

Stormwater Runoff Analysis

“165 Oliphant Warehouse”
Assessor’s Map 111, Lot 61A
165 Oliphant Lane
Middletown, RI

Prepared For
Sisyphus Holdings, LLC
36 Mount Vernon Street, Unit 1
Newport, RI 02840



Rev. September 2022



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1.0 PROJECT NARRATIVE

1.1 SITE INFORMATION

City / Town:	Middletown, Rhode Island
Adjacent Roadways:	Oliphant Lane
Lot(s) identification:	A.P. 111 Lot 61A
Zoning District:	LI (Light Industrial)
Current Use:	Parking Lot / Partially Vacant
Site Area:	1.39 Acres
FEMA Zone and Map:	Zone "X (Panel 44005C0091J)

1.2 EXISTING IMPROVEMENTS AND SITE CONDITIONS

The existing Site includes a single partially developed parcel on the south side of Oliphant Lane in a light industrial zoned (LI). The Site appears from historical aerial photography to have been used for storage and parking of vehicles. Prior to this use, the Site was vacant. There are two points of paved access from Oliphant Lane to the paved parking lot. There are no permanent structures on the Site. Aside from the pavement, lighting, and a utility pole at the northwest corner, there are no other significant improvements to the property. A historical stone wall runs along the front property line. The remainder of the property is occupied by woods and brush. The Site abuts other properties zoned light industrial to the sides and to the rear, with the property to the rear being occupied by the Rhode Island Airport. The "RPZ" zone associated with one of the airport runways extends onto the Site. The properties across Oliphant Lane to the northeast are zoned R20 (residential).

Municipal sewer and water main are present in Oliphant Lane, though no active service stubs are known to exist for this property. Overhead electrical and communication services are available on the north side of Oliphant Lane and electrical services appear to currently be currently provided to the Site. There are no stormwater quality or control devices located on the property. A drain line and a drain structure are located at the rear of the site, but they do not appear to connected to any sources of runoff and have been abandoned.

1.3 PROTECTED FEATURES

There are no features protected by the state located on the property. The property is located in the town of Middletown Watershed Protection District Zone 2. The ultimate receiving waterbody for the property is Bailey's Brook (WB ID RI0007035R-01). This waterway has been assessed with a TMDL for bacteria (enterococcus) and other impairments including phosphorus and lead.

1.4 SITE TERRAIN AND SOILS

In general, the site slopes from the abutting roadway towards the airport property to the rear. A small portion of the property slopes towards the abutting property to the southeast. Slopes vary between 1% and 20%, with the steeper slopes being present in the undeveloped portions of the property. The majority of the property has slopes less than 15%. The soil types on site are mapped as PmA and PmB (Pittstown

silt loam) by the USDA Natural Resource Conservation Service. These soils are a type C hydrologic soil common to Aquidneck Island; however, Class IV soil evaluations performed in the area of development revealed **sandy loams**, rather than the expected silt loams, with water tables varying from 33 to 16 inches.

1.5 PROPOSED IMPROVEMENTS

The applicant intends to demolish the existing improvements and construct a new warehouse and outdoor storage facility. The 17,235 square foot single-story warehouse structure is to be located at the front of the property at the building setback line. The structure will not extend into the RPZ zone associated with the nearby runway. Paved access and parking are proposed to loop the structure, linking to Oliphant Lane at approximately the same two locations as the existing parking lot. Paved parking in accordance with the zoning ordinance is proposed to be provided. A crushed stone outdoor storage area is proposed at the rear of the size. This area will be used for storage of Newport Boat Show display floats when not in use. This stone area has been sized to store the full complement of the display floats when properly stacked. A forklift will be used to stack and unstack the floats when needed for an event. An enclosed trash area is to be located to the side and rear of the structure in the paved parking area. The proposed lot coverage shall be within the maximum 35% lot coverage allowable by the zoning ordinance. A concrete retaining wall will be required at the rear of the site to flatten the area needed for outdoor storage.

New public and private utility services will be provided for the new structure. The water service proposed from the existing main in Oliphant Lane will require the approval of Newport Water. The proposed sewer service to an existing sewer stub will require approval from the Middletown Public Works Department. All electrical service work from the overhead lines shall be subject to design and approval by National Grid.

Stormwater control for this development will be provided by the deep stone reservoir created by the outdoor storage area and the surrounding retaining wall. After removing the existing vegetation and applying a substantial layer of ASTM C-33 sand, the reservoir provides a 36-inch depth to the seasonal high groundwater table. Staged outlet pipes through the concrete wall provide the necessary metering from the stone reservoir. All outlet devices are located above the 1.2-inch water quality storm water level and the device provides the required water quality and groundwater recharge via infiltration. Discharge from this device is to the abutter to the rear via multiple outlets in order to evenly distribute the runoff and reduce flow velocities. Stormwater modeling of the 100-year storm event indicates approximately 12-inches of freeboard from the top of the concrete retaining wall. As such, no overflow device is required.

2.0 PROPOSED ALTERATIONS AND STORMWATER CONSIDERATIONS

2.1 STORMWATER SYSTEM OBJECTIVES

The objectives of the project stormwater system are to accomplish the following:

- Provide water quality treatment and groundwater recharge for stormwater runoff in accordance with the Rhode Island Stormwater Design and Installation Standards Manual.
- Maintain the overall drainage patterns from the site to the extent practicable.

2.2 REDEVELOPMENT SITE

As the existing site lot coverage consists of less than 40% impervious this project does not qualify as a "redevelopment site" per section 3.2.6 of the RISDISM.

2.3 MINIMUM STORMWATER MANAGEMENT STANDARDS

2.3.1 MINIMUM STANDARD 1: LID SITE PLANNING AND DESIGN STRATEGIES

The proposed development utilizes LID designs conforming to the RISDISM. These elements are located immediately downstream of the new improvements and will directly treat the newly generated runoff with minimal interception of on-site clean runoff.

2.3.2 MINIMUM STANDARD 2: GROUNDWATER RECHARGE

This standard shall be met by infiltrating stormwater runoff in the deep stone of the outdoor storage area. A total of **0.851 acres** of impervious surfaces requiring recharge are intercepted by the stormwater system including both on-site and off-site sources. This equates to a total of **771** cubic feet of recharge volume based on the underlying hydrologic soil type. Per the HydroCAD analysis of the 1.2-inch WQ storm (split pervious method) a total of **4,225** cubic feet of recharge is provided. Refer to Appendix E for complete calculations.

2.3.3 MINIMUM STANDARD 3: WATER QUALITY

This standard shall be met by infiltrating stormwater runoff in the deep stone outdoor storage area. A total of intercepted **0.851 acres** of impervious surfaces requiring water quality are proposed, including both on-site and off-site sources. This equates to a total of **3,089** cubic feet of water quality volume. Per the HydroCAD analysis of the WQ storm (split pervious method) a total of **4,225** cubic feet of water quality volume is infiltrated by the stormwater system. Refer to Appendix E for complete calculations.



2.3.4 MINIMUM STANDARD 4: CONVEYANCE AND NATURAL CHANNEL PROTECTION

This standard may be waived for facilities with less than one acre of impervious area. The development area for the warehouse and associated paved parking includes less than one acre of impervious.

2.3.5 MINIMUM STANDARD 5: OVERBANK FLOOD PROTECTION

The TR-20 HydroCAD model demonstrates that the proposed system will successfully mitigate the 100-year storm event. In these calculations, all pre-development land was characterized as "good condition" as required by this standard. An off-site component of runoff from upstream residential properties passes through the development area, which was also modeled as "good condition". The modeling also demonstrates that the structures and stormwater devices will safely pass the 100-year storm event without flooding or breaching.

2.3.6 MINIMUM STANDARD 6: REDEVELOPMENT AND INFILL PROJECTS

As stated in section 2.2 above, this project does not qualify as a re-development project.

2.3.7 MINIMUM STANDARD 7: POLLUTION PREVENTION

Source controls and pollution prevention measures will be present during all phases of construction. A separate stormwater pollution prevention plan (Soil Erosion and Sediment Control Narrative) has been prepared.

2.3.8 MINIMUM STANDARD 8: LAND USES WITH HIGHER POTENTIAL POLLUTANT LOADS

The use of this property does not qualify as a LUHPPL and does not require any specific source controls, limited BMPs, or and additional state permitting.

2.3.9 MINIMUM STANDARD 9: ILLICIT DISCHARGES

Neither the using use nor any proposed uses will include any discharges considered to be "illicit" per this section of the Manual.

2.3.10 MINIMUM STANDARD 10: SOILS EROSION AND SEDIMENT CONTROL

Soil erosion and sediment control measures will be implemented during all phases of construction. A SESC plan has been provided in the permitting plan set and a separate Soil Erosion and Sediment Control Narrative has been prepared.



2.3.11 MINIMUM STANDARD 11: STORMWATER MANAGEMENT OPERATIONS AND MAINTENANCE

An Operations and Maintenance (O&M) Document has been prepared and submitted in addition to this narrative. This document satisfies the minimum requirements of this standard.

2.4 OVERALL STORMWATER DESIGN FUNCTION

The overall design of the stormwater system is to provide a reduction in peak rate of runoff and total volume runoff, and will meet the 11 minimum standards established in the RISDISM. All proposed stormwater devices are to be situated downstream of the proposed improvements and upstream of the existing receiving point for the runoff from this catchment. The existing drainage patterns across the site will be minimally impacted. There will be no negative impact to the abutting right of way or adjacent properties.

2.5 POLLUTANT LOADING CALCULATION

The downstream receiving water body, Bailey's Brook, has a TMDL for bacteria (enterococcus). A pollutant loading analysis (PLA) was performed for the development. This analysis shows a substantial reduction in runoff bacteria as a result of the development. This calculation is located in Appendix E.

3.0 DESIGN MODELING METHODOLOGY

Runoff and routing calculations have been performed for the watershed areas affected by the proposed development under existing and proposed development conditions scenarios. Time of concentration and runoff curve number calculations have been performed using the method described in NRCS Technical Release 55 – Urban Hydrology for Small Watersheds. The TR-20 based HydroCAD modeling software has been utilized to perform the more complex runoff and routing calculations, most of which are beyond the scope of the TR-55 method.

Design rainfall events have been modeled using the Soil Conservation Service (SCS) Type III hydrograph for 24-hour duration storms. The rainfall depth for each return period is taken from the RISDISM. This guidance document splits the state into five regions for rainfall frequency based on county. The project site is located in the **Newport** County region defined in the RISDISM. The rainfall frequency values recommended by RIDEM and used in this drainage analysis are listed in the table below.

Rainfall Frequency Values for Newport County Rhode Island with 24-Hour Storm Duration					
RIDEM <i>Stormwater Design and Installation Standards manual 3/15</i>					
Frequency	1-Yr	2-Yr	10-Yr	25-Yr	100-Yr
Inches of Rainfall	2.8	3.3	4.9	6.1	8.6

The existing and proposed conditions runoff calculations were analyzed and the proposed stormwater system was designed to mitigate the peak runoff for the 1, 10, and 100-year 24-hour design storms. The resulting design effectively mitigates and treats runoff from newly developed areas of the site before allowing it to discharge in a non-erosive manner to downstream areas in accordance with the RISDISM.

3.1 ANALYSIS DESIGN POINTS AND OFF-SITE CONTRIBUTIONS

The proposed development contributes stormwater runoff to the following design points. These design points provide a direct comparison for pre-construction and post-construction runoff flows and runoff volumes.

1. Abutting property to the rear (RI Airport)
2. Abutting property to the southeast

The following off-site areas contribute surface stormwater runoff to these design points. This runoff either drains through the project area or contributes in some manner which directly affects the design of the stormwater system and has been included in the design calculations. These areas are:

1. Portions of Oliphant Lane not captured by municipal drain structures.

Watershed maps for both the existing and proposed conditions can be found in Appendix B. These maps demonstrate the areas of the site which contribute to each of the design points and indicate the general pattern of surface or piped runoff flow.

