Landfill
	133,492	98	Paved parking, HSG C
	102,910	86	<50% Grass cover, Poor, HSG C
	520,152	86	Weighted Average
	386,660		74.34% Pervious Area
	133,492		25.66% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0400	0.16		**Sheet Flow, Sheet Flow** Grass: Dense n= 0.240 P2= 3.30"
6.3	645	0.0600	1.71		**Shallow Concentrated Flow, Shallow Grass** Short Grass Pasture Kv= 7.0 fps
16.9	745	Total			

Summary for Link #2: Unnamed Trib #2

Inflow Area = 1,759,298 sf, 4.98% Impervious, Inflow Depth = 6.19" for 100-Year event
Inflow = 160.82 cfs @ 12.41 hrs, Volume= 907,449 cf
Primary = 160.82 cfs @ 12.41 hrs, Volume= 907,449 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs

Summary for Link #5: Unnamed Trib #5

Inflow Area = 520,152 sf, 25.66% Impervious, Inflow Depth = 6.91" for 100-Year event
Inflow = 67.30 cfs @ 12.22 hrs, Volume= 299,700 cf
Primary = 67.30 cfs @ 12.22 hrs, Volume= 299,700 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-42.00 hrs, dt= 0.01 hrs

APPENDIX C

APPENDIX A CHECKLIST

APPENDIX A: STORMWATER MANAGEMENT PLAN CHECKLIST AND LID PLANNING REPORT – STORMWATER DESIGN SUMMARY

PROJECT NAME **Bristol Landfill Solar Facility**	**(RIDEM USE ONLY)**
TOWN **Bristol, Rhode Island**	**STW/WQC File #:**
BRIEF PROJECT DESCRIPTION: This project proposes the installation of a 6.88 MW AC Solar Facility on the capped Bristol Landfill. The solar array will be constructed using a ballasted system to minimize any disturbance to the landfill cap. There will be no proposed impervious area or land disturbance/excavation on top of the landfill.	**Date Received:**

Stormwater Management Plan (SMP) Elements – Minimum Standards

When submitting a SMP,[1] submit four separately bound documents: Appendix A Checklist; Stormwater Site Planning, Analysis and Design Report with Plan Set/Drawings; Soil Erosion and Sediment Control (SESC) Plan, and Post Construction Operations and Maintenance (O&M) Plan. Please refer to Suggestions to Promote Brevity**.**

Note**: All stormwater construction projects must create a Stormwater Management Plan (SMP). However, not every element listed below is required per the RIDEM Stormwater Rules and the RIPDES Construction General Permit (CGP). This checklist will help identify the required elements to be submitted with an Application for Stormwater Construction Permit & Water Quality Certification.**

PART 1. PROJECT AND SITE INFORMATION

PROJECT TYPE (Check all that apply)

☐ Residential	☐ Commercial	☐ Federal	☐ Retrofit	☐ Restoration
☐ Road	☒ Utility	☐ Fill	☐ Dredge	☐ Mine
☐ Other (specify):				

SITE INFORMATION

☒ Vicinity Map

INITIAL DISCHARGE LOCATION(S): The WQv discharges to: (You may choose more than one answer if several discharge points are associated with the project.)

☐ **Groundwater**	☒ **Surface Water**	☐ **MS4**
☐ GAA	☐ Isolated Wetland	☐ RIDOT
☒ GA	☒ Named Waterbody	☐ RIDOT Alteration Permit is Approved
☐ GB	☐ Unnamed Waterbody Connected to Named Waterbody	☐ Town
		☐ Other (specify):

ULTIMATE RECEIVING WATERBODY LOCATION(S): Include pertinent information that applies to both WQ_v and flow from larger storm events including overflows. Choose all that apply, and repeat table for each waterbody.

☐ Groundwater or Disconnected Wetland	☐ SRWP		
☒ Waterbody Name: Tributary to Mount Hope Bay	☐ Coldwater	☐ Warmwater	☐ Unassessed
☐ Waterbody ID: RI0007032R-03 & RI0007032R-03	☐ 4th order stream of pond 50 acres or more		
☐ TMDL for:	☐ Watershed of flood prone river (e.g., Pocasset River)		
☐ Contributes to a priority outfall listed in the TMDL	☐ Contributes stormwater to a public beach		
☐ 303(d) list – Impairment(s) for:	☐ Contributes to shellfishing grounds		

[1] Applications for a Construction General Permit that do not require any other permits from RIDEM and will disturb less than 5 acres over the entire course of the project do not need to submit a SMP. The Appendix A checklist must still be submitted.

