



DiPrete Engineering

Stormwater Management Report



Sharpe Drive Solar

Located in Cranston, RI

Applicant: Sharpe Solar, LLC

12-22-2023

Table of Contents

Executive Summary

RIDEM Appendix A Checklist

1.0 Project Description	1
2.0 Site Conditions	1
2.1 Soils	1
2.2 Existing Site Conditions	2
2.3 Post Site Conditions	2
3.0 Minimum Standards	3
3.1 Standard 1: LID Site Planning and Design Strategies	3
3.2 Standard 2: Groundwater Recharge	3
3.3 Standard 3: Water Quality	3
3.4 Standard 4: Conveyance and Natural Channel Protection	4
3.4.2 Channel Protection Volume	4
3.5 Standard 5: Overbank Flood Protection & Downstream Analysis	4
3.5.5 Downstream Analysis	4
3.6 Standard 6: Redevelopment and Infill Projects	4
3.7 Standard 7: Pollution Prevention	4
3.8 Standard 8: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)	4
3.9 Standard 9: Illicit Discharges	5
3.10 Standard 10: Construction Activity Soil Erosion, Runoff and Sedimentation and Pollution Prevention Control Measure Requirements	5
3.11 Standard 11: Stormwater Management System Operation and Maintenance	5
Cover Type Map	6

Executive Summary

On behalf of Sharpe Solar, LLC, we are submitting a drainage report for the proposed development at the end of Ross Simon's Drive in Cranston, Rhode Island. The site is located on Assessors' Plat 13, Lot 47. The project area is approximately 2 acres within the 50-acre lot. The project area exists today as predominantly grass and contains the pads of two greenhouses that have been removed and replaced with stone. The client proposes to construct a 0.4 MW AC Solar Photovoltaic System. The post development will be treated for water quality according to the "Freshwater Wetlands Program and Stormwater Construction Permitting Ground-Mounted Solar Array Guidance" document.

The Site has been designed to meet the Rhode Island Stormwater Design and Installation Standards Manual (RISDISM) and according to the Freshwater Wetlands Program and Stormwater Construction Permitting Ground-Mounted Solar Array Guidance.

The proposed development will remove most of the impervious and gravel areas and convert to grass or replace with stone. The existing grass areas will remain as grass and only a small area of woods will be converted to grass. Therefore, there will be an overall decrease in stormwater runoff from pre-development to post-development conditions.

The grassed and stone areas under the solar panels will be utilized to provide water quality treatment and will be in accordance with the "Freshwater Wetlands Program and Stormwater Construction Permitting Ground-Mounted Solar Array Guidance" document.

This report details how the site will show no net increase in stormwater runoff from pre-development to post development conditions, and how the proposed grass areas under the solar panels will provide water quality treatment for stormwater runoff.

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

PROJECT NAME Sharpe Drive Solar	(RIDEM USE ONLY)
TOWN Cranston	STW/WQC File #:
BRIEF PROJECT DESCRIPTION: Commercial Solar Installation, including electrical equipment.	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)

<input type="checkbox"/> Residential	<input type="checkbox"/> Commercial	<input type="checkbox"/> Federal	<input type="checkbox"/> Retrofit	<input type="checkbox"/> Restoration
<input type="checkbox"/> Road	<input checked="" type="checkbox"/> Utility	<input type="checkbox"/> Fill	<input type="checkbox"/> Dredge	<input type="checkbox"/> Mine
<input type="checkbox"/> 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.)

<input checked="" type="checkbox"/> Groundwater	<input checked="" type="checkbox"/> Surface Water	<input type="checkbox"/> MS4
<input type="checkbox"/> GAA	<input type="checkbox"/> Isolated Wetland	<input type="checkbox"/> RIDOT
<input type="checkbox"/> GA	<input checked="" type="checkbox"/> Named Waterbody: Pawtuxet River Main Stem	<input type="checkbox"/> RIDOT Alteration Permit is Approved
<input checked="" type="checkbox"/> GB	<input type="checkbox"/> Unnamed Waterbody Connected to Named Waterbody	<input type="checkbox"/> Town
<input type="checkbox"/> Other (specify):		

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

<input checked="" type="checkbox"/> Groundwater or Disconnected Wetland	<input type="checkbox"/> SRWP
<input checked="" type="checkbox"/> Waterbody Name: Pawtuxet River Main Stem	<input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater <input type="checkbox"/> Unassessed
<input checked="" type="checkbox"/> Waterbody ID: RI10006017R-03	<input type="checkbox"/> 4 th order stream of pond 50 acres or more
<input type="checkbox"/> TMDL for:	<input type="checkbox"/> Watershed of flood prone river (e.g., Pocasset River)
<input type="checkbox"/> Contributes to a priority outfall listed in the TMDL	<input type="checkbox"/> Contributes stormwater to a public beach

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.

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

<input checked="" type="checkbox"/> 303(d) list – Impairment(s) for: Lead, Mercury in Fish Tissue, non-native aquatic plants, Enterococcus	<input type="checkbox"/> Contributes to shellfishing grounds
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PROJECT HISTORY

<input type="checkbox"/> RIDEM Pre- Application Meeting	Meeting Date:	<input type="checkbox"/> Minutes Attached
<input checked="" type="checkbox"/> Municipal Master Plan Approval	Approval Date: July 12, 2023	<input type="checkbox"/> Minutes Attached
<input type="checkbox"/> Subdivision Suitability Required	Approval #:	
<input type="checkbox"/> Previous Enforcement Action has been taken on the property	Enforcement #:	

FLOODPLAIN & FLOODWAY See [Guidance Pertaining to Floodplain and Floodways](#)