4.0 STORMWATER RUNOFF COMPARISONS

Analysis of the existing and proposed runoff during design storms demonstrates that there will be no increase in the peak runoff or total volume runoff to the downstream design points as a result of the development. Comparisons of the runoff at the design points are given below in Section 4.1. The runoff volumes given have been evaluated over a 24-hour period. All of the HydroCAD modeling worksheets are attached in Appendix C and D.

4.1 SUMMARY OF STORMWATER CALCULATIONS

Table 4.1.1 Comparison of Runoff Values at Abutting Property to the Rear (101 vs. 201)

Storm Return Period	Existing Conditions Peak Runoff (cfs)	Proposed Conditions Peak Runoff (cfs)	Existing Conditions 24-hr Volume Runoff (af)	Proposed Conditions Volume 24-hr Runoff (af)
1-year	1.40	1.29	0.102	0.076
10-year	4.12	3.66	0.283	0.234
100-year	9.52	8.09	0.658	0.563

Table 4.1.2 Comparison of Runoff Values at Southeast Abutter (102 vs. 202)

Storm Return Period	Existing Conditions Peak Runoff (cfs)	Proposed Conditions Peak Runoff (cfs)	Existing Conditions 24-hr Volume Runoff (af)	Proposed Conditions Volume 24-hr Runoff (af)
1-year	0.15	0.14	0.010	0.010
10-year	0.39	0.37	0.027	0.025
100-year	0.84	0.81	0.059	0.057

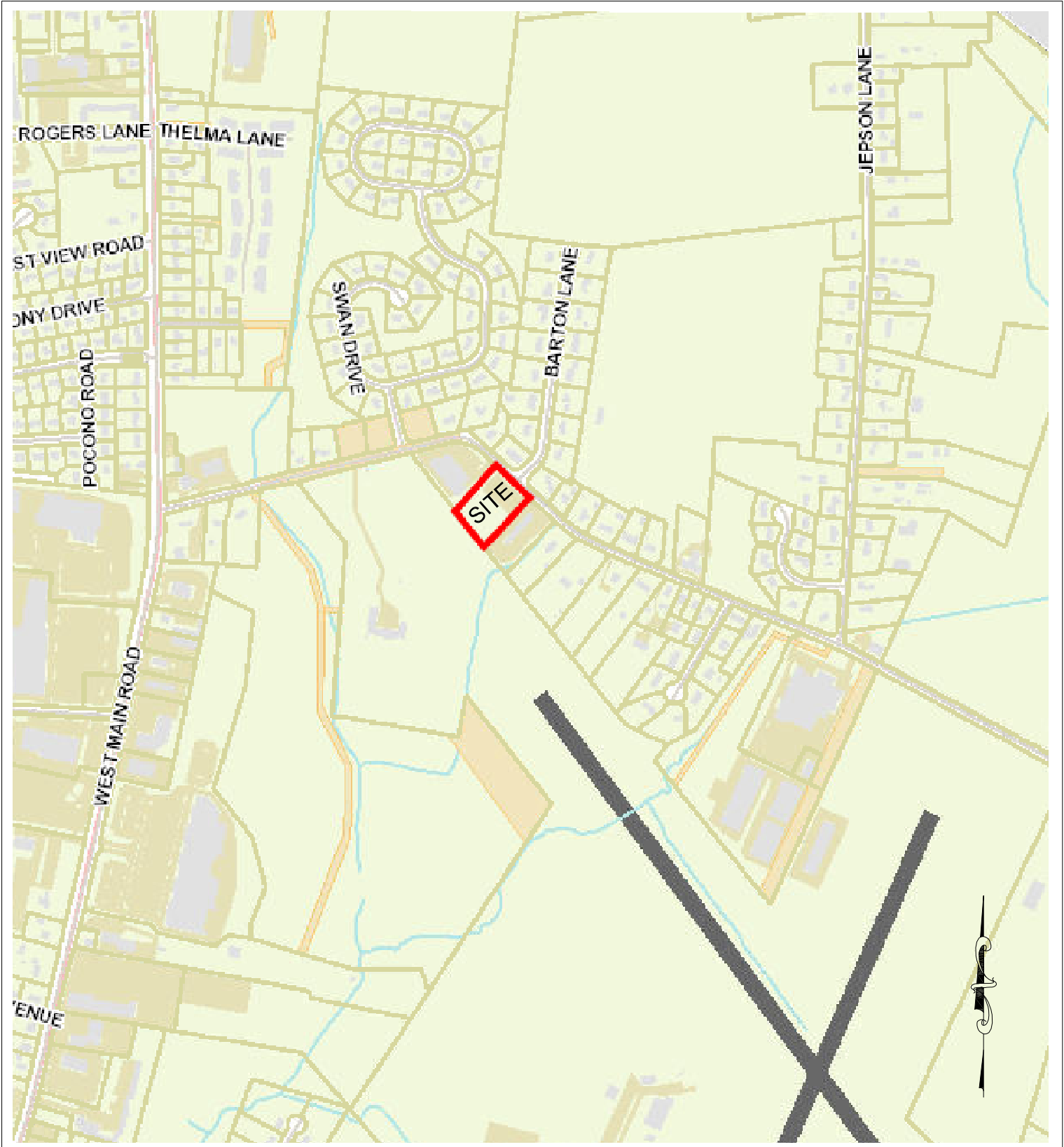


5.0 LIMITATIONS AND SPECIAL TERMS AND CONDITIONS

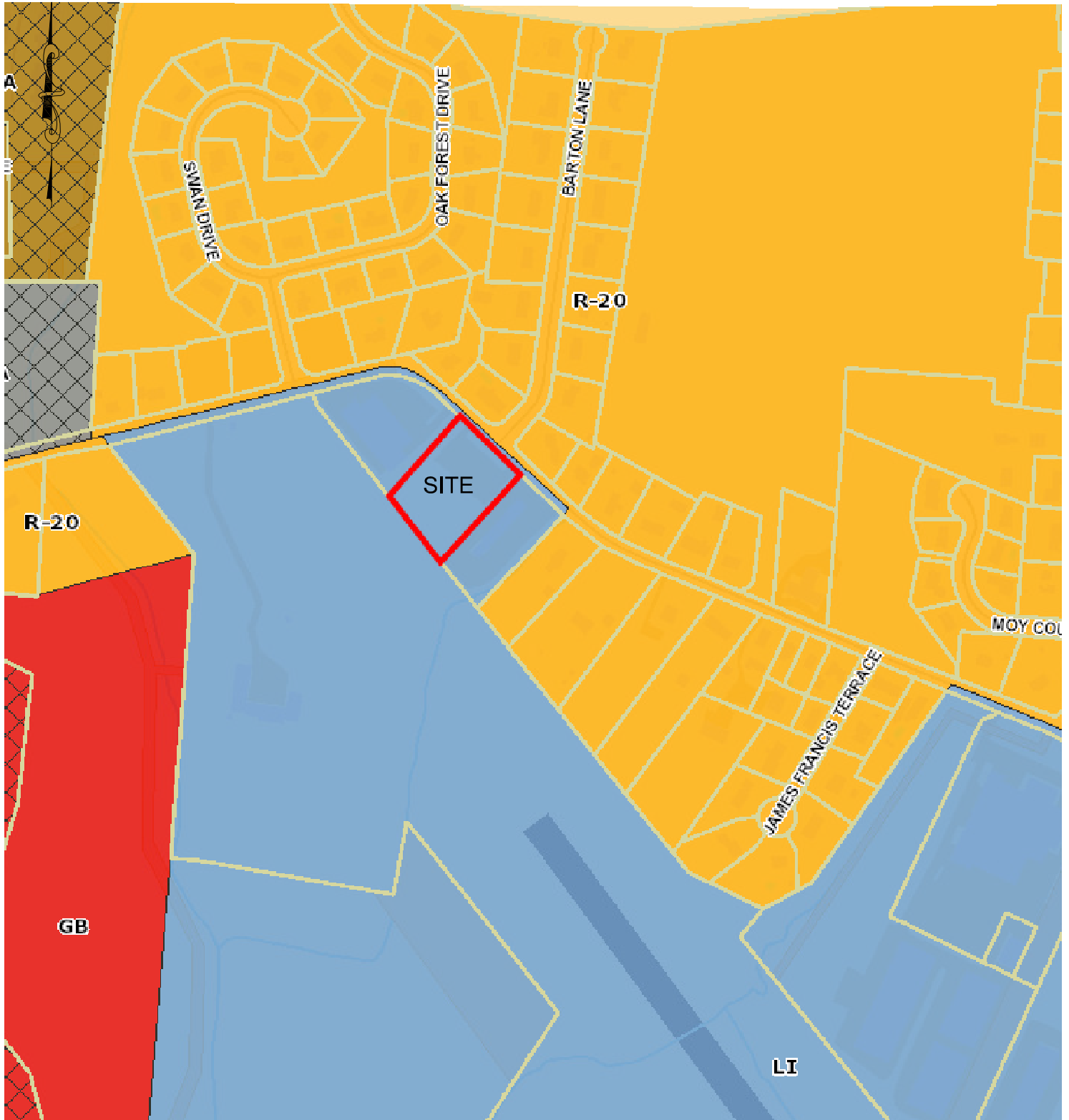
1. NE&C's evaluation was performed in accordance with generally accepted practices of other consultants undertaking similar studies at the same time and in the same geographical area, and NE&C observed the degree of care and skill generally exercised by other consultants under similar circumstances and conditions. No warranty expressed or implied is made.
2. Any additional research conducted should be reviewed by Northeast Engineers & Consultants, Inc., such that the conclusions presented herein may be modified.
3. All observations documented in this report were performed under the existing conditions at the time of the assessment.
4. This report has been prepared on the behalf of and is for the exclusive use of the Client. This report and findings contained herein shall not, in whole or in part be disseminated or conveyed to any party, nor used by any other party in whole or in part, without the written consent of NE&C.