PROJECT HISTORY		
☐ RIDEM Pre- Application Meeting	Meeting Date:	☐ Minutes Attached
☐ Municipal Master Plan Approval	Approval Date:	☐ Minutes Attached
☐ Subdivision Suitability Required	Approval #:	
☐ Previous Enforcement Action has been taken on the property	Enforcement #:	

FLOODPLAIN & FLOODWAY See Guidance Pertaining to Floodplain and Floodways	
☐ Riverine 100-year floodplain: **FEMA FLOODPLAIN FIRMETTE** has been reviewed and the 100-year floodplain is on site	
☐ Delineated from FEMA Maps	
NOTE: Per Rule 250-RICR-150-10-8-1.1(B)(5)(d)(3), provide volumetric floodplain compensation calculations for cut and fill/displacement calculated by qualified professional	
☐ Calculated by Professional Engineer	
☐ Calculations are provided for cut vs. fill/displacement volumes proposed within the 100-year floodplain	Amount of Fill (CY):
	Amount of Cut (CY):
☐ Restrictions or modifications are proposed to the flow path or velocities in a floodway	
☐ Floodplain storage capacity is impacted	
☒ Project area is not within 100-year floodplain as defined by RIDEM	

CRMC JURISDICTION
☐ CRMC Assent required
☐ Property subject to a Special Area Management Plan (SAMP). If so, specify which SAMP:
☐ Sea level rise mitigation has been designed into this project

LUHPPL IDENTIFICATION - MINIMUM STANDARD 8:			
1. OFFICE OF Land Revitalization and Sustainable Materials Management (OLRSMM)			
	☐ Known or suspected releases of HAZARDOUS MATERIAL are present at the site (Hazardous Material is defined in Rule 1.4(A)(33) of 250-140-30-1 of the RIDEM Rules and Regulations for Investigation and Remediation of Hazardous Materials (the Remediation Regulations))		**RIDEM CONTACT:**
	☐ Known or suspected releases of PETROLEUM PRODUCT are present at the site (Petroleum Product as defined in Rule 1.5(A)(84) of 250-140-25-1 of the RIDEM Rules and Regulations for Underground Storage Facilities Used for Regulated Substances and Hazardous Materials)		
	☒ This site is identified on the RIDEM Environmental Resources Map as one of the following regulated facilities		**SITE ID#**:
		☐ CERCLIS/Superfund (NPL)	
		☐ State Hazardous Waste Site (SHWS)	
		☐ Environmental Land Usage Restriction (ELUR)	
		☐ Leaking Underground Storage Tank (LUST)	
		☒ Closed Landfill	SR-02-0164
Note: If any boxes in 1 above are checked, the applicant must contact the RIDEM OLRSMM Project Manager associated with the Site to determine if subsurface infiltration of stormwater is allowable for the project. Indicate if the infiltration corresponds to "Red," "Yellow" or "Green" as described in Section 3.2.8 of the RISDISM Guidance (Subsurface Contamination Guidance). Also, note and reference approval in PART 3, Minimum Standard 2: Groundwater Recharge/Infiltration**.**			
2. PER MINIMUM STANDARD 8 of RICR 8.14.C.1-6 "LUHPPLS," THE SITE IS/HAS:			
	☐ Industrial Site with RIPDES MSGP, except where No Exposure Certification exists. http://www.dem.ri.gov/programs/water/permits/ripdes/stormwater/status.php		
	☐ Auto Fueling Facility (e.g., gas station)		
	☐ Exterior Vehicles Service, Maintenance, or Equipment Cleaning Area		

	☐ Road Salt Storage and Loading Areas (exposed to rainwater)	
	☐ Outdoor Storage and Loading/Unloading of Hazardous Substances	
3.	**STORMWATER INDUSTRIAL PERMITTING**	
	☐ The site is associated with existing or proposed activities that are considered Land Uses with Higher Potential Pollutant Loads (LUHPPLS) (see RICR 8.14.C)	Activities: Sector:
	☐ Construction is proposed on a site that is subject to THE MULTI-SECTOR GENERAL PERMIT (MSGP) UNDER RULE 31(B)15 OF THE RIPDES REGULATIONS.	MSGP permit #
	☐ Additional stormwater treatment is required by the MSGP Explain:	