<input checked="" type="checkbox"/> Riverine 100-year floodplain: FEMA FLOODPLAIN FIRMETTE has been reviewed and the 100-year floodplain is on site. No grading is proposed within the FEMA floodplain.	
<input checked="" type="checkbox"/> Delineated from FEMA Maps (Reference FEMA Flood Map 44007C0427H, Map Revised October 2, 2015)	
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	
<input type="checkbox"/> Calculated by Professional Engineer	
<input type="checkbox"/> Calculations are provided for cut vs. fill/displacement volumes proposed within the 100-year floodplain	Amount of Fill (CY): Amount of Cut (CY):
<input type="checkbox"/> Restrictions or modifications are proposed to the flow path or velocities in a floodway	
<input type="checkbox"/> Floodplain storage capacity is impacted	
<input type="checkbox"/> Project area is not within 100-year floodplain as defined by RIDEM	

CRMC JURISDICTION *N/A*

<input type="checkbox"/> CRMC Assent required
<input type="checkbox"/> Property subject to a Special Area Management Plan (SAMP). If so, specify which SAMP:
<input type="checkbox"/> 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)

<input type="checkbox"/> 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:
<input type="checkbox"/> 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)	
<input checked="" type="checkbox"/> This site is identified on the RIDEM Environmental Resources Map as one of the following regulated facilities	SITE ID#:
<input type="checkbox"/> CERCLIS/Superfund (NPL)	
<input type="checkbox"/> State Hazardous Waste Site (SHWS)	
<input checked="" type="checkbox"/> Environmental Land Usage Restriction (ELUR)	Listed ELUR document included in this submission
<input type="checkbox"/> Leaking Underground Storage Tank (LUST)	
<input type="checkbox"/> Closed Landfill	

Note: If any boxes in 1 above are checked, the applicant must contact the RIDEM OLRSM 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.

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

Since the proposed project does not fall under any of the restricted activities, this standard has been met. See the Stormwater Report by DiPrete Engineering.

2. PER MINIMUM STANDARD 8 of RICR 8.14.C.1-6 “LUHPPLS,” THE SITE IS/HAS:

<input type="checkbox"/>	Industrial Site with RIPDES MSGP, except where No Exposure Certification exists. http://www.dem.ri.gov/programs/water/permits/ripdes/stormwater/status.php	
<input type="checkbox"/>	Auto Fueling Facility (e.g., gas station)	
<input type="checkbox"/>	Exterior Vehicles Service, Maintenance, or Equipment Cleaning Area	

<input type="checkbox"/>	Road Salt Storage and Loading Areas (exposed to rainwater)	
<input type="checkbox"/>	Outdoor Storage and Loading/Unloading of Hazardous Substances	

3. STORMWATER INDUSTRIAL PERMITTING

<input type="checkbox"/>	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:
<input type="checkbox"/>	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 #
<input type="checkbox"/>	Additional stormwater treatment is required by the MSGP Explain:	

REDEVELOPMENT STANDARD – MINIMUM STANDARD 6

<input checked="" type="checkbox"/> Pre Construction Impervious Area		
<input checked="" type="checkbox"/>	Total Pre-Construction Impervious Area (TIA) 0.46 acres	
<input checked="" type="checkbox"/>	Total Site Area (TSA) 2.03 acres	
<input type="checkbox"/>	Jurisdictional Wetlands (JW)	
<input type="checkbox"/>	Conservation Land (CL)	
<input checked="" type="checkbox"/> Calculate the Site Size (defined as contiguous properties under same ownership)		
<input checked="" type="checkbox"/>	Site Size (SS) = (TSA) – (JW) – (CL) 2.03	
<input checked="" type="checkbox"/>	$(\text{TIA}) / (\text{SS}) = 0.46/2.03 = 0.22$	<input checked="" type="checkbox"/> (TIA) / (SS) >0.4? NO
<input type="checkbox"/> 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)

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

<p>A) PRESERVATION OF UNDISTURBED AREAS, BUFFERS, AND FLOODPLAINS</p> <ul style="list-style-type: none"><input checked="" type="checkbox"/> Sensitive resource areas and site constraints are identified (required)<input checked="" type="checkbox"/> Local development regulations have been reviewed (required)<input checked="" type="checkbox"/> All vegetated buffers and coastal and freshwater wetlands will be protected during and after construction<input type="checkbox"/> 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<input checked="" type="checkbox"/> As much natural vegetation and pre-development hydrology as possible has been maintained	<p>IF NOT IMPLEMENTED, EXPLAIN HERE</p> <p>The LOD is outside of all wetland and stream buffers. No earthwork is proposed inside the FEMA floodplain. The majority of the site today is already disturbed. Undisturbed areas within the project area have been avoided to the maximum extent practicable.</p>
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Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