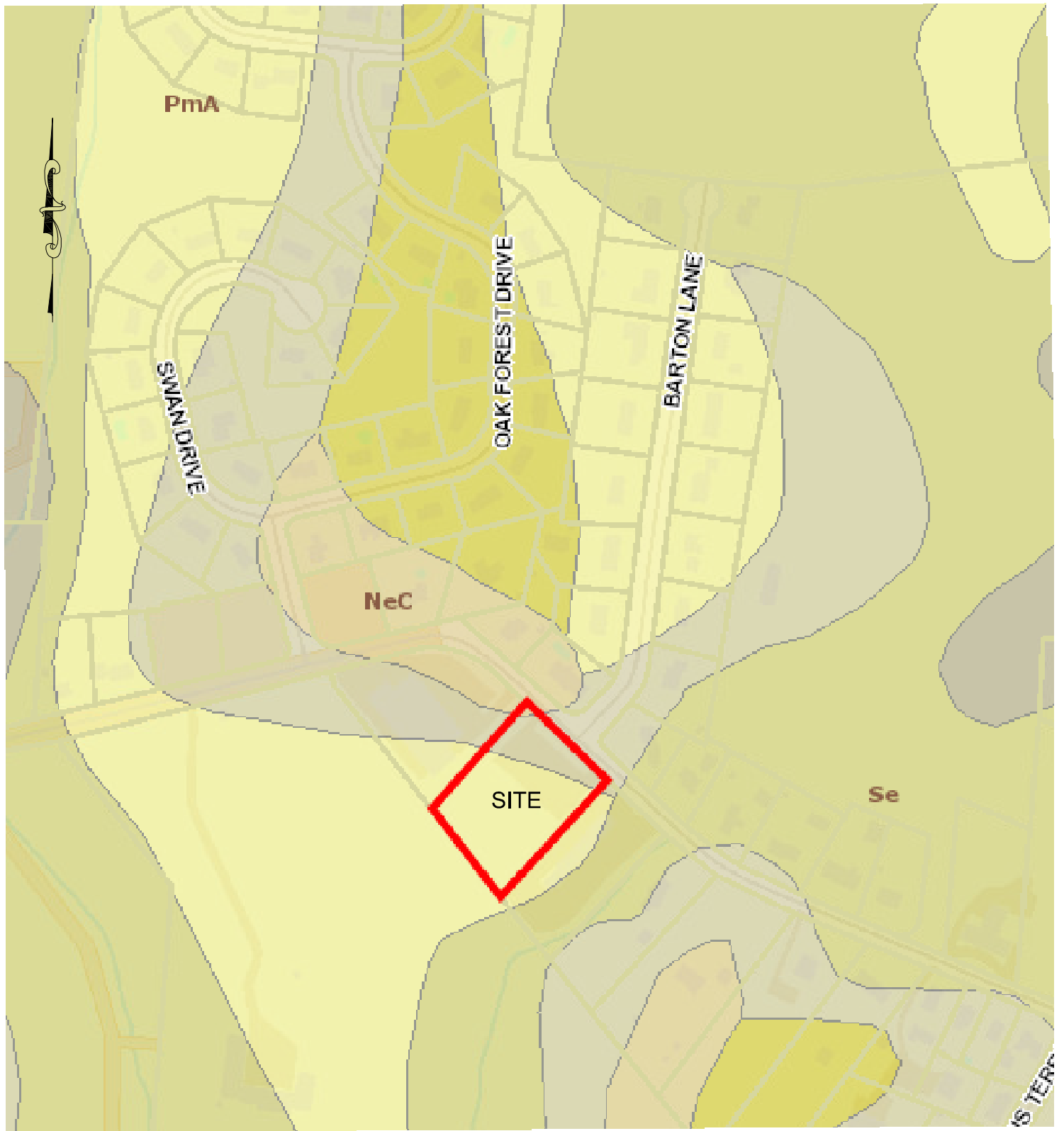
APPENDIX A FIGURES



Scale:	NTS	Date:	19JUL22	Designed By:	JJR	Drawn By:	JJR	Checked By:	GES
Project Title:				Drawing Title:					
165 OLIPHANT WAREHOUSE MIDDLETOWN, RHODE ISLAND				LOCUS MAP					
Issued for:				Drawing Number:			Project Number:		
PERMITTING				FIG 1			21272.0		



Scale:	NTS	Date:	19JUL22	Designed By:	JJR	Drawn By:	JJR	Checked By:	GES
Project Title:				Drawing Title:					
165 OLIPHANT WAREHOUSE MIDDLETOWN, RHODE ISLAND				ZONING MAP					
Issued for:				Drawing Number:			Project Number:		
PERMITTING				FIG 2			21272.0		



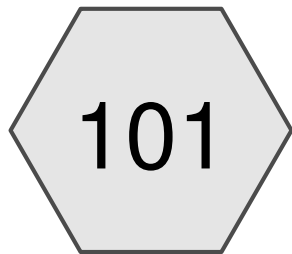
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Project Title:				Drawing Title:					
165 OLIPHANT WAREHOUSE MIDDLETOWN, RHODE ISLAND				SOILS MAP					
Issued for:				Drawing Number:			Project Number:		
PERMITTING				FIG 3			21272.0		



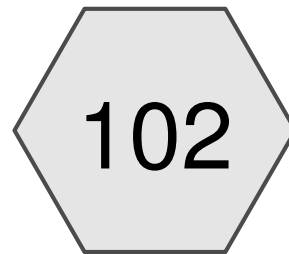
APPENDIX B WATERSHED MAPS



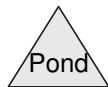
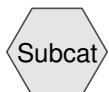
APPENDIX C EXISTING CONDITIONS HYDROCAD



To rear



To southeast abutter



Routing Diagram for 21272_2022-09-28

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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.216	74	>75% Grass cover, Good, HSG C (101, 102)
0.809	65	Brush, Good, HSG C (101, 102)
0.058	98	Offsite pavement (101)
0.007	98	Offsite pavement (102)
0.408	98	Pavement (101, 102)

Summary for Subcatchment 101: To rear

Runoff = 1.40 cfs @ 12.08 hrs, Volume= 0.102 af, Depth> 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 1 YEAR Rainfall=2.80"

Area (sf)	CN	Description
7,134	74	>75% Grass cover, Good, HSG C
* 16,361	98	Pavement
34,276	65	Brush, Good, HSG C
* 2,536	98	Offsite pavement
60,307	76	Weighted Average
41,410	67	68.67% Pervious Area
18,897	98	31.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	29	0.1030	0.26		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.30"
0.9	91	0.0357	1.73		Sheet Flow, Pavement Smooth surfaces n= 0.011 P2= 3.30"
1.3	184	0.0217	2.37		Shallow Concentrated Flow, Woods/brush Unpaved Kv= 16.1 fps
4.1	304	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment 102: To southeast abutter

Runoff = 0.15 cfs @ 12.08 hrs, Volume= 0.010 af, Depth> 1.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 1 YEAR Rainfall=2.80"

Area (sf)	CN	Description
* 295	98	Offsite pavement
* 1,394	98	Pavement
971	65	Brush, Good, HSG C
2,285	74	>75% Grass cover, Good, HSG C
4,945	80	Weighted Average
3,256	71	65.84% Pervious Area
1,689	98	34.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Subcatchment 101: To rear

Runoff = 4.12 cfs @ 12.08 hrs, Volume= 0.283 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 YEAR Rainfall=4.90"

Area (sf)	CN	Description
7,134	74	>75% Grass cover, Good, HSG C
* 16,361	98	Pavement
34,276	65	Brush, Good, HSG C
* 2,536	98	Offsite pavement
60,307	76	Weighted Average
41,410	67	68.67% Pervious Area
18,897	98	31.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	29	0.1030	0.26		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.30"
0.9	91	0.0357	1.73		Sheet Flow, Pavement Smooth surfaces n= 0.011 P2= 3.30"
1.3	184	0.0217	2.37		Shallow Concentrated Flow, Woods/brush Unpaved Kv= 16.1 fps
4.1	304	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment 102: To southeast abutter

Runoff = 0.39 cfs @ 12.07 hrs, Volume= 0.027 af, Depth> 2.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 YEAR Rainfall=4.90"

Area (sf)	CN	Description
* 295	98	Offsite pavement
* 1,394	98	Pavement
971	65	Brush, Good, HSG C
2,285	74	>75% Grass cover, Good, HSG C
4,945	80	Weighted Average
3,256	71	65.84% Pervious Area
1,689	98	34.16% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

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Summary for Subcatchment 101: To rear

Runoff = 9.52 cfs @ 12.07 hrs, Volume= 0.658 af, Depth> 5.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 YEAR Rainfall=8.60"

Area (sf)	CN	Description
7,134	74	>75% Grass cover, Good, HSG C
* 16,361	98	Pavement
34,276	65	Brush, Good, HSG C
* 2,536	98	Offsite pavement
60,307	76	Weighted Average
41,410	67	68.67% Pervious Area
18,897	98	31.33% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.9	29	0.1030	0.26		Sheet Flow, Grass Grass: Short n= 0.150 P2= 3.30"
0.9	91	0.0357	1.73		Sheet Flow, Pavement Smooth surfaces n= 0.011 P2= 3.30"
1.3	184	0.0217	2.37		Shallow Concentrated Flow, Woods/brush Unpaved Kv= 16.1 fps
4.1	304	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment 102: To southeast abutter

Runoff = 0.84 cfs @ 12.07 hrs, Volume= 0.059 af, Depth> 6.18"

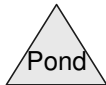
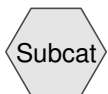
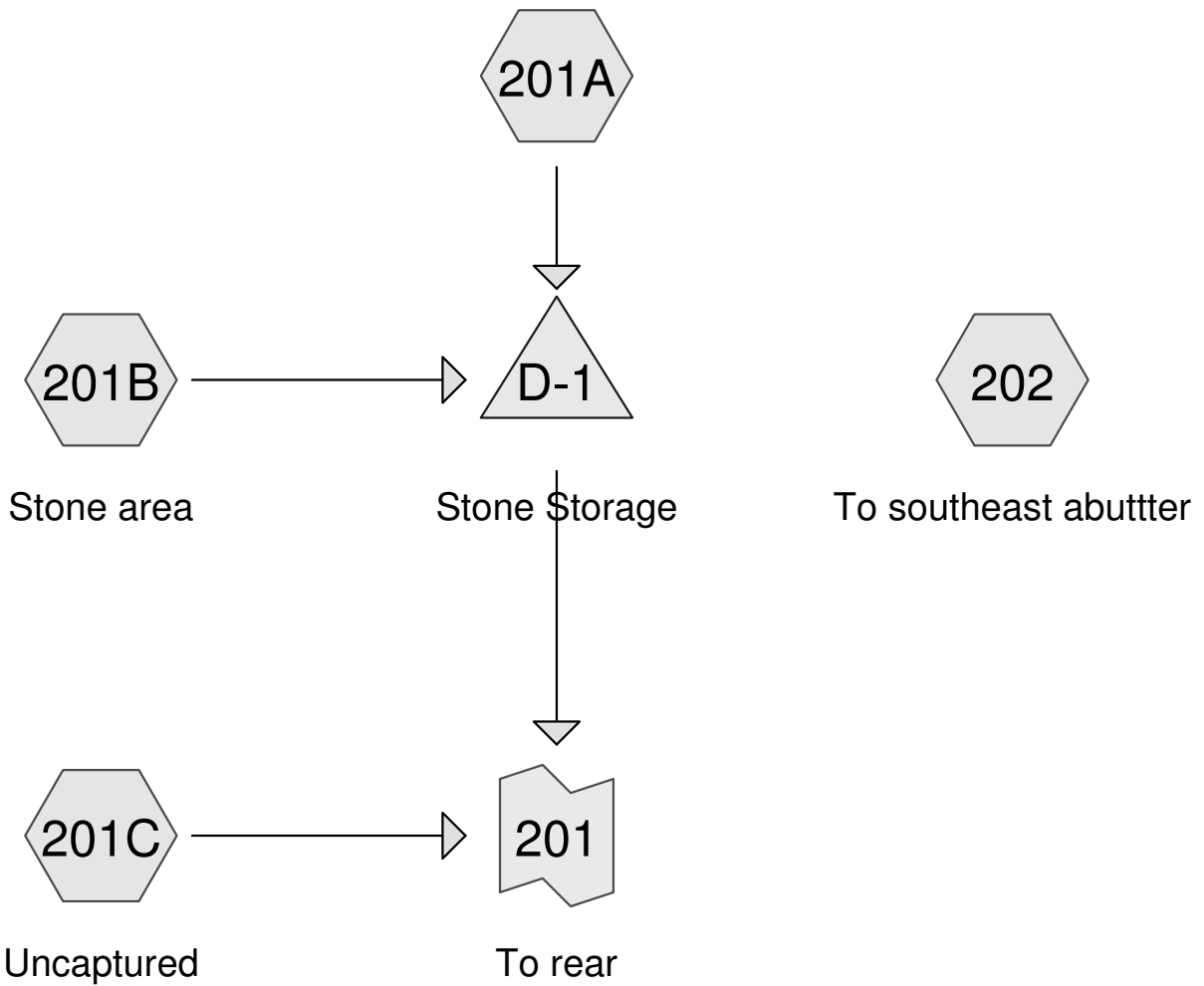
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 YEAR Rainfall=8.60"

Area (sf)	CN	Description
* 295	98	Offsite pavement
* 1,394	98	Pavement
971	65	Brush, Good, HSG C
2,285	74	>75% Grass cover, Good, HSG C
4,945	80	Weighted Average
3,256	71	65.84% Pervious Area
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum



APPENDIX D PROPOSED CONDITIONS HYDROCAD



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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.298	74	>75% Grass cover, Good, HSG C (201A, 201C, 202)
0.396	98	Building (201A)
0.015	98	Concrete (202)
0.058	98	Offsite Pavement (201A)
0.007	98	Offsite pavement (202)
0.397	98	Pavement (201A)
0.328	98	Stone area (98% capture) (201B)

Summary for Subcatchment 201A:

Runoff = 2.54 cfs @ 12.07 hrs, Volume= 0.182 af, Depth> 2.25"
Routed to Pond D-1 : Stone Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 YEAR Rainfall=2.80"

	Area (sf)	CN	Description
*	17,313	98	Pavement
	5,245	74	>75% Grass cover, Good, HSG C
*	2,536	98	Offsite Pavement
*	17,235	98	Building
	42,329	95	Weighted Average
	5,245	74	12.39% Pervious Area
	37,084	98	87.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Subcatchment 201B: Stone area

Runoff = 0.92 cfs @ 12.07 hrs, Volume= 0.070 af, Depth> 2.57"
Routed to Pond D-1 : Stone Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 YEAR Rainfall=2.80"

	Area (sf)	CN	Description
*	14,282	98	Stone area (98% capture)
	14,282	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Subcatchment 201C: Uncaptured

Runoff = 0.08 cfs @ 12.08 hrs, Volume= 0.006 af, Depth> 0.78"
Routed to Link 201 : To rear

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 YEAR Rainfall=2.80"

	Area (sf)	CN	Description
	3,841	74	>75% Grass cover, Good, HSG C
	3,841	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Subcatchment 202: To southeast abuttter

Runoff = 0.14 cfs @ 12.08 hrs, Volume= 0.010 af, Depth> 1.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 1 YEAR Rainfall=2.80"

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Area (sf)	CN	Description
3,905	74	>75% Grass cover, Good, HSG C
* 298	98	Offsite pavement
* 672	98	Concrete
4,875	79	Weighted Average
3,905	74	80.10% Pervious Area
970	98	19.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Pond D-1: Stone Storage

Inflow Area = 1.300 ac, 90.74% Impervious, Inflow Depth > 2.33" for 1 YEAR event
 Inflow = 3.46 cfs @ 12.07 hrs, Volume= 0.253 af
 Outflow = 1.51 cfs @ 12.24 hrs, Volume= 0.249 af, Atten= 56%, Lag= 10.0 min
 Discarded = 0.27 cfs @ 12.24 hrs, Volume= 0.179 af
 Primary = 1.25 cfs @ 12.24 hrs, Volume= 0.070 af
 Routed to Link 201 : To rear

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 146.41' @ 12.24 hrs Surf.Area= 11,168 sf Storage= 3,476 cf
 Flood Elev= 148.00' Surf.Area= 14,282 sf Storage= 10,454 cf

Plug-Flow detention time= 87.4 min calculated for 0.249 af (99% of inflow)
 Center-of-Mass det. time= 78.4 min (855.0 - 776.6)

Volume	Invert	Avail.Storage	Storage Description
#1	144.50'	10,454 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 31,679 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.50	150	0	0
144.60	805	48	48
145.00	1,848	531	578
146.00	9,550	5,699	6,277
147.00	13,486	11,518	17,795
148.00	14,282	13,884	31,679

Device	Routing	Invert	Outlet Devices
#1	Discarded	144.50'	1.027 in/hr Exfiltration over Surface area
#2	Primary	146.00'	4.0" Vert. (5) 4" PVC Outlets to grade X 6.00 C= 0.600 Limited to weir flow at low heads
#3	Device 4	146.50'	20.0" W x 6.0" H Vert. 20"W x 6"H orifice C= 0.600 Limited to weir flow at low heads
#4	Primary	145.25'	8.0" Round (2) 8" ADS X 2.00 L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 145.25' / 145.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#5	Device 6	146.75'	20.0" W x 6.0" H Vert. 20"W x 6"H orifice C= 0.600 Limited to weir flow at low heads
#6	Primary	145.25'	8.0" Round (2) 8" ADS X 2.00 L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 145.25' / 145.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Discarded OutFlow Max=0.27 cfs @ 12.24 hrs HW=146.41' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=1.25 cfs @ 12.24 hrs HW=146.41' (Free Discharge)
 ↑ **2=(5) 4" PVC Outlets to grade** (Orifice Controls 1.25 cfs @ 2.38 fps)
 ↓ **4=(2) 8" ADS** (Passes 0.00 cfs of 3.06 cfs potential flow)
 ↑ **3=20"W x 6"H orifice** (Controls 0.00 cfs)
 ↓ **6=(2) 8" ADS** (Passes 0.00 cfs of 3.06 cfs potential flow)
 ↑ **5=20"W x 6"H orifice** (Controls 0.00 cfs)

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165 Oliphant Warehouse Proposed
Type III 24-hr 1 YEAR Rainfall=2.80"

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Summary for Link 201: To rear

Inflow Area = 1.388 ac, 84.97% Impervious, Inflow Depth > 0.66" for 1 YEAR event
Inflow = 1.29 cfs @ 12.23 hrs, Volume= 0.076 af
Primary = 1.29 cfs @ 12.23 hrs, Volume= 0.076 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Subcatchment 201A:

Runoff = 4.69 cfs @ 12.07 hrs, Volume= 0.350 af, Depth> 4.32"
Routed to Pond D-1 : Stone Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YEAR Rainfall=4.90"

	Area (sf)	CN	Description
*	17,313	98	Pavement
	5,245	74	>75% Grass cover, Good, HSG C
*	2,536	98	Offsite Pavement
*	17,235	98	Building
	42,329	95	Weighted Average
	5,245	74	12.39% Pervious Area
	37,084	98	87.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Subcatchment 201B: Stone area

Runoff = 1.63 cfs @ 12.07 hrs, Volume= 0.127 af, Depth> 4.66"
Routed to Pond D-1 : Stone Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YEAR Rainfall=4.90"

	Area (sf)	CN	Description
*	14,282	98	Stone area (98% capture)
	14,282	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Subcatchment 201C: Uncaptured

Runoff = 0.24 cfs @ 12.08 hrs, Volume= 0.017 af, Depth> 2.28"
Routed to Link 201 : To rear

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YEAR Rainfall=4.90"

	Area (sf)	CN	Description
	3,841	74	>75% Grass cover, Good, HSG C
	3,841	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Subcatchment 202: To southeast abuttter

Runoff = 0.37 cfs @ 12.07 hrs, Volume= 0.025 af, Depth> 2.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 YEAR Rainfall=4.90"

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Area (sf)	CN	Description
3,905	74	>75% Grass cover, Good, HSG C
* 298	98	Offsite pavement
* 672	98	Concrete
4,875	79	Weighted Average
3,905	74	80.10% Pervious Area
970	98	19.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Pond D-1: Stone Storage

Inflow Area = 1.300 ac, 90.74% Impervious, Inflow Depth > 4.40" for 10 YEAR event
 Inflow = 6.32 cfs @ 12.07 hrs, Volume= 0.477 af
 Outflow = 3.80 cfs @ 12.16 hrs, Volume= 0.469 af, Atten= 40%, Lag= 5.6 min
 Discarded = 0.31 cfs @ 12.16 hrs, Volume= 0.251 af
 Primary = 3.50 cfs @ 12.16 hrs, Volume= 0.217 af
 Routed to Link 201 : To rear

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 146.86' @ 12.16 hrs Surf.Area= 12,954 sf Storage= 5,283 cf
 Flood Elev= 148.00' Surf.Area= 14,282 sf Storage= 10,454 cf

Plug-Flow detention time= 73.3 min calculated for 0.469 af (98% of inflow)
 Center-of-Mass det. time= 62.5 min (824.4 - 761.9)

Volume	Invert	Avail.Storage	Storage Description
#1	144.50'	10,454 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 31,679 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.50	150	0	0
144.60	805	48	48
145.00	1,848	531	578
146.00	9,550	5,699	6,277
147.00	13,486	11,518	17,795
148.00	14,282	13,884	31,679

Device	Routing	Invert	Outlet Devices
#1	Discarded	144.50'	1.027 in/hr Exfiltration over Surface area
#2	Primary	146.00'	4.0" Vert. (5) 4" PVC Outlets to grade X 6.00 C= 0.600 Limited to weir flow at low heads
#3	Device 4	146.50'	20.0" W x 6.0" H Vert. 20"W x 6"H orifice C= 0.600 Limited to weir flow at low heads
#4	Primary	145.25'	8.0" Round (2) 8" ADS X 2.00 L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 145.25' / 145.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#5	Device 6	146.75'	20.0" W x 6.0" H Vert. 20"W x 6"H orifice C= 0.600 Limited to weir flow at low heads
#6	Primary	145.25'	8.0" Round (2) 8" ADS X 2.00 L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 145.25' / 145.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Discarded OutFlow Max=0.31 cfs @ 12.16 hrs HW=146.86' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.31 cfs)

Primary OutFlow Max=3.49 cfs @ 12.16 hrs HW=146.86' (Free Discharge)
 ↑ **2=(5) 4" PVC Outlets to grade** (Orifice Controls 2.11 cfs @ 4.02 fps)
 ↓ **4=(2) 8" ADS** (Passes 1.18 cfs of 3.80 cfs potential flow)
 ↑ **3=20"W x 6"H orifice** (Orifice Controls 1.18 cfs @ 1.94 fps)
 ↓ **6=(2) 8" ADS** (Passes 0.21 cfs of 3.80 cfs potential flow)
 ↑ **5=20"W x 6"H orifice** (Orifice Controls 0.21 cfs @ 1.09 fps)

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165 Oliphant Warehouse Proposed
Type III 24-hr 10 YEAR Rainfall=4.90"

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Summary for Link 201: To rear

Inflow Area = 1.388 ac, 84.97% Impervious, Inflow Depth > 2.02" for 10 YEAR event
Inflow = 3.66 cfs @ 12.16 hrs, Volume= 0.234 af
Primary = 3.66 cfs @ 12.16 hrs, Volume= 0.234 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs

Summary for Subcatchment 201A:

Runoff = 8.41 cfs @ 12.07 hrs, Volume= 0.647 af, Depth> 7.99"
Routed to Pond D-1 : Stone Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YEAR Rainfall=8.60"

Area (sf)	CN	Description
* 17,313	98	Pavement
5,245	74	>75% Grass cover, Good, HSG C
* 2,536	98	Offsite Pavement
* 17,235	98	Building
42,329	95	Weighted Average
5,245	74	12.39% Pervious Area
37,084	98	87.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Subcatchment 201B: Stone area

Runoff = 2.87 cfs @ 12.07 hrs, Volume= 0.228 af, Depth> 8.35"
Routed to Pond D-1 : Stone Storage

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YEAR Rainfall=8.60"

Area (sf)	CN	Description
* 14,282	98	Stone area (98% capture)
14,282	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Subcatchment 201C: Uncaptured

Runoff = 0.58 cfs @ 12.07 hrs, Volume= 0.040 af, Depth> 5.46"
Routed to Link 201 : To rear

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YEAR Rainfall=8.60"

Area (sf)	CN	Description
3,841	74	>75% Grass cover, Good, HSG C
3,841	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Subcatchment 202: To southeast abuttter

Runoff = 0.81 cfs @ 12.07 hrs, Volume= 0.057 af, Depth> 6.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 YEAR Rainfall=8.60"

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Area (sf)	CN	Description
3,905	74	>75% Grass cover, Good, HSG C
* 298	98	Offsite pavement
* 672	98	Concrete
4,875	79	Weighted Average
3,905	74	80.10% Pervious Area
970	98	19.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Pond D-1: Stone Storage

Inflow Area = 1.300 ac, 90.74% Impervious, Inflow Depth > 8.08" for 100 YEAR event
 Inflow = 11.28 cfs @ 12.07 hrs, Volume= 0.876 af
 Outflow = 7.97 cfs @ 12.14 hrs, Volume= 0.854 af, Atten= 29%, Lag= 4.3 min
 Discarded = 0.33 cfs @ 12.14 hrs, Volume= 0.332 af
 Primary = 7.65 cfs @ 12.14 hrs, Volume= 0.523 af
 Routed to Link 201 : To rear