REDEVELOPMENT STANDARD – MINIMUM STANDARD 6		
☒ Pre Construction Impervious Area		
	☐ Total Pre-Construction Impervious Area (**TIA**) = 4.61 acres	
	☒ Total Site Area (**TSA**) = 91.54 acres	
	☒ Jurisdictional Wetlands (**JW**) = 36.73 acres	
	☐ Conservation Land (**CL**)=	
☒ Calculate the Site Size (defined as contiguous properties under same ownership)		
	☒ Site Size (**SS**) = (**TSA**) – (**JW**) – (**CL**) = 54.81 acres	
	☒ (**TIA**) / (**SS**) = 0.084	☐ (**TIA**) / (**SS**) >**0.4**? No
☐ YES, Redevelopment		

PART 2. LOW IMPACT DEVELOPMENT ASSESSMENT – MINIMUM STANDARD 1

(NOT REQUIRED FOR REDEVELOPMENT OR RETROFITS)

This section may be deleted if not required.

Note: A written description must be provided specifying why each method is not being used or is not applicable at the Site. Appropriate answers may include:

- Town requires … (state the specific local requirement)
- Meets Town's dimensional requirement of …
- Not practical for site because …
- Applying for waiver/variance to achieve this (pending/approved/denied)
- Applying for wavier/variance to seek relief from this (pending/approved/denied)

A) PRESERVATION OF UNDISTURBED AREAS, BUFFERS, AND FLOODPLAINS	**IF NOT IMPLEMENTED, EXPLAIN HERE**
☒ Sensitive resource areas and site constraints are identified (required) ☒ Local development regulations have been reviewed (required) ☒ All vegetated buffers and coastal and freshwater wetlands will be protected during and after construction ☒ Conservation Development or another site design technique has been incorporated to protect open space and pre-development hydrology. **Note:** If Conservation Development has been used, check box and skip to Subpart C ☒ As much natural vegetation and pre-development hydrology as possible has been maintained	

B) LOCATE DEVELOPMENT IN LESS SENSITIVE AREAS AND WORK WITH THE NATURAL LANDSCAPE CONDITIONS, HYDROLOGY, AND SOILS ☒ Development sites and building envelopes have been appropriately distanced from wetlands and waterbodies ☒ Development and stormwater systems have been located in areas with greatest infiltration capacity (e.g., soil groups A and B) ☒ Plans show measures to prevent soil compaction in areas designated as Qualified Pervious Areas (QPA's) ☒ Development sites and building envelopes have been positioned outside of floodplains ☒ Site design positions buildings, roadways and parking areas in a manner that avoids impacts to surface water features ☒ Development sites and building envelopes have been located to minimize impacts to steep slopes (≥15%) ☐ Other (describe):	
C) MINIMIZE CLEARING AND GRADING ☒ Site clearing has been restricted to <u>minimum area needed</u> for building footprints, development activities, construction access, and safety. ☒ Site has been designed to position buildings, roadways, and parking areas in a manner that minimizes grading (cut and fill quantities) ☒ Protection for stands of trees and individual trees and their root zones to be preserved has been specified, and such protection extends at least to the tree canopy drip line(s) ☒ Plan notes specify that public trees removed or damaged during construction shall be replaced with equivalent	
D) REDUCE IMPERVIOUS COVER ☐ Reduced roadway widths (≤22 feet for ADT ≤ 400; ≤ 26 feet for ADT 400 - 2,000) ☐ Reduced driveway areas (length minimized via reduced ROW width (≤ 45 ft.) and/or reduced (or absolute minimum) front yard setback; width minimized to ≤ 9 ft. wide one lane; ≤ 18 ft. wide two lanes; shared driveways; pervious surface) ☐ Reduced building footprint: Explain approach: ☐ Reduced sidewalk area (≤ 4 ft. wide; one side of the street; unpaved path; pervious surface) ☐ Reduced cul-de-sacs (radius < 45 ft; vegetated island; alternative turn-around) ☐ Reduced parking lot area: Explain approach ☐ Use of pervious surfaces for driveways, sidewalks, parking areas/overflow parking areas, etc. ☐ Minimized impervious surfaces (project meets or is less than maximum specified by Zoning Ordinance) ☐ Other (describe):	Not Applicable; there is not impervious cover being proposed in the project.
E) DISCONNECT IMPERVIOUS AREA ☐ Impervious surfaces have been disconnected, and runoff has been diverted to QPAs to the maximum extent possible ☐ Residential street edges allow side-of-the-road drainage into vegetated open swales ☐ Parking lot landscaping breaks up impervious expanse AND accepts runoff ☐ Other (describe):	Not Applicable; there is not impervious cover being proposed in the project.
F) MITIGATE RUNOFF AT THE POINT OF GENERATION ☐ Small-scale BMPs have been designated to treat runoff as close as possible to the source	