<p>B) LOCATE DEVELOPMENT IN LESS SENSITIVE AREAS AND WORK WITH THE NATURAL LANDSCAPE CONDITIONS, HYDROLOGY, AND SOILS</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Development sites and building envelopes have been appropriately distanced from wetlands and waterbodies <input checked="" type="checkbox"/> Development and stormwater systems have been located in areas with greatest infiltration capacity (e.g., soil groups A and B) <input checked="" type="checkbox"/> Plans show measures to prevent soil compaction in areas designated as Qualified Pervious Areas (QPA's) <input type="checkbox"/> Development sites and building envelopes have been positioned outside of floodplains <input type="checkbox"/> Site design positions buildings, roadways and parking areas in a manner that avoids impacts to surface water features <input checked="" type="checkbox"/> Development sites and building envelopes have been located to minimize impacts to steep slopes ($\geq 15\%$) <input type="checkbox"/> Other (describe): 	<p>The LOD is outside of all wetland and stream buffers. No earthwork is proposed inside the FEMA floodplain. The majority of the site today is already disturbed. Undisturbed areas within the project area have been avoided to the maximum extent practicable.</p>
<p>C) MINIMIZE CLEARING AND GRADING</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Site clearing has been restricted to <u>minimum area needed</u> for building footprints, development activities, construction access, and safety. <input checked="" type="checkbox"/> Site has been designed to position buildings, roadways, and parking areas in a manner that minimizes grading (cut and fill quantities) <input checked="" type="checkbox"/> 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) <input type="checkbox"/> Plan notes specify that public trees removed or damaged during construction shall be replaced with equivalent 	<p>Undisturbed areas within the project area have been avoided to the maximum extent practicable.</p> <p>Only a small, wooded area is proposed to be converted to grass. The majority of the area within the LOD exists today as grass, dirt, stone, or impervious.</p>
<p>D) REDUCE IMPERVIOUS COVER</p> <ul style="list-style-type: none"> <input type="checkbox"/> Reduced roadway widths (≤ 22 feet for ADT ≤ 400; ≤ 26 feet for ADT 400 - 2,000) <input type="checkbox"/> 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) <input type="checkbox"/> Reduced building footprint: Explain approach: <input type="checkbox"/> Reduced sidewalk area (≤ 4 ft. wide; one side of the street; unpaved path; pervious surface) <input type="checkbox"/> Reduced cul-de-sacs (radius < 45 ft; vegetated island; alternative turn-around) <input type="checkbox"/> Reduced parking lot area: Explain approach <input type="checkbox"/> Use of pervious surfaces for driveways, sidewalks, parking areas/overflow parking areas, etc. <input checked="" type="checkbox"/> Minimized impervious surfaces (project meets or is less than maximum specified by Zoning Ordinance) <input type="checkbox"/> Other (describe): 	<p>The existing dirt and impervious areas will be converted to grass or stone. The only proposed impervious is one concrete equipment pad. An existing gravel access drive will remain to provide site access.</p>
<p>E) DISCONNECT IMPERVIOUS AREA</p> <ul style="list-style-type: none"> <input type="checkbox"/> Impervious surfaces have been disconnected, and runoff has been diverted to QPAs to the maximum extent possible <input type="checkbox"/> Residential street edges allow side-of-the-road drainage into vegetated open swales <input type="checkbox"/> Parking lot landscaping breaks up impervious expanse AND accepts runoff <input type="checkbox"/> Other (describe): 	<p>The existing dirt and impervious areas will be converted to grass or stone. The only proposed impervious is one concrete equipment pad. An existing gravel access drive will remain to provide site access.</p>

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

<p>F) MITIGATE RUNOFF AT THE POINT OF GENERATION</p> <p><input type="checkbox"/> Small-scale BMPs have been designated to treat runoff as close as possible to the source</p>	<p>No BMPs are proposed.</p> <p>The grassed and stone areas under the solar panels are gently sloped and the drip edges of the solar panels will be parallel to the existing contour lines. This will promote infiltration and reduce the risk of erosion.</p>
<p>G) PROVIDE LOW-MAINTENANCE NATIVE VEGETATION</p> <p><input checked="" type="checkbox"/> Low-maintenance landscaping has been proposed using native species and cultivars</p> <p><input type="checkbox"/> Plantings of native trees and shrubs in areas previously cleared of native vegetation are shown on site plan</p> <p><input checked="" type="checkbox"/> Lawn areas have been limited/minimized, and yards have been kept undisturbed to the maximum extent practicable on residential lots</p>	<p>Trees may create shading over the solar panels.</p>
<p>H) RESTORE STREAMS/WETLANDS</p> <p><input type="checkbox"/> Historic drainage patterns have been restored by removing closed drainage systems, daylighting buried streams, and/or restoring degraded stream channels and/or wetlands</p> <p><input type="checkbox"/> Removal of invasive species</p> <p><input type="checkbox"/> Other</p>	<p>None observed</p>

PART 3. SUMMARY OF REMAINING STANDARDS

GROUNDWATER RECHARGE – MINIMUM STANDARD 2 <i>N/A</i>		
YES	NO	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	The project has been designed to meet the groundwater recharge standard.
<input type="checkbox"/>	<input type="checkbox"/>	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);
<input type="checkbox"/>	<input type="checkbox"/>	Your waiver request has been explained in the Narrative, if applicable.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this site identified as a Regulated Facility in Part 1, Minimum Standard 8: LUHPPL Identification?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<p>If “Yes,” has approval for infiltration by the OLRSM Site Project Manager, per Part 1, Minimum Standard 8, been requested?</p> <p>Since the proposed project does not fall within any of the restricted activities, Minimum Standard 8 has been met.</p>

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: Project Area					

Notes:

- Only BMPs listed in RISDISM Table 3-5 “List of BMPs Acceptable for Recharge” may be used to meet the recharge requirement.

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

2. Recharge requirement must be satisfied for each waterbody ID.		
<input checked="" type="checkbox"/> Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document, page numbers, appendices, etc.): Stormwater Report by DiPrete Engineering		
WATER QUALITY – MINIMUM STANDARD 3		
YES	NO	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Does this project meet or exceed the required water quality volume WQv (see RICR 8.9.E-I)?
<input type="checkbox"/>	<input type="checkbox"/>	Is the proposed final impervious cover greater than 20% of the disturbed area (see RICR 8.9.E-I)?
<input type="checkbox"/>	<input type="checkbox"/>	If “Yes,” either the Modified Curve Number Method or the Split Pervious/Impervious method in Hydro-CAD was used to calculate WQv; or,
<input type="checkbox"/>	<input type="checkbox"/>	If “Yes,” either TR-55 or TR-20 was used to calculate WQv; and,
<input checked="" type="checkbox"/>	<input type="checkbox"/>	If “No,” the project meets the minimum WQv of 0.2 watershed inches over the entire disturbed area.
<input type="checkbox"/>	<input type="checkbox"/>	Not Applicable
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Does this project meet or exceed the ability to treat required water quality flow WQf (see RICR 8.9.I.1-3)?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	RICR 8.36. A Pollutant Loading Analysis is needed and has been completed.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	The Water Quality Guidance Document (Water Quality Goals and Pollutant Loading Analysis Guidance for Discharges to Impaired Waters) has been followed as applicable.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	BMPs are proposed that are on the approved technology list . If “Yes,” please provide all required worksheets from the manufacturer.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	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 WQv Required (cu ft)	LID Stormwater Credits (see RICR 8.18)	Water Quality Treatment Remaining (cu ft)	Water Quality Provided by BMPs (cu ft)
			WQv directed to a QPA (cu ft)		
DP-1: Project Area					
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.					
<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		This project has met the setback requirements for each BMP. If “No,” please explain:			
<input checked="" type="checkbox"/> Indicate where the pertinent calculations and/or information for the above items are provided (i.e., name of report/document,					