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 147.29' @ 12.14 hrs Surf.Area= 13,715 sf Storage= 7,162 cf
 Flood Elev= 148.00' Surf.Area= 14,282 sf Storage= 10,454 cf

Plug-Flow detention time= 59.3 min calculated for 0.854 af (98% of inflow)
 Center-of-Mass det. time= 43.9 min (794.1 - 750.2)

Volume	Invert	Avail.Storage	Storage Description
#1	144.50'	10,454 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 31,679 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.50	150	0	0
144.60	805	48	48
145.00	1,848	531	578
146.00	9,550	5,699	6,277
147.00	13,486	11,518	17,795
148.00	14,282	13,884	31,679

Device	Routing	Invert	Outlet Devices
#1	Discarded	144.50'	1.027 in/hr Exfiltration over Surface area
#2	Primary	146.00'	4.0" Vert. (5) 4" PVC Outlets to grade X 6.00 C= 0.600 Limited to weir flow at low heads
#3	Device 4	146.50'	20.0" W x 6.0" H Vert. 20"W x 6"H orifice C= 0.600 Limited to weir flow at low heads
#4	Primary	145.25'	8.0" Round (2) 8" ADS X 2.00 L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 145.25' / 145.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#5	Device 6	146.75'	20.0" W x 6.0" H Vert. 20"W x 6"H orifice C= 0.600 Limited to weir flow at low heads
#6	Primary	145.25'	8.0" Round (2) 8" ADS X 2.00 L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 145.25' / 145.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Discarded OutFlow Max=0.33 cfs @ 12.14 hrs HW=147.29' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.33 cfs)

Primary OutFlow Max=7.65 cfs @ 12.14 hrs HW=147.29' (Free Discharge)
 ↑ **2=(5) 4" PVC Outlets to grade** (Orifice Controls 2.67 cfs @ 5.10 fps)
 ↓ **4=(2) 8" ADS** (Passes 2.91 cfs of 4.39 cfs potential flow)
 ↑ **3=20"W x 6"H orifice** (Orifice Controls 2.91 cfs @ 3.50 fps)
 ↓ **6=(2) 8" ADS** (Passes 2.07 cfs of 4.39 cfs potential flow)
 ↑ **5=20"W x 6"H orifice** (Orifice Controls 2.07 cfs @ 2.48 fps)

Summary for Link 201: To rear

Inflow Area = 1.388 ac, 84.97% Impervious, Inflow Depth > 4.87" for 100 YEAR event
Inflow = 8.09 cfs @ 12.13 hrs, Volume= 0.563 af
Primary = 8.09 cfs @ 12.13 hrs, Volume= 0.563 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs



APPENDIX E SUPPLEMENTARY CALCULATIONS



Minimum Standard 3: Water Quality

Project: 21272.0 165 Oliphant Storage

Stone Storage D-1 Water Quality Volume Calculations:

Pavement =	0.397	ac	
Roof =	0.396	ac	
Offsite Impervious =	0.058	ac	
Site Impervious Area:	0.793	ac	
Tot. Impervious Area:	0.851	ac	WQ_R: 3,089 cf

Total Volume below outlet per HydroCAD = 1,896 cf

Total Volume infiltrated in a WQ Storm = 4,225 cf
(1.2" Split Pervious Method)



Minimum Standard 2: Groundwater Recharge
Project: 21272.0 165 Oliphant Storage

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

Impervious Area*: 37,070 sf **F =** 0.25

$$WRec_v = (\text{Impervious Area}) / 12 \times F$$

$$WRec_v = 772 \text{ cf}$$

Volume of Infiltration for a WQ storm:** 4,225 cf

* Summarized from HydroCAD Report

** As shown in the HydroCAD analysis for the 1.2" WQ storm (24-hr)



Pollutant Loading Analysis

The following method for Pollutant Loading Analysis (PLA) Calculations has been developed from the Rhode Island Stormwater Design and Installation Standards Manual (RISDISM), Appendix H.3.

Stormwater pollutant export load (L, in pounds or billion colonies) from a developed site can be determined by solving the following equation.

(Eq 1) $L = [(P)(P_j)(R_v)/12](C)(A)(2.72)$

Where:

- P = rainfall depth in inches (from Figure H-8 from Appendix H.3 of the RISDISM)
- P_j = rainfall correction factor
- R_v = runoff coefficient expressing the fraction of rainfall converted to runoff
- C = flow weighted mean concentration of the pollutant in urban runoff (mg/L)
- A = contributing drainage area of development site (acres)

For bacteria, the conversion factor is modified, so the loading equation is:

(Eq 1a) $L = 1.03(10^{-3})(P)(P_j)(R_v)](C')(A)$

Where:

- P = rainfall depth in inches (from Figure H-8 from Appendix H.3 of the RISDISM)
- P_j = rainfall correction factor
- R_v = runoff coefficient expressing the fraction of rainfall converted to runoff
- C' = flow weighted mean of bacteria concentration (#col/100 mL)
- A = contributing drainage area of development site (acres)

The runoff coefficient R_v can be determined from the following equation:

(Eq 2) $R_v = 0.05 + 0.009(\%I)$

Where:

- %I = percent of the site imperviousness

Site:	165 Oliphant Warehouse and Storage	
Contributing Site Area (ac):	1.394	
Pollutant Assessed:	Bacteria (fecal coliform)	
Rainfall Depth (P):	47	(from Figure H-8 of the RISDISM)
Rainfall Correction Factor (P_j):	0.9	(use 0.9)
C or C' (as applicable):	varies	(from Table H-2 of the RISDISM)
Area of Existing Impervious (ac):	0.408	
Existing Percent Impervious:	29.27%	
Area of Proposed Impervious:	0.866	
Proposed Percent Impervious:	62.12%	
Existing Conditions (L) =	81	Billion Colonies/year
Proposed Conditions (L) =	13	Billion Colonies/year
Total Pollutant Load Attributed to Improvements =	-68	Billion Colonies/year



Pollutant Loading Analysis (Bacteria)

Project: 165 Oliphant Storage **Rainfall Depth (P):** 47 (from Figure H-8 of the RISDISM)
Job Number: 21272.0 **Rainfall Correction Factor (P_J):** 0.9
Date: 29-Sep-22 **Pollutant Load (L):** = 1.03(10⁻³)(P)(P_J)(RV)](C')(A)

Existing Area Loading Calculations

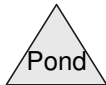
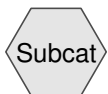
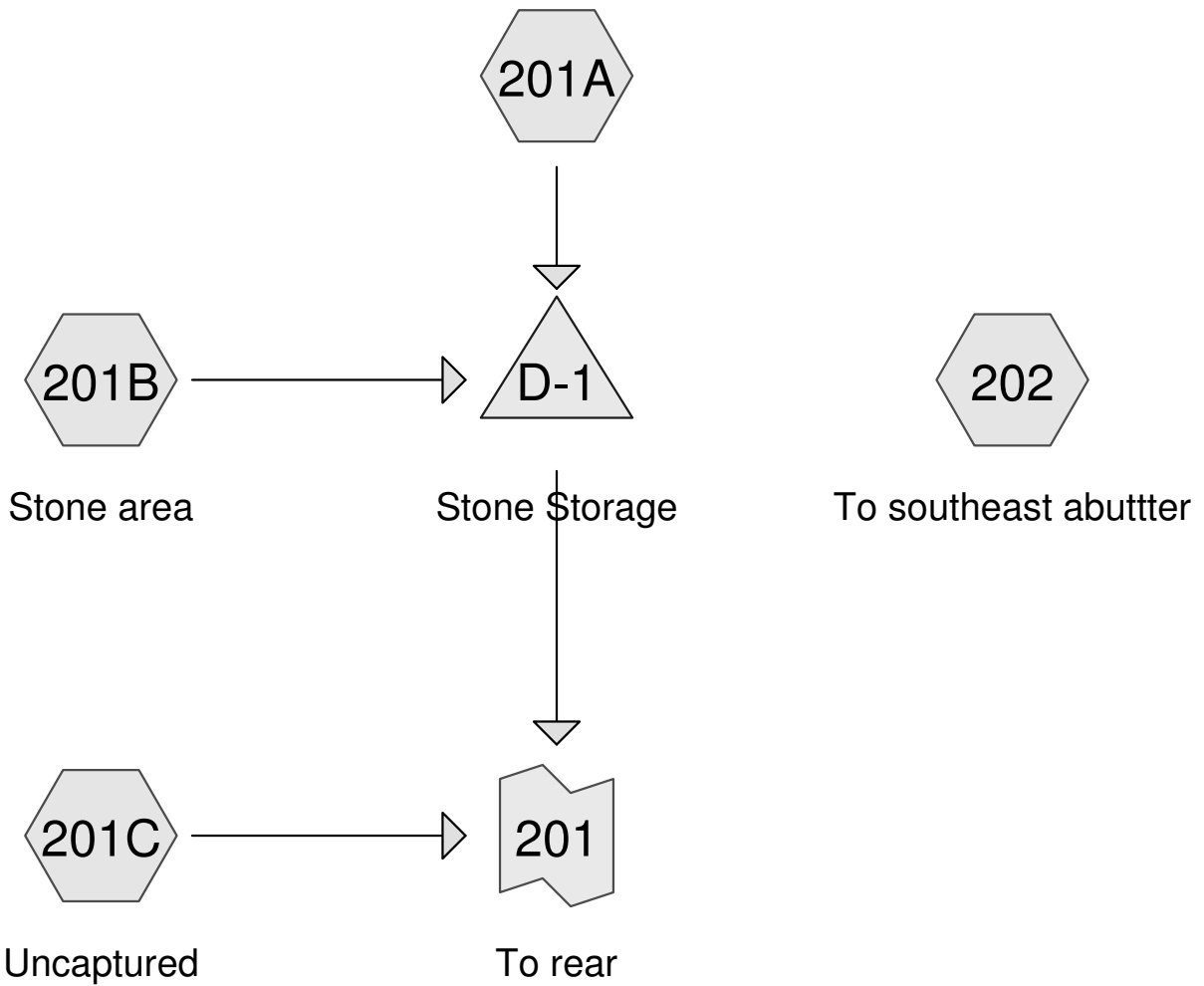
Area Description	A = Area (ac)	Impervious Area (ac)	Percent Impervious (I%)	R _v = 0.05 + (0.009 X I%)	1.03 X 10 ⁻³ X P X P _J =	C = Loading Rate	L = Load (bc/y)	Treatment % from BMPs	FL = Final Load after Treatment (bc/y)
(1) Area (Developed)	0.725	0.408	56.3%	0.5565	0.0436	4600	80.9	0%	80.9
(2) Area (Undeveloped)	0.669	0.000	0.0%	0.0500	0.0436	300	0.4	0%	0.4
(3) Totals:	1.394	0.408					81.3		81.3

Proposed Loading Calculations

Area Description	A = Area (ac)	Impervious Area (ac)	Percent Impervious (I%)	R _v = 0.05 + (0.009 X I%)	1.03 X 10 ⁻³ X P X P _J =	C = Loading Rate	L = Load (bc/y)	Treatment % from BMPs	FL = Final Load after Treatment (bc/y)
(4) Onsite to D-1	1.202	0.793	66.0%	0.6438	0.0436	4600	155.1	95%	7.8
(5) Onsite (untreated)	0.192	0.015	7.8%	0.1203	0.0436	4600	4.6	0%	4.6
(6) Offsite to D-1	0.098	0.058	59.2%	0.5827	0.0436	4600	11.4	95%	0.6
(7) Totals:	1.492	0.866					171.2		13.0