G) PROVIDE LOW-MAINTENANCE NATIVE VEGETATION ☒ Low-maintenance landscaping has been proposed using native species and cultivars ☒ Plantings of native trees and shrubs in areas previously cleared of native vegetation are shown on site plan ☒ Lawn areas have been limited/minimized, and yards have been kept undisturbed to the maximum extent practicable on residential lots	
H) RESTORE STREAMS/WETLANDS ☒ Historic drainage patterns have been restored by removing closed drainage systems, daylighting buried streams, and/or restoring degraded stream channels and/or wetlands ☐ Removal of invasive species ☐ Other	No work within the regulated wetlands is being proposed as part of the project.

PART 3. SUMMARY OF REMAINING STANDARDS

GROUNDWATER RECHARGE – MINIMUM STANDARD 2		
YES	**NO**	
☐	☒	The project has been designed to meet the groundwater recharge standard.
☒	☐	If "No," the justification for groundwater recharge criterion waiver has been explained in the Narrative (e.g., threat of groundwater contamination or physical limitation), if applicable (see RICR 8.8.D);
☒	☐	Your waiver request has been explained in the Narrative, if applicable.
☐	☒	Is this site identified as a Regulated Facility in Part 1, Minimum Standard 8: LUHPPL Identification?
☐	☐	If "Yes," has approval for infiltration by the OLRSMM Site Project Manager, per Part 1, Minimum Standard 8, been requested?

TABLE 2-1: Summary of Recharge (see RISDISM Section 3.3.2)
(Add or Subtract Rows as Necessary)

Design Point	**Impervious Area Treated (sq ft)**	**Total Re_v Required (cu ft)**	**LID Stormwater Credits (see RISDISM Section 4.6.1)**	**Recharge Required by Remaining BMPs (cu ft)**	**Recharge Provided by BMPs (cu ft)**
			Portion of Re_v directed to a QPA (cu ft)		
DP-1:					
DP-2:					
DP-3:					
DP-4:					
TOTALS:					

Notes:
1. Only BMPs listed in RISDISM Table 3-5 "List of BMPs Acceptable for Recharge" may be used to meet the recharge requirement.
2. Recharge requirement must be satisfied for each waterbody ID.

☐ Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.):

WATER QUALITY – MINIMUM STANDARD 3		
YES	**NO**	
☐	☒	Does this project meet or exceed the required water quality volume WQv (see RICR 8.9.E-I)?
☐	☒	Is the proposed final impervious cover greater than 20% of the disturbed area (see RICR 8.9.E-I)?
☐	☐	If "Yes," either the Modified Curve Number Method or the Split Pervious/Impervious method in Hydro-CAD was used to calculate WQv; or,
☐	☐	If "Yes," either TR-55 or TR-20 was used to calculate WQv; and,
☐	☒	If "No," the project meets the minimum WQv of 0.2 watershed inches over the entire disturbed area.
☐	☒	Not Applicable
☐	☒	Does this project meet or exceed the ability to treat required water quality flow WQf (see RICR 8.9.I.1-3)?
☐	☒	Does this project propose an increase of impervious cover to a receiving water body with impairments? If "Yes," please indicate below the method that was used to address the water quality requirements of no further degradation to a low-quality water.
☐	☒	RICR 8.36. A Pollutant Loading Analysis is needed and has been completed.
☒	☐	The Water Quality Guidance Document (Water Quality Goals and Pollutant Loading Analysis Guidance for Discharges to Impaired Waters) has been followed as applicable.
☐	☒	BMPs are proposed that are on the approved technology list . If "Yes," please provide all required worksheets from the manufacturer.
☐	☒	Additional pollutant-specific requirements and/or pollutant removal efficiencies are applicable to the site as the result of a TMDL, SAMP, or other watershed-specific requirements. If "Yes," please describe:

TABLE 3-1: Summary of Water Quality (see RICR 8.9)					
Design Point and WB ID	**Impervious area treated (sq ft)**	**Total WQ_v Required (cu ft)**	**LID Stormwater Credits** (see RICR 8.18) **WQv directed to a QPA (cu ft)**	**Water Quality Treatment Remaining (cu ft)**	**Water Quality Provided by BMPs (cu ft)**
DP-1:					
DP-2:					
DP-3:					
DP-4:					
TOTALS:					

Notes:
1. Only BMPs listed in RICR 8.20 and 8.25 or the Approved Technologies List of BMPs is Acceptable for Water Quality treatment.
2. For each Design Point, the Water Quality Volume Standard must be met for each Waterbody ID.

☐ YES ☐ NO	This project has met the setback requirements for each BMP. If "No," please explain:

☐ Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.):

CONVEYANCE AND NATURAL CHANNEL PROTECTION (RICR 8.10) – MINIMUM STANDARD 4		
YES	**NO**	
☐	☒	Is this standard waived? If "Yes," please indicate one or more of the reasons below:
		☐ The project directs discharge to a large river (i.e., 4th-order stream or larger. See RISDISM Appendix I for State-wide list and map of stream orders), bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters. ☐ The project is a small facility with impervious cover of less than or equal to 1 acre. ☐ The project has a post-development peak discharge rate from the facility that is less than 2 cfs for the 1-year, 24-hour Type III design storm event (prior to any attenuation). (Note: LID design strategies can greatly reduce the peak discharge rate).
☒	☐	Conveyance and natural channel protection for the site have been met. If "No,' explain why:

TABLE 4-1: Summary of Channel Protection Volumes (see RICR 8.10)					
Design Point	**Receiving Water Body Name**	**Coldwater Fishery? (Y/N)**	**Total CPv Required (cu ft)**	**Total CPv Provided (cu ft)**	**Average Release Rate Modeled in the 1-yr storm (cfs)**
DP-1:					
DP-2:					
DP-3:					
DP-4:					
TOTALS:					
Note: The Channel Protection Volume Standard must be met in each waterbody ID.					
☐ YES ☐ NO	The CPv is released at roughly a uniform rate over a 24-hour duration (see examples of sizing calculations in Appendix D of the RISDISM).				
☐ YES ☐ NO	Do additional design restrictions apply resulting from any discharge to cold-water fisheries; If "Yes," please indicate restrictions and solutions below.				
☐ Indicate below where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.).					

OVERBANK FLOOD PROTECTION (RICR 8.11) AND OTHER POTENTIAL HIGH FLOWS – MINIMUM STANDARD 5			
YES	**NO**		
☐	☒	Is this standard waived? If yes, please indicate one or more of the reasons below:	
		☐	The project directs discharge to a large river (i.e., 4th-order stream or larger. See Appendix I for state-wide list and map of stream orders), bodies of water >50.0 acres in surface area (i.e., lakes, ponds, reservoirs), or tidal waters.
		☐	A Downstream Analysis (see RICR 8.11.D and E) indicates that peak discharge control would not be beneficial or would exacerbate peak flows in a downstream tributary of a particular site (e.g., through coincident peaks).
☐	☒	Does the project flow to an MS4 system or subject to other stormwater requirements? If "Yes," indicate as follows:	
		☐	RIDOT
		☐	Other (specify):
Note: The project could be approved by RIDEM but not meet RIDOT or Town standards. RIDOT's regulations indicate that post-volumes must be **less** than pre-volumes for the 10-yr storm at the design point entering the RIDOT system. If you have not already received approval for the discharge to an MS4, please explain below your strategy to comply with RIDEM and the MS4.			
		Indicate below which model was used for your analysis. ☐ TR-55 ☐ TR-20 ☒ HydroCAD ☐ Bentley/Haestad ☐ Intellisolve ☐ Other (Specify):	
YES	**NO**		
☒	☐	Does the drainage design demonstrate that flows from the 100-year storm event through a BMP will safely manage and convey the 100-year storm? If "No," please explain briefly below and reference where in the application further documentation can be found (i.e., name of report/document, page numbers, appendices, etc.):	
☐	☒	Do off-site areas contribute to the sub-watersheds and design points? If "Yes,"	
☐	☐	Are the areas modeled as "present condition" for both pre- and post-development analysis?	
☐	☐	Are the off-site areas shown on the subwatershed maps?	
☐	☒	Does the drainage design confirm safe passage of the 100-year flow through the site for off-site runoff?	
☐	☒	Is a Downstream Analysis required (see RICR 8.11.E.1)?	
☒	☐	Calculate the following:	
		☒	Area of disturbance within the sub-watershed (areas) = 1.06 acres
		☒	Impervious cover (%) = 5.1%
☐	☒	Is a dam breach analysis required (earthen embankments over six (6) feet in height, or a capacity of 15 acre-feet or more, and contributes to a significant or high hazard dam)?	
☐	☐	Does this project meet the overbank flood protection standard?	