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

page numbers, appendices, etc.):
 Stormwater Report by DiPrete Engineering

CONVEYANCE AND NATURAL CHANNEL PROTECTION (RICR 8.10) – MINIMUM STANDARD 4 N/A		
YES	NO	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Is this standard waived? If “Yes,” please indicate one or more of the reasons below:
		<input type="checkbox"/> 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. <input checked="" type="checkbox"/> The project is a small facility with impervious cover of less than or equal to 1 acre. <input type="checkbox"/> 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).
<input type="checkbox"/>	<input type="checkbox"/>	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) N/A					
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:					
<u>Note:</u> The Channel Protection Volume Standard must be met in each waterbody ID.					
<input type="checkbox"/> YES <input type="checkbox"/> 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).				
<input type="checkbox"/> YES <input type="checkbox"/> NO	Do additional design restrictions apply resulting from any discharge to cold-water fisheries; If “Yes,” please indicate restrictions and solutions below.				
<input checked="" type="checkbox"/> 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.). Stormwater Report by DiPrete Engineering					

OVERBANK FLOOD PROTECTION (RICR 8.11) AND OTHER POTENTIAL HIGH FLOWS – MINIMUM STANDARD 5 N/A		
YES	NO	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is this standard waived? If yes, please indicate one or more of the reasons below:
		<input type="checkbox"/> 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. <input type="checkbox"/> 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).
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Does the project flow to an MS4 system or subject to other stormwater requirements?

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

		If "Yes," indicate as follows:	
	<input type="checkbox"/>	RIDOT	
	<input type="checkbox"/>	Other (specify):	
<p>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.</p>			
		Indicate below which model was used for your analysis.	
		<input type="checkbox"/> TR-55 <input type="checkbox"/> TR-20 <input type="checkbox"/> HydroCAD <input type="checkbox"/> Bentley/Haestad <input type="checkbox"/> Intellisolve <input type="checkbox"/> Other (Specify): None, see below.	
YES	NO		
<input checked="" type="checkbox"/>	<input type="checkbox"/>	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.):	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Do off-site areas contribute to the sub-watersheds and design points? If "Yes,"	
<input type="checkbox"/>	<input type="checkbox"/>	Are the areas modeled as "present condition" for both pre- and post-development analysis?	
<input type="checkbox"/>	<input type="checkbox"/>	Are the off-site areas shown on the subwatershed maps?	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Does the drainage design confirm safe passage of the 100-year flow through the site for off-site runoff?	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is a Downstream Analysis required (see RICR 8.11.E.1)?	
<input type="checkbox"/>	<input type="checkbox"/>	Calculate the following:	
	<input type="checkbox"/>	Area of disturbance within the sub-watershed (areas)	
	<input type="checkbox"/>	Impervious cover (%)	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	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)?	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Does this project meet the overbank flood protection standard?	
		See the Stormwater Report by DiPrete Engineering	

Table 5-1 Hydraulic Analysis Summary *N/A*

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)
DP-1:								
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.	
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.	
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).	

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

Table 5-2 Summary of Best Management Practices N/A										
BMP ID	DP #	BMP Type (e.g., bioretention, tree filter)	BMP Functions				Bypass Type External (E) Internal (I) or NA	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)	Yes/No	Technical Justification (Design Report page number)
		TOTALS:								

Table 5.3 Summary of Soils to Evaluate Each BMP N/A									
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	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Describe any LUHPPLs identified in Part 1, Minimum Standard 8, Section 2. If not applicable, continue to Minimum Standard 9. See the Stormwater Report by DiPrete Engineering
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Are these activities already covered under an MSGP? If “No,” please explain if you have applied for an MSGP or intend to do so?
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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:
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	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.).

ILLCIT 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.