APPENDIX F WQ STORM ANALYSIS (SPLIT PERVIOUS METHOD)



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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.298	74	>75% Grass cover, Good, HSG C (201A, 201C, 202)
0.396	98	Building (201A)
0.015	98	Concrete (202)
0.058	98	Offsite Pavement (201A)
0.007	98	Offsite pavement (202)
0.397	98	Pavement (201A)
0.328	98	Stone area (98% capture) (201B)

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Summary for Subcatchment 201A:Runoff = 0.97 cfs @ 12.07 hrs, Volume= 0.070 af, Depth> 0.87"
Routed to Pond D-1 : Stone StorageRunoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Rainfall=1.20"

	Area (sf)	CN	Description
*	17,313	98	Pavement
	5,245	74	>75% Grass cover, Good, HSG C
*	2,536	98	Offsite Pavement
*	17,235	98	Building
	42,329	95	Weighted Average
	5,245	74	12.39% Pervious Area
	37,084	98	87.61% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Subcatchment 201B: Stone areaRunoff = 0.37 cfs @ 12.07 hrs, Volume= 0.027 af, Depth> 0.98"
Routed to Pond D-1 : Stone StorageRunoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Rainfall=1.20"

	Area (sf)	CN	Description
*	14,282	98	Stone area (98% capture)
	14,282	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Subcatchment 201C: UncapturedRunoff = 0.00 cfs @ 12.40 hrs, Volume= 0.000 af, Depth> 0.06"
Routed to Link 201 : To rearRunoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Rainfall=1.20"

	Area (sf)	CN	Description
	3,841	74	>75% Grass cover, Good, HSG C
	3,841	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Subcatchment 202: To southeast abuttter

Runoff = 0.03 cfs @ 12.07 hrs, Volume= 0.002 af, Depth> 0.25"

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ Rainfall=1.20"

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Area (sf)	CN	Description
3,905	74	>75% Grass cover, Good, HSG C
* 298	98	Offsite pavement
* 672	98	Concrete
4,875	79	Weighted Average
3,905	74	80.10% Pervious Area
970	98	19.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					Direct Entry, Minimum

Summary for Pond D-1: Stone Storage

Inflow Area = 1.300 ac, 90.74% Impervious, Inflow Depth > 0.90" for WQ event
 Inflow = 1.34 cfs @ 12.07 hrs, Volume= 0.097 af
 Outflow = 0.20 cfs @ 12.55 hrs, Volume= 0.097 af, Atten= 85%, Lag= 28.6 min
 Discarded = 0.20 cfs @ 12.55 hrs, Volume= 0.097 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
 Routed to Link 201 : To rear

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs
 Peak Elev= 145.87' @ 12.55 hrs Surf.Area= 8,540 sf Storage= 1,680 cf
 Flood Elev= 148.00' Surf.Area= 14,282 sf Storage= 10,454 cf

Plug-Flow detention time= 91.8 min calculated for 0.097 af (100% of inflow)
 Center-of-Mass det. time= 90.7 min (872.7 - 781.9)

Volume	Invert	Avail.Storage	Storage Description
#1	144.50'	10,454 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 31,679 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
144.50	150	0	0
144.60	805	48	48
145.00	1,848	531	578
146.00	9,550	5,699	6,277
147.00	13,486	11,518	17,795
148.00	14,282	13,884	31,679

Device	Routing	Invert	Outlet Devices
#1	Discarded	144.50'	1.027 in/hr Exfiltration over Surface area
#2	Primary	146.00'	4.0" Vert. (5) 4" PVC Outlets to grade X 6.00 C= 0.600 Limited to weir flow at low heads
#3	Device 4	146.50'	20.0" W x 6.0" H Vert. 20"W x 6"H orifice C= 0.600 Limited to weir flow at low heads
#4	Primary	145.25'	8.0" Round (2) 8" ADS X 2.00 L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 145.25' / 145.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf
#5	Device 6	146.75'	20.0" W x 6.0" H Vert. 20"W x 6"H orifice C= 0.600 Limited to weir flow at low heads
#6	Primary	145.25'	8.0" Round (2) 8" ADS X 2.00 L= 5.0' Ke= 0.500 Inlet / Outlet Invert= 145.25' / 145.00' S= 0.0500 '/' Cc= 0.900 n= 0.012, Flow Area= 0.35 sf

Discarded OutFlow Max=0.20 cfs @ 12.55 hrs HW=145.87' (Free Discharge)
 ↑ **1=Exfiltration** (Exfiltration Controls 0.20 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=144.50' (Free Discharge)
 ↑ **2=(5) 4" PVC Outlets to grade** (Controls 0.00 cfs)
 ↑ **4=(2) 8" ADS** (Controls 0.00 cfs)
 ↑ **3=20"W x 6"H orifice** (Controls 0.00 cfs)
 ↑ **6=(2) 8" ADS** (Controls 0.00 cfs)
 ↑ **5=20"W x 6"H orifice** (Controls 0.00 cfs)

Summary for Link 201: To rear

Inflow Area = 1.388 ac, 84.97% Impervious, Inflow Depth > 0.00" for WQ event
Inflow = 0.00 cfs @ 12.40 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 12.40 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.01 hrs



APPENDIX G SOIL EVALUATIONS



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment Systems Program



Site Evaluation Form
Part A - Soil Profile Description

Application Number N/A (Stormwater design only)

Property Owner:

Property Location: 165 Oliphant Lane, Middletown, Rhode Island

Date of Test Hole: October 22, 2021

Soil Evaluator: Edward J. Avizinis, CPSS, PWS License Number: D4083

Weather: Partly Cloudy - 70 Shaded: Yes No Time: 9am

Table with 11 columns: TH 1 Horizon, Depth, Horizon Boundaries (Dist, Topo), Soil Colors (Matrix, Re-Dox Features), Re-Dox (Ab. S. Contr.), Texture, Structure, Consistence, Soil Category. It contains two main sections for TH 1 and TH 2 horizons with multiple rows of soil profile data.

TH 1 Soil Class B/A Total Depth 96 Impervious/Limiting Layer Depth >96 (og) GW Seepage Depth N/A SHWT 33" (og)

TH 2 Soil Class B/A Total Depth 96 Impervious/Limiting Layer Depth >96 (og) GW Seepage Depth N/A SHWT 31" (og)

Comments:



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment Systems Program



Site Evaluation Form
Part A - Soil Profile Description Application Number Drainage THs

Property Owner: Sisyphus Holdings LLC
Property Location: 165 Oliphant Lane, Middletown (A.P. 111, Lot 61A)
Date of Test Hole: September 13, 2022
Soil Evaluator: Daniel Welch License Number: D4094
Weather: Overcast/Rain, 70°F Shaded: Yes No Time: 4:00pm

Table with 11 columns: TH Horizon, Depth, Horizon Boundaries (Dist, Topo), Soil Colors (Matrix, Re-Dox Features), Re-Dox (Ab., S., Contr.), Texture, Structure, Consistence, Soil Category. Contains data for TH 3 and TH 4 horizons.

TH 3 Soil Class A Total Depth 96" Impervious/Limiting Layer Depth N/R (og) GW Seepage Depth N/A SHWT 17" (og)
TH 4 Soil Class A Total Depth 96" Impervious/Limiting Layer Depth N/R (og) GW Seepage Depth N/A SHWT 18" (og)

Comments:





Part B

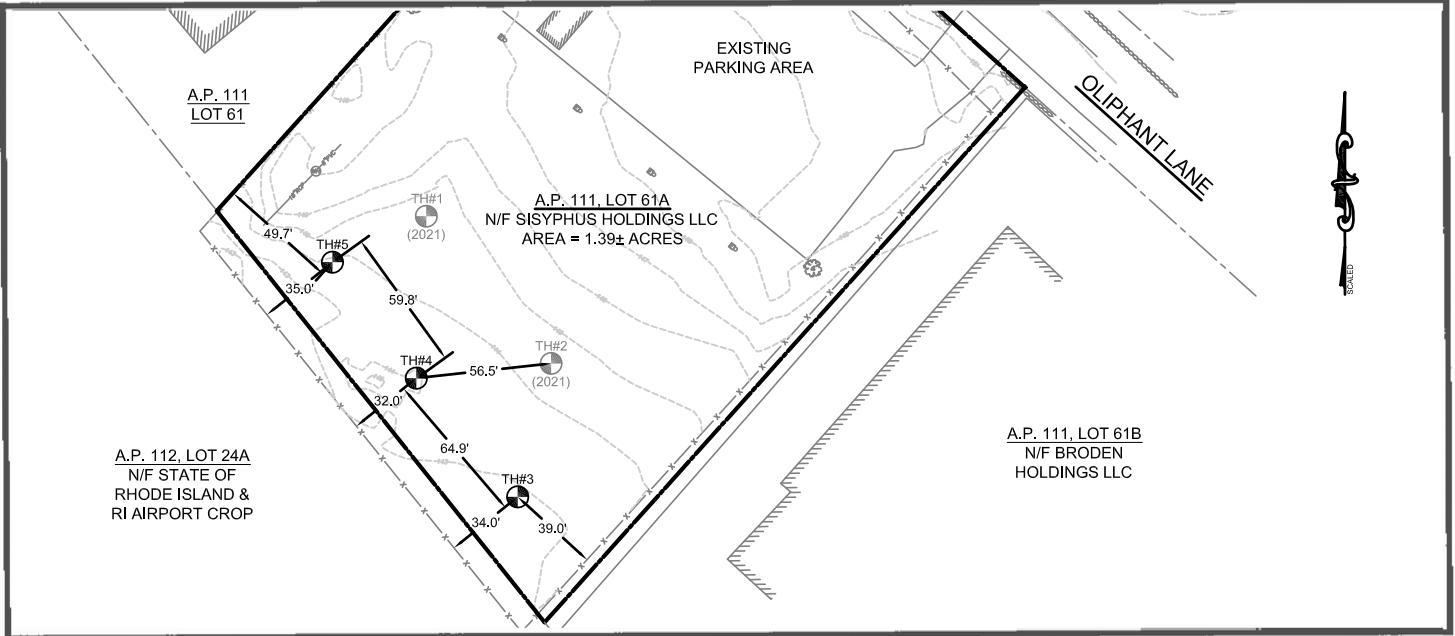
Site Evaluation – to be completed by Soil Evaluator or Class II or III Designer

Please use the area below to locate:

1. Test holes and bedrock test holes,
 2. Approximate direction of due north,
 3. Offsets from all test holes to fixed points such as street, utility pole, or other permanent, marked object.*
- *OFFSETS MUST BE SHOWN**

Key:

-  Approximate location of test holes
-  Approximate location of bedrock test holes
-  Estimated gradient and direction of slope
-  Approximate direction of due north



1. Relief and Slope: 2-10%
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes? If yes, locate on above sketch. NO YES
3. Restrictive Layer or Bedrock within 4' below original ground within 25 feet of test hole? Provide all test hole locations & depths above. NO YES
4. Presence of existing or proposed private drinking water wells within 200 feet of test holes? If yes, locate on above sketch. NO YES
5. Public drinking water wells within 500 feet of test holes? If yes, locate on above sketch. NO YES
6. Is site within the watershed of a public drinking water reservoir or other critical area defined in Rule 6.42? NO YES
7. Has soil been excavated from or fill deposited on site? If yes, locate on above sketch. NO YES
8. Site's potential for flooding or ponding: NONE SLIGHT MODERATE SEVERE
9. Landscape position: Backslope
10. Vegetation: Underbrush
11. Indicate approximate location of property lines and roadways.
12. Additional comments, site constraints or additional information regarding site: _____

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: Daniel Welch D4094 Part B prepared by: Daniel Welch D4094
Signature License # Signature License #

DO NOT WRITE IN THIS SPACE

Witnessed Soil Evaluation Decision: Concur Inconclusive Disclaim

Unwitnessed Soil Evaluations Decision: Accept Inconclusive Disclaim

Wet Season Determination required Additional Field Review Required

Explanation: _____

Signature Authorized Agent Date



STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS

Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment Systems Program



Site Evaluation Form
Part A - Soil Profile Description

Application Number Drainage THs

Property Owner: Sisyphus Holdings LLC

Property Location: 165 Oliphant Lane, Middletown (A.P. 111, Lot 61A)

Date of Test Hole: September 13, 2022

Soil Evaluator: Daniel Welch License Number: D4094

Weather: Overcast/Rain, 70°F Shaded: Yes No Time: 4:00pm

Table with 11 columns: TH Horizon, Depth, Horizon Boundaries (Dist, Topo), Soil Colors (Matrix, Re-Dox Features), Re-Dox (Ab., S., Contr.), Texture, Structure, Consistence, Soil Category. Rows include Ap, Bw1, Bw2, Cdg.