Table 5-1 Hydraulic Analysis Summary								
Subwatershed (Design Point)	**1.2" Peak Flow** (cfs) **		**1-yr Peak Flow** (cfs)		**10-yr Peak Flow** (cfs)		**100-yr Peak Flow** (cfs)	
	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)	Pre (cfs)	Post (cfs)
WS-A	2.61	2.61	28.28	28.28	73.82	73.82	160.82	160.82
WS-B:	2.72	2.72	15.08	15.08	33.83	33.83	67.30	67.30
TOTALS:								

** Utilize modified curve number method or split pervious /impervious method in HydroCAD.

Note: The hydraulic analysis must demonstrate no impact to each individual subwatershed DP unless each DP discharges to the same wetland or water resource.

Indicate as follows where the pertinent calculations and/or information for the items above are provided	**Name of report/document, page numbers, appendices, etc.**
Existing conditions analysis for each subwatershed, including curve numbers, times of concentration, runoff rates, volumes, and water surface elevations showing methodologies used and supporting calculations.	Appendix B of the Stormwater Management Report
Proposed conditions analysis for each subwatershed, including curve numbers, times of concentration, runoff rates, volumes, water surface elevations, and routing showing the methodologies used and supporting calculations.	Appendix B of the Stormwater Management Report
Final sizing calculations for structural stormwater BMPs, including contributing drainage area, storage, and outlet configuration.	
Stage-storage, inflow and outflow hydrographs for storage facilities (e.g., detention, retention, or infiltration facilities).	

Table 5-2 Summary of Best Management Practices												
BMP ID	**DP #**	**BMP Type** (e.g., bioretention, tree filter)	**BMP Functions**					**Bypass Type**	**Horizontal Setback Criteria are met per RICR 8.21.B.10, 8.22.D.11, and 8.35.B.4**		
			Pre-Treatment (Y/N/ NA)	Re_v	WQ_v	CP_v (Y/N/ NA)	Overbank Flood Reduction (Y/N/NA)	External (E) Internal (I) or NA	Yes/ No	Technical Justification (Design Report page number)	Distance Provided
		TOTALS:									

Table 5.3 Summary of Soils to Evaluate Each BMP									
DP #	**BMP ID**	**BMP Type** (e.g., bioretention, tree filter)	**Soils Analysis for Each BMP**						
			Test Pit ID# and Ground Elevation		SHWT Elevation (ft)	Bottom of Practice Elevation* (ft)	Separation Distance Provided (ft)	Hydrologic Soil Group (A, B, C, D)	Exfiltration Rate Applied (in/hr)
			Primary	Secondary					
		TOTALS:							

* For underground infiltration systems (UICs) bottom equals bottom of stone, for surface infiltration basins bottom equals bottom of basin, for filters bottom equals interface of storage and top of filter layer

LAND USES WITH HIGHER POTENTIAL POLLUTANTS LOADS (LUHPPLs) – MINIMUM STANDARD 8			
YES	**NO**	**N/A**	
☐	☐	☒	Describe any LUHPPLs identified in Part 1, Minimum Standard 8, Section 2. If not applicable, continue to Minimum Standard 9.
☐	☐	☒	Are these activities already covered under an MSGP? If "No," please explain if you have applied for an MSGP or intend to do so?
☐	☐	☒	List the specific BMPs that are proposed for this project that receive stormwater from LUHPPL drainage areas. These BMP types must be listed in RISDISM Table 3-3, "Acceptable BMPs for Use at LUHPPLs." Please list BMPs:
☐	☐	☒	Additional BMPs, or additional pretreatment BMP's if any, that meet RIPDES MSGP requirements; Please list BMPs:
			Indicate below where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.).