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

YES	NO	N/A	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have you checked for illicit discharges?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Have any been found and/or corrected? If “Yes,” please identify.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Have you included a Soil Erosion and Sediment Control Plan Set and/or Complete Construction Plan Set?
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	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:
		<input type="checkbox"/>	Soil Erosion and Sediment Control Plan Project Narrative, including a description of how the fifteen (15) Performance Criteria have been met:
		<input type="checkbox"/>	Provide Natural Buffers and Maintain Existing Vegetation
		<input type="checkbox"/>	Minimize Area of Disturbance
		<input type="checkbox"/>	Minimize the Disturbance of Steep Slopes
		<input type="checkbox"/>	Preserve Topsoil
		<input type="checkbox"/>	Stabilize Soils
		<input type="checkbox"/>	Protect Storm Drain Inlets
		<input type="checkbox"/>	Protect Storm Drain Outlets
		<input type="checkbox"/>	Establish Temporary Controls for the Protection of Post-Construction Stormwater Control Measures
		<input type="checkbox"/>	Establish Perimeter Controls and Sediment Barriers
		<input type="checkbox"/>	Divert or Manage Run-On from Up-Gradient Areas
		<input type="checkbox"/>	Properly Design Constructed Stormwater Conveyance Channels
		<input type="checkbox"/>	Retain Sediment On-Site
		<input type="checkbox"/>	Control Temporary Increases in Stormwater Velocity, Volume, and Peak Flows
		<input type="checkbox"/>	Apply Construction Activity Pollution Prevention Control Measures
		<input type="checkbox"/>	Install, Inspect, and Maintain Control Measures and Take Corrective Actions
		<input type="checkbox"/>	Qualified SESC Plan Preparer’s Information and Certification
		<input type="checkbox"/>	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
		<input type="checkbox"/>	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		
<input checked="" type="checkbox"/>	<input type="checkbox"/>		Have you minimized all sources of pollutant contact with stormwater runoff, to the maximum extent practicable?
<input checked="" type="checkbox"/>	<input type="checkbox"/>		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?
<input checked="" type="checkbox"/>	<input type="checkbox"/>		Lawn, Garden, and Landscape Management meet the requirements of RISDISM Section G.7? If “No,” why not?
<input checked="" type="checkbox"/>	<input type="checkbox"/>		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.).

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

<input type="checkbox"/>	<input checked="" type="checkbox"/>	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:
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Is stormwater being directed from public areas to private property? If “Yes,” note the following: <u>Note:</u> 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		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Designated snow stockpile locations?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Trash racks to prevent floatables, trash, and debris from discharging to Waters of the State?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Asphalt-only based sealants?
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Pet waste stations? (<u>Note:</u> 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).
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Regular sweeping? Please describe:
<input type="checkbox"/>	<input checked="" type="checkbox"/>	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).
<input checked="" type="checkbox"/>	<input type="checkbox"/>	A prohibition of phosphate-based fertilizers? (<u>Note:</u> 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	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Existing and proposed drainage area delineations
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Locations of all streams and drainage swales
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Drainage flow paths, mapped according to the DEM <i>Guidance for Preparation of Drainage Area Maps</i> (included in RISDISM Appendix K)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Complete drainage area boundaries; include off-site areas in both mapping and analyses, as applicable
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Logs of borings and/or test pit investigations along with supporting soils/geotechnical report
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Mapped seasonal high-water-table test pit locations
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Mapped locations of the site-specific borings and/or test pits and soils information from the test pits at the locations of the BMPs
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Mapped locations of the BMPs, with the BMPs consistently identified on the Site Construction Plans
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Mapped bedrock outcrops adjacent to any infiltration BMP
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Soils were logged by a:
	<input type="checkbox"/>	DEM-licensed Class IV soil evaluator Name:
	<input type="checkbox"/>	RI-registered P.E. Name:
A map showing the changes in cover types have been provided and show an existing disturbed area with a proposed overall reduction of impervious and gravel surfaces. The project area flows overland to the Pawtuxet River in existing conditions and will do the same in proposed conditions as no changes to the site’s topography is proposed. Since passive grass infiltration is proposed, no soil evaluations have been performed.		

Subwatershed and Impervious Area Summary

Stormwater Management, Design, and Installation Rules (250-RICR-150-10-8)

Subwatershed (area to each design point)	First Receiving Water ID or MS4	Area Disturbed (units)	Existing Impervious (units)	Proposed Impervious (units)
DP-1: Project Area	Pawtuxet River (RI10006017R-03)	1.8 ac	0.021 ac	0.011 ac

Site Construction Plans (Indicate that the following applicable specifications are provided)		
YES	NO	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Existing and proposed plans (scale not greater than 1" = 40') with North arrow
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Existing and proposed site topography (with 1 or 2-foot contours); 10-foot contours accepted for off-site areas
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Boundaries of existing predominant vegetation and proposed limits of clearing
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Site Location clarification
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Location and field-verified boundaries of resource protection areas such as: <ul style="list-style-type: none"> ▶ freshwater and coastal wetlands, including lakes and ponds ▶ coastal shoreline features Perennial and intermittent streams, in addition to Areas Subject to Storm Flowage (ASSFs)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	All required setbacks (e.g., buffers, water-supply wells, septic systems)
<input type="checkbox"/>	<input checked="" type="checkbox"/>	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: <ul style="list-style-type: none"> ▶ 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
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Logs of borings and/or test pit investigations along with supporting soils/geotechnical report and corresponding water tables
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Mapping of any OLRSM approved remedial actions/systems (including ELURs)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Location of existing and proposed roads, buildings, and other structures including limits of disturbance; <ul style="list-style-type: none"> ▶ 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
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Locations, cross sections, and profiles of all stream or wetland crossings and their method of stabilization

1.0 Project Description

The purpose of this report is to specify a Stormwater Management Design for the proposed solar project on Assessor's Plat 13 Lots 47 at the end of Ross Simons Drive in Cranston, Rhode Island.

The project site spans approximately 49.1 acres, historically used for greenhouses, featuring existing infrastructure including utility poles and concrete pads, as well as use to be part of a much larger site which was once a landfill and now currently capped of and contains a solar field (located southwest of the project site). Accessible via Ross Simons Drive, the site's predominantly flat topography allows natural overland stormwater discharge to the Pawtuxet River which runs along the eastern edge of the property.

The client proposes a 0.4 MW solar facility, within an area that is already almost entirely disturbed today. Site improvements include a solar array one equipment pad, and utility poles. The site will not require proposed service by sewer or water.

The project proposed will be developed outside of wetland and riverbank buffers. The solar panels will be constructed to match the existing grades wherever possible and will require little to no earthwork operations. All new grass areas will be loamed and seeded. Existing stone areas will remain and be repaired as necessary. The proposed fence surrounding the solar panels will be elevated six inches above grade, allowing passage for small animals.