TH 5 Soil Class A Total Depth 96" Impervious/Limiting Layer Depth N/R (og) GW Seepage Depth N/A SHWT 16" (og)

TH Soil Class Total Depth Impervious/Limiting Layer Depth (og) GW Seepage Depth SHWT (og)

Comments:





Part B

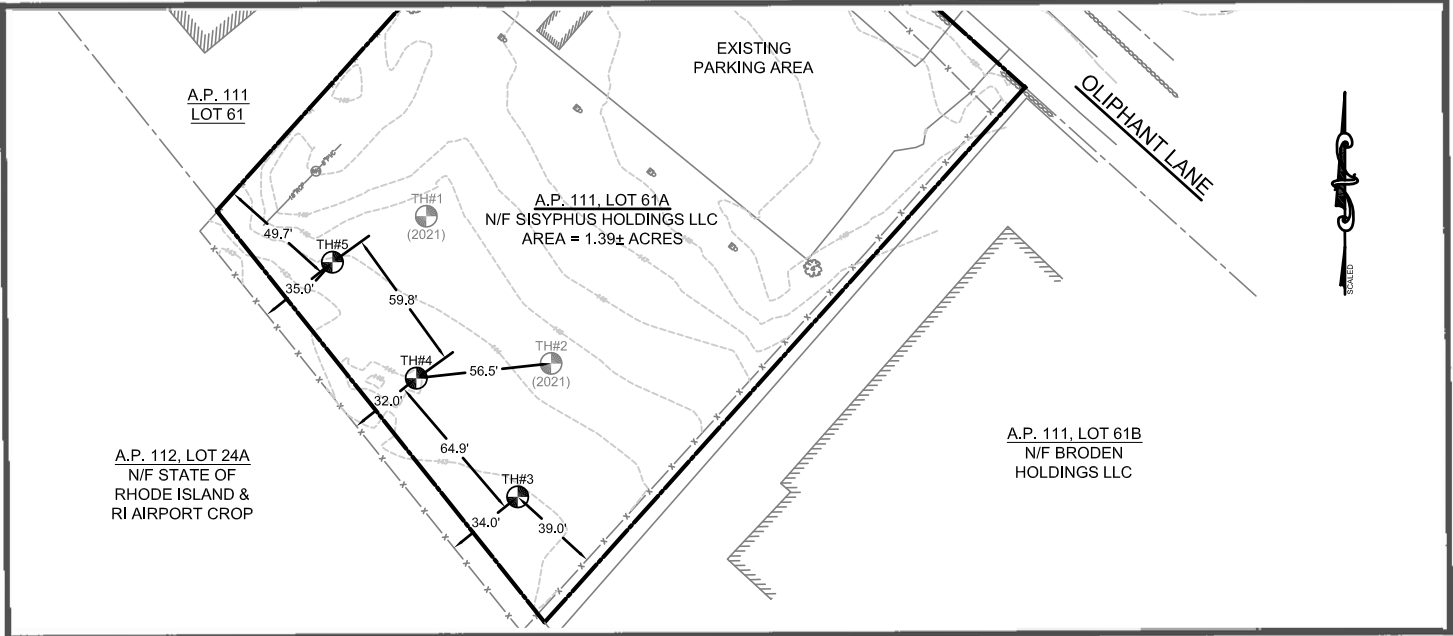
Site Evaluation – to be completed by Soil Evaluator or Class II or III Designer

Please use the area below to locate:

1. Test holes and bedrock test holes,
 2. Approximate direction of due north,
 3. Offsets from all test holes to fixed points such as street, utility pole, or other permanent, marked object.*
- *OFFSETS MUST BE SHOWN**

Key:

-  Approximate location of test holes
-  Approximate location of bedrock test holes
-  Estimated gradient and direction of slope
-  Approximate direction of due north



1. Relief and Slope: 2-10%
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes? If yes, locate on above sketch. NO YES
3. Restrictive Layer or Bedrock within 4' below original ground within 25 feet of test hole? Provide all test hole locations & depths above. NO YES
4. Presence of existing or proposed private drinking water wells within 200 feet of test holes? If yes, locate on above sketch. NO YES
5. Public drinking water wells within 500 feet of test holes? If yes, locate on above sketch. NO YES
6. Is site within the watershed of a public drinking water reservoir or other critical area defined in Rule 6.42? NO YES
7. Has soil been excavated from or fill deposited on site? If yes, locate on above sketch. NO YES
8. Site's potential for flooding or ponding: NONE SLIGHT MODERATE SEVERE
9. Landscape position: Backslope
10. Vegetation: Underbrush
11. Indicate approximate location of property lines and roadways.
12. Additional comments, site constraints or additional information regarding site: _____

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: Daniel Welch D4094 Part B prepared by: Daniel Welch D4094
Signature License # Signature License #

DO NOT WRITE IN THIS SPACE

Witnessed Soil Evaluation Decision: Concur Inconclusive Disclaim

Unwitnessed Soil Evaluations Decision: Accept Inconclusive Disclaim

Wet Season Determination required Additional Field Review Required

Explanation: _____

Signature Authorized Agent Date



APPENDIX H RISDISM STORMWATER CHECKLIST (APPENDIX A)

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

PROJECT NAME: 165 Oliphant Warehouse	(RIDEM USE ONLY)
TOWN: Middletown RI	STW/WQC File #:
BRIEF PROJECT DESCRIPTION: Construction of a 17k sf warehouse on a partially vacant property with associated parking, utilities, stormwater controls, and outdoor storage.	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 checked="" type="checkbox"/> Commercial	<input type="checkbox"/> Federal	<input type="checkbox"/> Retrofit	<input type="checkbox"/> Restoration
<input type="checkbox"/> Road	<input 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 type="checkbox"/> Surface Water	<input type="checkbox"/> MS4
<input type="checkbox"/> GAA	<input type="checkbox"/> Isolated Wetland	<input type="checkbox"/> RIDOT
<input checked="" type="checkbox"/> GA	<input type="checkbox"/> Named Waterbody	<input type="checkbox"/> RIDOT Alteration Permit is Approved
<input 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: Bailey Brook	<input type="checkbox"/> Coldwater <input type="checkbox"/> Warmwater <input type="checkbox"/> Unassessed
<input checked="" type="checkbox"/> Waterbody ID: RI0007035R-01	<input type="checkbox"/> 4 th order stream of pond 50 acres or more
<input checked="" type="checkbox"/> TMDL for: Enterococcus	<input type="checkbox"/> Watershed of flood prone river (e.g., Pocasset River)
<input checked="" type="checkbox"/> Contributes to a priority outfall listed in the TMDL	<input type="checkbox"/> Contributes stormwater to a public beach
<input checked="" type="checkbox"/> 303(d) list – Impairment(s) for: enterococcus, phosphorus, Lead	<input type="checkbox"/> 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		
<input type="checkbox"/> RIDEM Pre- Application Meeting	Meeting Date:	<input type="checkbox"/> Minutes Attached
<input type="checkbox"/> Municipal Master Plan Approval	Approval Date:	<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		
<input checked="" type="checkbox"/> 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		
<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 checked="" type="checkbox"/> Project area is not within 100-year floodplain as defined by RIDEM		

CRMC JURISDICTION
<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 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 type="checkbox"/> Environmental Land Usage Restriction (ELUR)		
<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.		
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		

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

<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): 0.408 acres	
<input checked="" type="checkbox"/>	Total Site Area (TSA) 1.394 acres	
<input checked="" type="checkbox"/>	Jurisdictional Wetlands (JW) 0.00 acres	
<input checked="" type="checkbox"/>	Conservation Land (CL) 0.00 acres	
<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) = 1.394 acres	
<input checked="" type="checkbox"/>	(TIA) / (SS) < 0.4 ?	<input type="checkbox"/> (TIA) / (SS) > 0.4?
<input type="checkbox"/> YES, Redevelopment		

PART 2. LOW IMPACT DEVELOPMENT ASSESSMENT – MINIMUM STANDARD 1

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)

<p>A) PRESERVATION OF UNDISTURBED AREAS, BUFFERS, AND FLOODPLAINS</p> <p><input type="checkbox"/> Sensitive resource areas and site constraints are identified (required)</p> <p><input checked="" type="checkbox"/> Local development regulations have been reviewed (required)</p> <p><input type="checkbox"/> All vegetated buffers and coastal and freshwater wetlands will be protected during and after construction</p> <p><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</p> <p><input type="checkbox"/> As much natural vegetation and pre-development hydrology as possible has been maintained</p>	No sensitive areas or buffers present on site.
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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 type="checkbox"/> Development sites and building envelopes have been appropriately distanced from wetlands and waterbodies <input type="checkbox"/> Development and stormwater systems have been located in areas with greatest infiltration capacity (e.g., soil groups A and B) <input 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 checked="" 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>No type A or B soils located on site.</p> <p>Minimal steep slopes are present on site.</p>
<p>C) MINIMIZE CLEARING AND GRADING</p> <ul style="list-style-type: none"> <input 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 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>Minimal earth (non-crushed stone) fill required.</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 checked="" 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>Parking is limited per zoning. Outdoor storage area is pervious rather than additional impervious or gravel.</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>No QPAs possible due to mapped soils types.</p>
<p>F) MITIGATE RUNOFF AT THE POINT OF GENERATION</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Small-scale BMPs have been designated to treat runoff as close as possible to the source 	

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<p>G) PROVIDE LOW-MAINTENANCE NATIVE VEGETATION</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Low-maintenance landscaping has been proposed using native species and cultivars <input type="checkbox"/> Plantings of native trees and shrubs in areas previously cleared of native vegetation are shown on site plan <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>H) RESTORE STREAMS/WETLANDS</p> <ul style="list-style-type: none"> <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 <input type="checkbox"/> Removal of invasive species <input type="checkbox"/> Other 	N/A

PART 3. SUMMARY OF REMAINING STANDARDS

GROUNDWATER RECHARGE – MINIMUM STANDARD 2		
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 type="checkbox"/>	<input checked="" type="checkbox"/>	Is this site identified as a Regulated Facility in Part 1, Minimum Standard 8: LUHPPL Identification?
<input type="checkbox"/>	<input type="checkbox"/>	If “Yes,” has approval for infiltration by the OLRSM Site Project Manager, per Part 1, Minimum Standard 8, been requested?

TABLE 2-1: Summary of Recharge (see RISDISM Section 3.3.2)

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: Rear Abutter	0.851	772	0	772	4,225
DP-2: SE Abutter	0	0	0	0	0
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.):

Stormwater Report: Appendix E “Supplementary Calculations”

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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 checked="" 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 checked="" 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 checked="" type="checkbox"/>	<input type="checkbox"/>	If “Yes,” either TR-55 or TR-20 was used to calculate WQv; and,
<input 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 checked="" type="checkbox"/>	<input 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. BMPs have been designed in accordance with the manual. WQ provided exceeds that which is required. Downstream water body is impaired for bacteria per TMDL.
<input checked="" type="checkbox"/>	<input 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 checked="" type="checkbox"/>	<input type="checkbox"/>	BMPs are proposed that are on the approved technology list . If “Yes,” please provide all required worksheets from the manufacturer.
<input checked="" type="checkbox"/>	<input 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: Treatment provided for off-site impervious surfaces to compensate for pollutants generated by the development.