ILLICIT DISCHARGES – MINIMUM STANDARD 9			
Illicit discharges are defined as unpermitted discharges to Waters of the State that do not consist entirely of stormwater or uncontaminated groundwater, except for certain discharges identified in the RIPDES Phase II Stormwater General Permit.			
YES	**NO**	**N/A**	
☒	☐	☐	Have you checked for illicit discharges?
☐	☒	☐	Have any been found and/or corrected? If "Yes," please identify.
☒	☐	☐	Does your report explain preventative measures that keep non-stormwater discharges out of the Waters of the State (during and after construction)?

SOIL EROSION AND SEDIMENT CONTROL (SESC) – MINIMUM STANDARD 10				
YES	**NO**	**N/A**		
☒	☐	☐	Have you included a Soil Erosion and Sediment Control Plan Set and/or Complete Construction Plan Set?	
☐	☐	☐	Have you provided a **separately-bound** document based upon the SESC Template? If yes, proceed to Minimum Standard 11 (the following items can be assumed to be addressed).	
			If "No," include a document with your submittal that addresses the following elements of an SESC Plan:	
			☐	Soil Erosion and Sediment Control Plan Project Narrative, including a description of how the fifteen (15) Performance Criteria have been met:
			☐	Provide Natural Buffers and Maintain Existing Vegetation
			☐	Minimize Area of Disturbance
			☐	Minimize the Disturbance of Steep Slopes
			☐	Preserve Topsoil
			☐	Stabilize Soils
			☐	Protect Storm Drain Inlets
			☐	Protect Storm Drain Outlets
			☐	Establish Temporary Controls for the Protection of Post-Construction Stormwater Control Measures
			☐	Establish Perimeter Controls and Sediment Barriers
			☐	Divert or Manage Run-On from Up-Gradient Areas
			☐	Properly Design Constructed Stormwater Conveyance Channels
			☐	Retain Sediment On-Site
			☐	Control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows
			☐	Apply Construction Activity Pollution Prevention Control Measures
			☐	Install, Inspect, and Maintain Control Measures and Take Corrective Actions
			☐	Qualified SESC Plan Preparer's Information and Certification
			☐	Operator's Information and Certification; if not known at the time of application, the Operator must certify the SESC Plan upon selection and prior to initiating site activities
			☐	Description of Control Measures, such as Temporary Sediment Trapping and Conveyance Practices, including design calculations and supporting documentation, as required

STORMWATER MANAGEMENT SYSTEM OPERATION, MAINTENANCE, AND POLLUTION PREVENTION PLAN – MINIMUM STANDARDS 7 AND 9		
Operation and Maintenance Section		
YES	**NO**	
☒	☐	Have you minimized all sources of pollutant contact with stormwater runoff, to the maximum extent practicable?
☐	☒	Have you provided a **separately-bound** Operation and Maintenance Plan for the site and for all of the BMPs, and does it address each element of RICR 8.17 and RISDISM Appendix C and E?
☒	☐	Lawn, Garden, and Landscape Management meet the requirements of RISDISM Section G.7? If "No," why not?
☒	☐	Is the property owner or homeowner's association responsible for the stormwater maintenance of all BMP's? If "No," you must provide a legally binding and enforceable maintenance agreement (see RISDISM Appendix E, page 26) that identifies the entity that will be responsible for maintenance of the stormwater. Indicate where this agreement can be found in your report (i.e., name of report/document, page numbers, appendices, etc.).
☐	☒	Do you anticipate that you will need legal agreements related to the stormwater structures? (e.g. off-site easements, deed restrictions, covenants, or ELUR per the Remediation Regulations). If "Yes," have you obtained them? Or please explain your plan to obtain them:

☐	☒	Is stormwater being directed from public areas to private property? If "Yes," note the following: Note: This is not allowed unless a funding mechanism is in place to provide the finances for the long-term maintenance of the BMP and drainage, or a funding mechanism is demonstrated that can guarantee the long-term maintenance of a stormwater BMP by an individual homeowner.
Pollution Prevention Section		
☐	☒	Designated snow stockpile locations?
☐	☒	Trash racks to prevent floatables, trash, and debris from discharging to Waters of the State?
☒	☐	Asphalt-only based sealants?
☐	☐	Pet waste stations? (Note: If a receiving water has a bacterial impairment, and the project involves housing units, then this could be an important part of your pollution prevention plan).
☒	☐	Regular sweeping? Please describe: Weekly or as required by site conditions. Dust suppression techniques shall be employed at all time during soil disturbance.
☐	☒	De-icing specifications, in accordance with RISDISM Appendix G. (NOTE: If the groundwater is GAA, or this area contributes to a drinking water supply, then this could be an important part of your pollution prevention plan).
☐	☒	A prohibition of phosphate-based fertilizers? (Note: If the site discharges to a phosphorus impaired waterbody, then this could be an important part of your pollution prevention plan).