The stormwater quality requirements will be met with the grass under the panels, which has been designed to meet the RIDEM Stormwater Design and Installations Standards Manual and the "Freshwater Wetlands Program and Stormwater Construction Permitting Gound-Mounted Solar Array Guidance" document.

2.0 Site Conditions

2.1 SOILS

There are the following soil types within the analyzed area of the Site as mapped by the NRCS USDA Soil Conservation service:

Soil Symbol	Description	Hydrologic Group
Pp	Podunk fine sandy loam	B
QoA	Quonset gravelly sandy loam, 0 to 3 percent slopes	A
Ru	Rumney fine sandy loam	C
UD	Udorthents-Urban land complex	None
Ur	Urban land	None

Soils listed above are the soils for the entire site area (49.1 acres). Soils within the proposed work area are entirely in a Hydraulic Group A.

2.2 EXISTING SITE CONDITIONS

The Site was historically home to greenhouses and currently is predominately grass with a stone field, gravel access drive and a small, wooded area along the property boundary to the north of the project area. The site area also has a small mix of existing infrastructure, including utility poles, stone fields and concrete pads. There is an existing gravel access drive that starts at the end of Ross Simons Drive which makes its way to the Narragansett Electric Company owned substation. This substation is located just south of the proposed project area. The existing gravel access drive is to remain and serve as access to the solar site. Riparian wetlands and the Pawtuxet River are just east of the project area. The site exhibits predominantly flat topography which slopes from west to east, allowing stormwater to naturally discharging overland to the Pawtuxet River.

None of the stormwater on site is treated or detained before being discharged overland to the Pawtuxet River.

2.3 POST SITE CONDITIONS

The Client proposes to construct solar panels, which will provide renewable energy. The existing impervious, gravel and wooded areas will be converted to grass or stone. All existing grass and stone areas will remain as such. The grass areas will be loam and seeded as necessary. The stone field will be repaired as necessary. No freshwater perimeter wetlands will be disturbed.

The proposed drainage design uses the existing and proposed grass and stone areas to treat runoff from the panels and meets the following criteria according to the "Freshwater Wetlands Program and Stormwater Construction Permitting Ground-Mounted Solar Array Guidance" document.

Grass and stone under solar panels:

- Grass having a "good" hydrologic condition and at least 6" of loam cover provided.
- Slopes less than 8%.
- Solar panel drip edges align with elevation contour lines (+/- 15 degrees) to maintain sheet flow and prevent erosion.
- Spacing between the panels that is approximately equal to the panel width to ensure adequate light is provided for the vegetative cover.
- No proposed use of fertilizer, pesticides, or herbicides, apart from a specified limited amount of fertilizer to establish the initial vegetative cover.

The above elements will be implemented to meet RISDISM and the "Freshwater Wetlands Program and Stormwater Construction Permitting Ground-Mounted Solar Array Guidance" document.

The primary goal of providing water quality treatment is accomplished by providing grass and stone areas under the solar panels that promotes infiltration and minimizes the risk of erosion. Stormwater runoff mitigation is provided through the conversion of the existing dirt and impervious areas to grass or stone onsite. By reducing the site's overall impervious from pre-development to post-development, the second goal of the proposed drainage system is

achieved. Any potential impacts from the proposed development on abutting properties, wetlands, and the Pawtuxet River have been mitigated.

3.0 Minimum Standards

The site has been designed to meet the minimum standards as outlined in the Rhode Island Stormwater Design and Installation Standards Manual (RISDISM). The following sections outline how the site meets and exceeds the minimum required standards.

3.1 Minimum Standard 1: LID Site Planning and Design Strategies

See "Appendix A: Stormwater Management Checklist" from the RISDISM provided at the beginning of this report.

3.2 Minimum Standard 2: Groundwater Recharge

Groundwater is to be recharged per watershed based on impervious area coverage in accordance with section 3.2.2 of the RISDISM.

Groundwater recharge is determined from the following equation:

$$Re_v = 1'' * F * I / 12$$

Where:

Re_v = Groundwater Recharge Volume (cf)

F = Recharge Factor based on Hydrologic Soil Groups (HSG) (see table below)

I = Impervious Area (sf)

HSG	Recharge Factor (F)
A	0.60
B	0.35
C	0.25
D	0.10

Recharge volume for the site is provided through the use of the grass and stone under the panels designed to work in accordance with the "Freshwater Wetlands Program and Stormwater Construction Permitting Ground-Mounted Solar Array Guidance" document.

The project proposes the conversion of the existing impervious and dirt areas to either grass or stone, and all existing grass will remain. A small, wooded area will also be converted to grass, however there is still an overall reduction in the impervious area of the site from predevelopment to post development (pre-development impervious area of 21%, post-development impervious area of 17.19%).

Any new grassed areas will be provided with at least 6" of loam to ensure a "good" hydrologic condition. The project will not require extensive earthwork operations; therefore, the existing grass areas will be preserved. The topography within the project area already has gradual slopes of less than 8%, and the proposed solar panels have been oriented so that their drip edges are parallel to the existing contour lines (+/- 15%).

3.3 Minimum Standard 3: Water Quality

The project proposes the conversion of the existing impervious and dirt areas to grass and stone, and all existing grass and existing stone will remain. A small, wooded area will also be converted to grass,

however there is still an overall reduction in the impervious of the site from predevelopment to post development (pre-development percent impervious area of 21%, post-development impervious area of 17.19%).

Any new grassed areas will be provided with at least 6" of loam to ensure a "good" hydrologic condition. No grading is proposed onsite; therefore, the existing grass areas will be preserved. The topography within the project area already has gradual slopes of less than 8%, and the proposed solar panels have been oriented so that their drip edges are parallel to the existing contour lines (+/- 15%). According to the "Freshwater Wetlands Program and Stormwater Construction Permitting Ground-Mounted Solar Array Guidance" document, the Water Quality Minimum Standard has been met.