TABLE 3-1: Summary of Water Quality (see RICR 8.9)					
Design Point	Impervious area treated (ac)	Total WQ _v Required (cu ft)	LID Stormwater Credits (see RICR 8.18)	Water Quality Treatment Remaining (cu ft)	Water Quality Provided by BMPs (cu ft)
			WQ _v directed to a QPA (cu ft)		
DP-1: Rear abutter	0.851	3,089	0	3,089	4,225
DP-2: SE abutter	0	0	0	0	0
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.					
<input checked="" type="checkbox"/> YES	This project has met the setback requirements for each BMP.				
<input type="checkbox"/> NO	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, page numbers, appendices, etc.): Stormwater Report: Appendix E “Supplementary Calculations”				

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CONVEYANCE AND NATURAL CHANNEL PROTECTION (RICR 8.10) – MINIMUM STANDARD 4		
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). (<u>Note</u> : 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:

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OVERBANK FLOOD PROTECTION (RICR 8.11) AND OTHER POTENTIAL HIGH FLOWS – MINIMUM STANDARD 5		
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? 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 checked="" type="checkbox"/> HydroCAD <input type="checkbox"/> Bentley/Haestad <input type="checkbox"/> Intellisolve <input type="checkbox"/> Other (Specify):
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 checked="" type="checkbox"/>	<input type="checkbox"/>	Do off-site areas contribute to the sub-watersheds and design points? If "Yes,"
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Are the areas modeled as "present condition" for both pre- and post-development analysis?
<input checked="" 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 checked="" type="checkbox"/>	<input type="checkbox"/>	Calculate the following:
		<input checked="" type="checkbox"/> Area of disturbance within the sub-watershed (areas) 1.39 acres
		<input checked="" type="checkbox"/> Impervious cover (%) 60%
<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?

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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)
DP-1: Rear Abutter	0.49	0.00	1.40	1.29	4.12	3.66	9.52	8.09
DP-2: SE Abutter	0.04	0.03	0.15	0.14	0.39	0.37	0.84	0.81
DP-3:								
DP-4:								
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.	Stormwater Report Appendix C
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.	Stormwater Report Appendix D
Final sizing calculations for structural stormwater BMPs, including contributing drainage area, storage, and outlet configuration.	Stormwater Report Appendix E
Stage-storage, inflow and outflow hydrographs for storage facilities (e.g., detention, retention, or infiltration facilities).	n/a

Table 5-2 Summary of Best Management Practices

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)	Distance Provided
D-1	1	Infiltration	Y	4,225 cf	4,225 cf	N	N	N/A	Y		
		TOTALS:									

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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						Exfiltration Rate Applied (in/hr)
			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)	
			Primary	Secondary					
1	D-1	Infiltration	TH#1	TH#2	Varies	Varies	3	B/C	1.02
			TH#3	TH#5					
		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 type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Describe any LUHPPLs identified in Part 1, Minimum Standard 8, Section 2. If not applicable, continue to Minimum Standard 9.
<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.).

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	
<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)?

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SOIL EROSION AND SEDIMENT CONTROL (SESC) – MINIMUM STANDARD 10		
YES	NO	N/A
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
		<p>Have you included a Soil Erosion and Sediment Control Plan Set and/or Complete Construction Plan Set?</p> <p>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).</p> <p>If “No,” include a document with your submittal that addresses the following elements of an SESC Plan:</p>
		<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.).
<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:

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<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 checked="" type="checkbox"/>	<input 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 checked="" type="checkbox"/>	<input type="checkbox"/>	Regular sweeping? Please describe: (Sweeping of pavement recommended)
<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 type="checkbox"/>	<input checked="" 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).

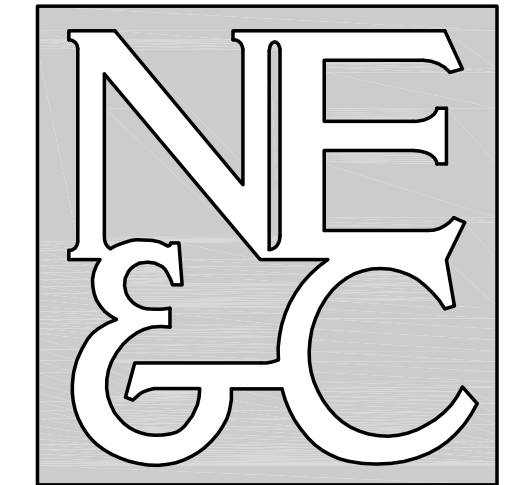
PART 4. SUBWATERSHED MAPPING AND SITE-PLAN DETAILS

Existing and Proposed Subwatershed Mapping (REQUIRED)		
YES	NO	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Existing and proposed drainage area delineations
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Locations of all streams and drainage swales
<input checked="" type="checkbox"/>	<input 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 checked="" type="checkbox"/>	<input type="checkbox"/>	Complete drainage area boundaries; include off-site areas in both mapping and analyses, as applicable
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Logs of borings and/or test pit investigations along with supporting soils/geotechnical report
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Mapped seasonal high-water-table test pit locations
<input checked="" type="checkbox"/>	<input 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 checked="" type="checkbox"/>	<input 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 checked="" type="checkbox"/>	<input type="checkbox"/>	Soils were logged by a:
	<input checked="" type="checkbox"/>	DEM-licensed Class IV soil evaluator Name: Ed Avizinis
	<input type="checkbox"/>	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: Rear abutter	RI0007035R-01	1.34	0.43	0.85
DP-2: SE abutter	RI0007035R-01	0.045	0.04	0.02
DP-3:				
TOTALS:		1.39	0.47	0.87

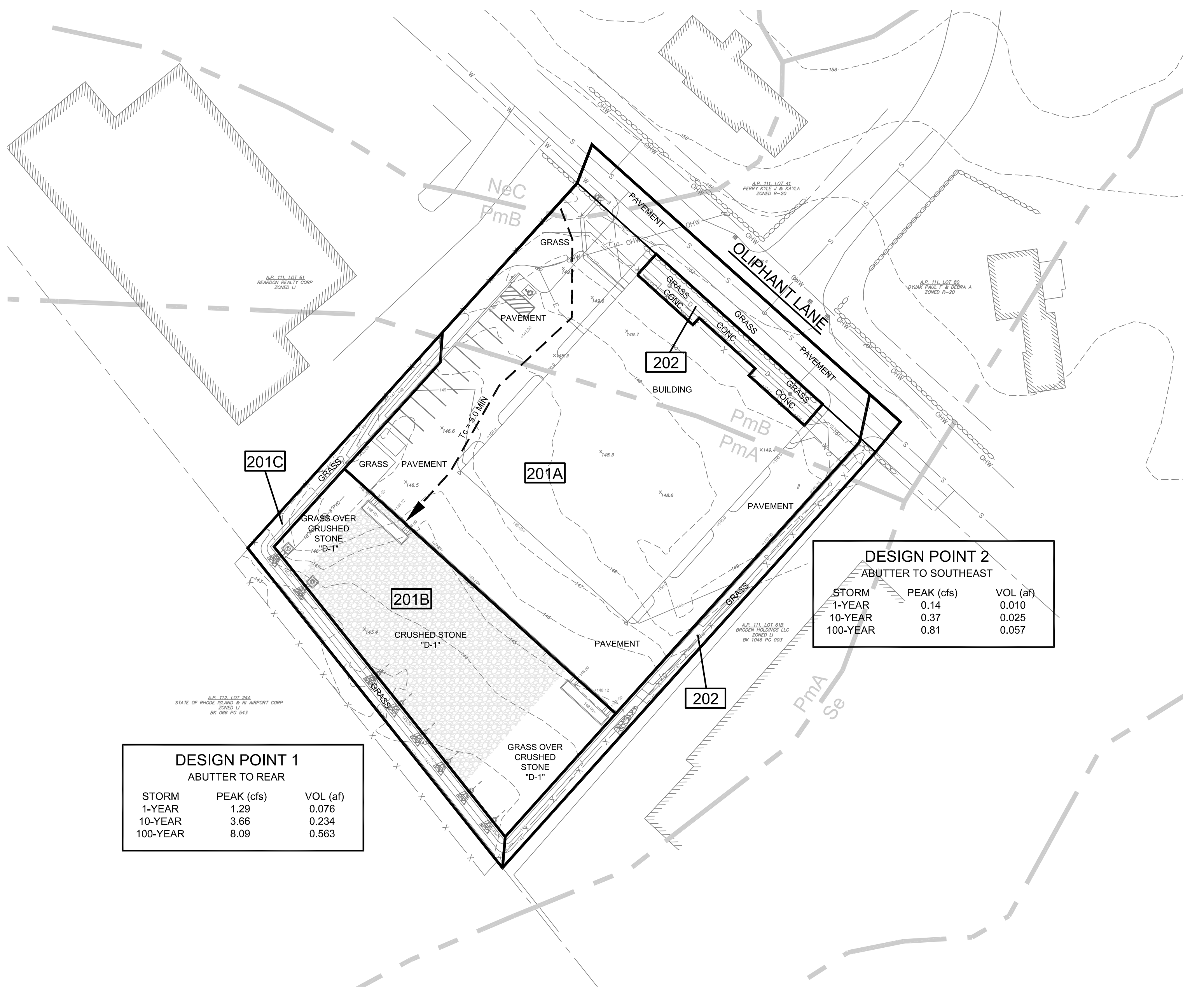
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Site Construction Plans (Indicate that the following applicable specifications are provided)		
YES	NO	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	Existing and proposed plans (scale not greater than 1" = 40') with North arrow
<input 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 checked="" type="checkbox"/>	<input 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 checked="" type="checkbox"/>	<input 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-approv ed 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



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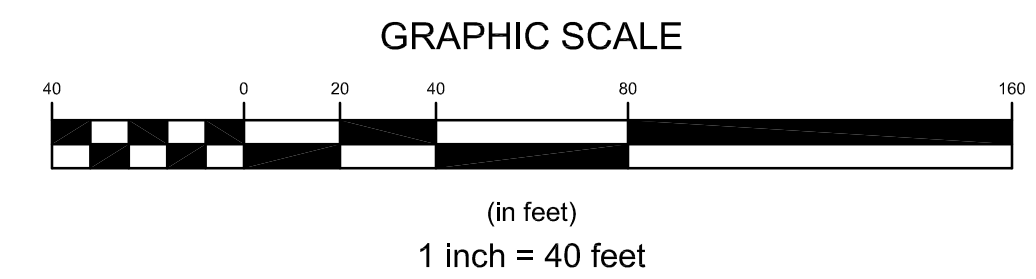


DESIGN POINT 1
ABUTTER TO REAR

STORM	PEAK (cfs)	VOL (af)
1-YEAR	1.29	0.076
10-YEAR	3.66	0.234
100-YEAR	8.09	0.563

DESIGN POINT 2
ABUTTER TO SOUTHEAST

STORM	PEAK (cfs)	VOL (af)
1-YEAR	0.14	0.010
10-YEAR	0.37	0.025
100-YEAR	0.81	0.057



No.	Revision	Date	App.
Designed By:	JJR	Drawn by:	JJR
Checked by:	GES	Scale:	1"=40'
Date:	29SEP22	Project Title:	
165 OLIPHANT WAREHOUSE A.P. 111 LOT 61A 165 OLIPHANT LANE MIDDLETOWN RHODE ISLAND			
Client/Owner:			
SISYPHUS HOLDINGS, LLC 36 MOUNT VERNON STREET, UNIT 1 NEWPORT, RI 02840			
Drawing Title:			
PROPOSED WATERSHED PLAN			
Drawing Number:		W-2	
Sheet		1 of 1	
Project Number:		21272.0	
Survey Index:		-	
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