PART 4. SUBWATERSHED MAPPING AND SITE-PLAN DETAILS

Existing and Proposed Subwatershed Mapping (REQUIRED)			
YES	**NO**		
☒	☐		Existing and proposed drainage area delineations
☒	☐		Locations of all streams and drainage swales
☒	☐		Drainage flow paths, mapped according to the DEM *Guidance for Preparation of Drainage Area Maps* (included in RISDISM Appendix K)
☒	☐		Complete drainage area boundaries; include off-site areas in both mapping and analyses, as applicable
☐	☒		Logs of borings and/or test pit investigations along with supporting soils/geotechnical report
☐	☒		Mapped seasonal high-water-table test pit locations
☐	☒		Mapped locations of the site-specific borings and/or test pits and soils information from the test pits at the locations of the BMPs
☒	☐		Mapped locations of the BMPs, with the BMPs consistently identified on the Site Construction Plans
☐	☒		Mapped bedrock outcrops adjacent to any infiltration BMP
☐	☒		Soils were logged by a:
		☐	DEM-licensed Class IV soil evaluator Name:
		☐	RI-registered P.E. Name:

Subwatershed and Impervious Area Summary				
Subwatershed (area to each design point)	**First Receiving Water ID or MS4**	**Area Disturbed (units)**	**Existing Impervious (units)**	**Proposed Impervious (units)**
DP-1:				
DP-2:				
DP-3:				
DP-4:				
TOTALS:				

Site Construction Plans (Indicate that the following applicable specifications are provided)		
YES	**NO**	
☐	☒	Existing and proposed plans (scale not greater than 1" = 40') with North arrow
☒	☐	Existing and proposed site topography (with 1 or 2-foot contours); 10-foot contours accepted for off-site areas
☒	☐	Boundaries of existing predominant vegetation and proposed limits of clearing
☒	☐	Site Location clarification
☒	☐	Location and field-verified boundaries of resource protection areas such as: ▸ freshwater and coastal wetlands, including lakes and ponds ▸ coastal shoreline features Perennial and intermittent streams, in addition to Areas Subject to Storm Flowage (ASSFs)
☒	☐	All required setbacks (e.g., buffers, water-supply wells, septic systems)
☒	☐	Representative cross-section and profile drawings, and notes and details of structural stormwater management practices and conveyances (i.e., storm drains, open channels, swales, etc.), which include: ▸ Location and size of the stormwater treatment practices (type of practice, depth, area). Stormwater treatment practices (BMPs) must have labels that correspond to RISDISM Table 5-2; ▸ Design water surface elevations (applicable storms); ▸ Structural details of outlet structures, embankments, spillways, stilling basins, grade-control structures, conveyance channels, etc.; ▸ Existing and proposed structural elevations (e.g., inverts of pipes, manholes, etc.); ▸ Location of floodplain and, if applicable, floodway limits and relationship of site to upstream and downstream properties or drainage that could be affected by work in the floodplain; ▸ Planting plans for structural stormwater BMPs, including species, size, planting methods, and maintenance requirements of proposed planting
☐	☒	Logs of borings and/or test pit investigations along with supporting soils/geotechnical report and corresponding water tables
☐	☒	Mapping of any OLRSMM-approved remedial actions/systems (including ELURs)
☒	☐	Location of existing and proposed roads, buildings, and other structures including limits of disturbance; ▸ Existing and proposed utilities (e.g., water, sewer, gas, electric) and easements; ▸ Location of existing and proposed conveyance systems, such as grass channels, swales, and storm drains, and location(s) of final discharge point(s) (wetland, waterbody, etc.); ▸ Cross sections of roadways, with edge details such as curbs and sidewalks; ▸ Location and dimensions of channel modifications, such as bridge or culvert crossings
☐	☒	Locations, cross sections, and profiles of all stream or wetland crossings and their method of stabilization