3.4 Minimum Standard 4: Conveyance and Natural Channel Protection

All stormwater leaving the site will flow overland to the Pawtuxet River and no concentrated discharge is proposed.

Any new grassed areas will be provided with at least 6" of loam to ensure a "good" hydrologic condition. No grading is proposed onsite; therefore, the existing grass areas will be preserved. The topography within the project area already has gradual slopes of less than 8%, and the proposed solar panels have been oriented so that their drip edges are parallel to the existing contour lines (+/- 15%). These measures will promote infiltrate and mitigate erosion onsite.

The total project area, and subsequently the total drainage area, is less than 5 acres. Per the "Freshwater Wetlands Program and Stormwater Construction Permitting Ground-Mounted Solar Array Guidance" document, the Conveyance and Natural Channel Protection Minimum Standard has been met.

3.5 Minimum Standard 5: Overbank Flood Protection & Downstream Analysis

The project proposes the conversion of the existing impervious and dirt areas to grass and stone, and all existing grass and existing stone will remain. A small, wooded area will also be converted to grass, however there is still an overall reduction in the impervious of the site from predevelopment to post development (pre-development percent impervious area of 21%, post-development impervious area of 17.19%).

3.8 Minimum Standard 8: Land Uses with High Potential Pollutant Loads (LUHPPLs)

AP 13 Lot 47 has a listed ELUR. The restrictions applicable to the property include:

- No residential use of Lot 47 of the Property shall be permitted that is contrary to the Department approvals and restrictions contained herein;
- Groundwater at Lot 47 of the Property shall not be used for any purpose; and
- Any enclosed structure erected on Lot 47 of the Property shall contain a passive venting system or other appropriate system as may be approved by the Department so as to mitigate the risk of vapor intrusion in the building.

As the proposed project does not fall within any of the restricted activities, this minimum standard has been met.

3.9 Minimum Standard 9: Illicit Discharges

There are no proposed Illicit Discharges on site. The site will not need service by public water and sewer.

3.10 Minimum Standard 10: Construction Activity Soil Erosion, Runoff and Sedimentation and Pollution Prevention Control Measure Requirements

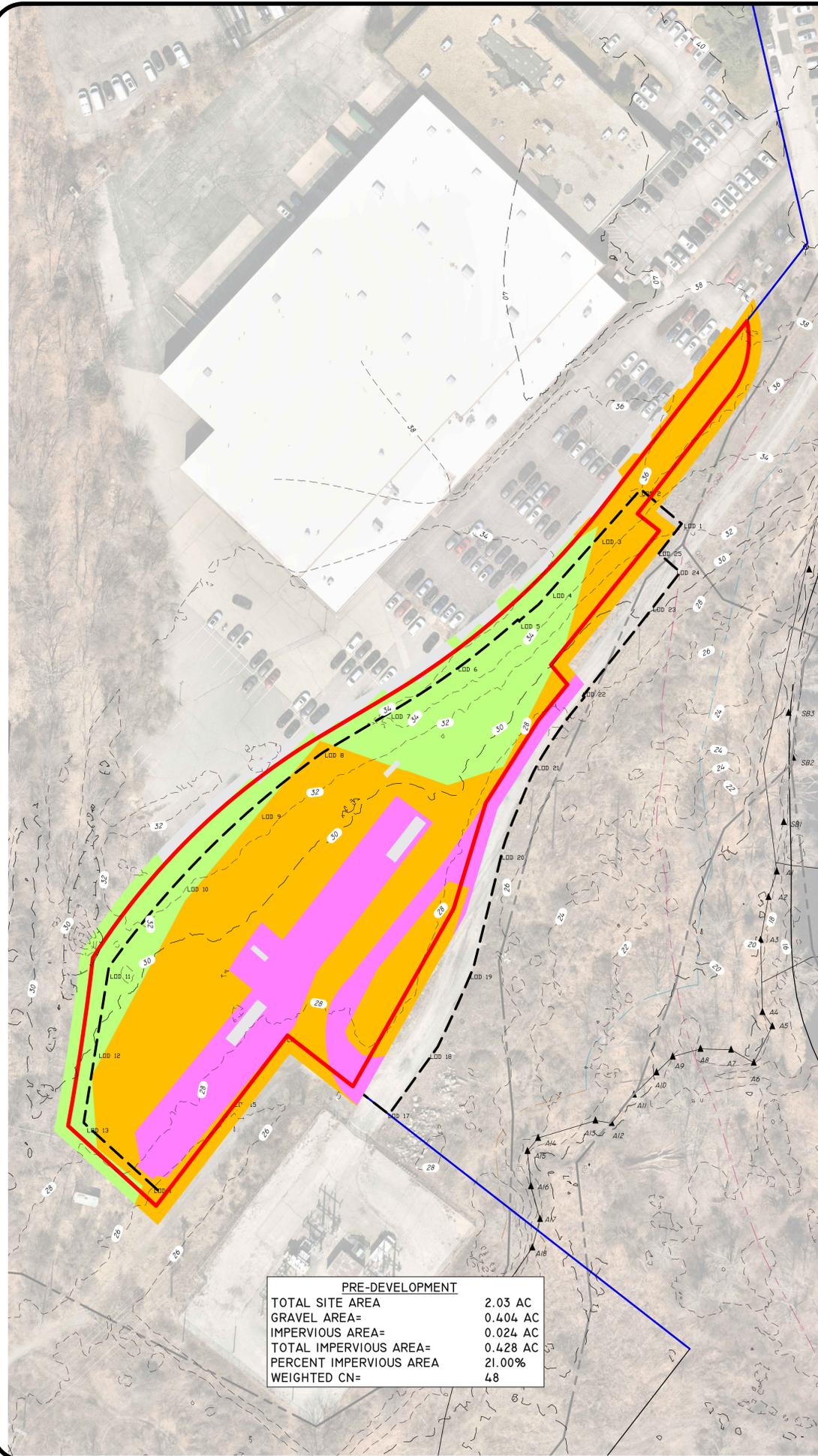
See the SESC for this development prepared by DiPrete Engineering.

3.11 Minimum Standard 11: Stormwater Management System Operation and Maintenance

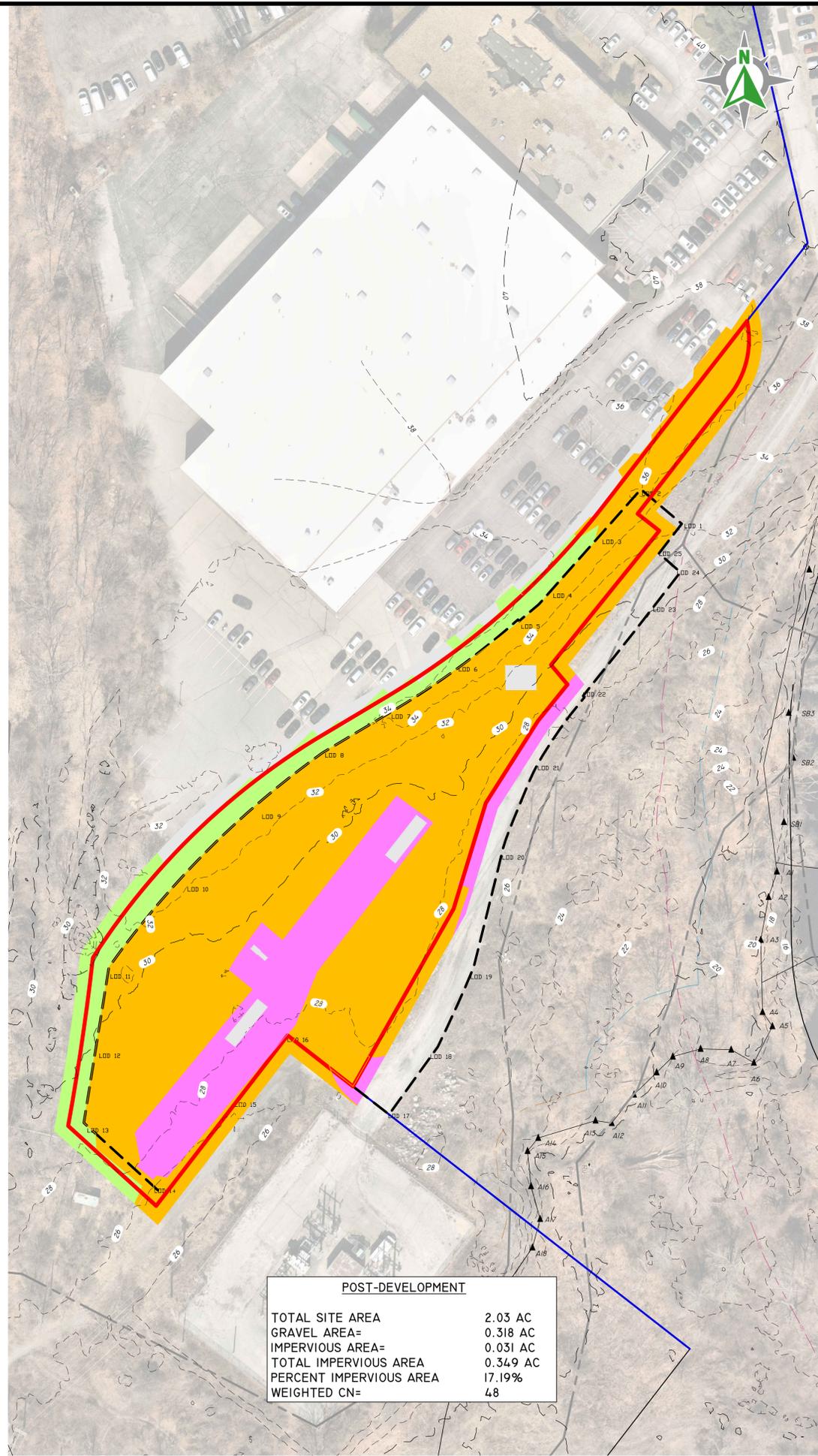
See the O&M for this development prepared by DiPrete Engineering.

Cover Type Map

Z:\DEVELOPMENT\PROJECTS\0437-033 SHARPE DRIVE SOLAR\AUTOCAD DRAWINGS\0437-033-WAMP.DWG PLOTTED: 12/22/2023



PRE-DEVELOPMENT	
TOTAL SITE AREA	2.03 AC
GRAVEL AREA=	0.404 AC
IMPERVIOUS AREA=	0.024 AC
TOTAL IMPERVIOUS AREA=	0.428 AC
PERCENT IMPERVIOUS AREA	21.00%
WEIGHTED CN=	48



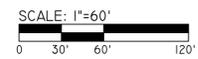
POST-DEVELOPMENT	
TOTAL SITE AREA	2.03 AC
GRAVEL AREA=	0.318 AC
IMPERVIOUS AREA=	0.031 AC
TOTAL IMPERVIOUS AREA	0.349 AC
PERCENT IMPERVIOUS AREA	17.19%
WEIGHTED CN=	48

LEGEND

- WOODS - A SOILS
- GRASS - A SOILS
- GRAVEL - A SOILS
- IMPERVIOUS

LEGEND

- PROJECT AREA
- SOIL BOUNDARY



COVER TYPE MAP
SHARPE DRIVE SOLAR

DiPrete Engineering

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