October 6, 2023

Ref: 15225.01

Wareham Planning Board Members
45 Marion Road
Wareham, MA

Re: MS4 Stormwater Management Permit Application
Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation (the "Project")
0 Route 25, Wareham, MA (the "Site")

Dear Members of the Planning Board:

On behalf of our Client, Wareham, PV I LLC, VHB would like to respectfully request that the Planning Board issue an MS4 Stormwater Management Permit ("MS4 Permit") as required by Section 1260 of the Wareham Zoning By-Laws. While the Project does not involve any stormwater discharges to a municipal separate storm sewer system, Section 1262.1 states that an MS4 permit "will be necessary for all new development…of one acre or more", which would encompass the Project.

As stated in Section 1266, Application Requirements, the Planning Board "requires submission of some or all of the information listed in Section 1217." We are not certain which of this information would or would not be required in this case, but all of the potential application requirements and conformance to each are listed below. For clarity, the application requirements are listed in regular text, and VHB's responses are listed in ***bold italic text.***

Section 1217: Application Requirements

1217.1 Survey of existing vegetation conducted by an individual qualified through appropriate academic credentials and field experience. A statement of credentials should be submitted with the survey.

1. Major upland vegetation communities located on the site, including trees, shrub layer, ground cover and herbaceous vegetation;
2. Size and height of trees, noting specimen trees and/or forest communities; and
3. Location of any rare and endangered species as mapped by the Massachusetts Natural Heritage and Endangered Species Program.

> An existing conditions survey, stamped by a Professional Engineer, is included in the site plans dated September 22, 2023. Additionally, attached as part of this permit application is a General Vegetation Survey prepared by VHB and dated July 16, 2021 documenting an assessment of vegetation at the Site. Also, a Tree Survey Memorandum prepared by VHB and dated October 6, 2023 has been submitted to the Planning Board reporting the results of a survey of trees 18" DBH or greater at the Site.

1217.2 Submission of a locus map at a scale of 1"=500' showing the proposed site in relation to the surrounding area.

> A locus map has been submitted as part of the Stormwater Management Report, last revised September 2023. A copy of the Stormwater Management Report is attached as part of this permit application.

1217.3 Submission of a plan at a scale of 1"=40' of the project site showing existing and proposed contour lines at intervals of not more than 2 feet prepared by a registered land surveyor or a professional engineer.

> The existing and proposed contour lines are reflected on the revised site plans dated September 22, 2023, and attached as part of this permit application.

1217.4 Soil survey or soil logs indicating predominant soil types on the project site, including information on erosion potential from the Natural Resources Conservation Service.

> Soil logs from the Natural Resources Conservation Service have been submitted as an appendix to the Stormwater Management Report, last revised September 2023. A copy of the Stormwater Management Report is attached as part of this permit application.

1217.5 Delineation of all bodies of water, including wetlands, vernal pools, streams, ponds, and coastal waters within 100 feet of the project site/limit of work and delineation of the 100-year floodplain.

> Delineation of all bodies of water, including wetlands, etc. are noted on the site plans. The site plans are attached as part of this permit application.

1217.6 Submission of a plan at a scale of 1"=40' indicating the limit of work. The limit of work shall include all building, parking, and vehicular use areas, and any grading associated with the proposed development. The plan or accompanying narrative shall document the species and quantities of specimen trees and/or other vegetation to be removed or relocated within the project area.

> The limit of work and plans denoting the proposed work are included on the site plans and are attached as part of this permit application.

1217.7 Construction schedule that describes the timing of vegetation removal, transplanting or replacement in relation to other construction activities.

> A construction schedule was submitted as part of the Site Plan Review Special Permit Application for the Project. It has been attached for reference.

1217.8 Plans and/or description of Best Management Practices (BMP's) to be employed in development of the project site.

> BMPs to be employed for the Project are noted on the site plans, and detailed in the Stormwater Management Report, both of which are attached as part of this permit application.

1217.9 Submission of an erosion and sedimentation control plan at a scale of 1"=40'. This plan shall include BMPs for erosion and sediment control (vegetative and/or structural) to prevent surface water from eroding cut and fill side slopes, road shoulders and other areas and measures to avoid sedimentation of nearby wetlands and ponds. The following information shall be submitted on erosion control and sedimentation plans submitted with the project application:

1. Plans and details of any sediment and erosion control structure drawn at a scale of 1"=40';

2. Spillway designs showing calculations and profiles;
3. Notes and construction specifications;
4. Type of sediment trap;
5. Drainage area to any sediment trap;
6. Volume of storage required;
7. Outlet length or pipe sizes; and
8. A description of the sequence of construction activities that specifies the time frame for soil stabilization and completion and any necessary winter stabilization measures

> Proposed erosion control is noted on the site plans and attached as part of this permit application. Additional erosion control details that will be employed during construction will be detailed by the contractor.

Section 1267: Review Standards

Compliance with the standards set forth in Section 1267 is described in the "MS4 Compliance" discussion beginning on page 14 of the attached revised Stormwater Management Report.

As noted above, the permit application requirements noted in Section 1217 and the standards set forth in Section 1267 have been adhered to. VHB requests that the Planning Board issue an MS4 Stormwater Management Permit in conjunction with the Site Plan Review Special Permit.

Sincerely,

VHB

Sarah Ebaugh
Project Manager

Attachments:

1. Revised Site Plans, prepared by VHB, revised September 22, 2023
2. Stormwater Management Report, prepared by VHB, revised September 2023
3. General Vegetation Survey, prepared by VHB, dated July 16, 2021
4. Tree Survey Memorandum, prepared by VHB, dated October 6, 2023
5. Construction Schedule

Site Plans

Site Plans

Issued for	**Local Approvals**
Date Issued	**June 26, 2023**
Latest Issue	**September 22, 2023**

Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation

0 Route 25
Wareham, MA

vhb.com

vhb

101 Walnut Street
PO Box 9151
Watertown, MA 02471
617.924.1770

Designer/Developer/Electrical Engineer
Wareham PV I, LLC
330 Congress Street, 6th Floor
Boston, MA 02210
617.377.4301

Owner

David Fletcher
PO Box 829
Plymouth, MA 02362

Applicant

Wareham PV I, LLC
330 Congress Street
6th Floor
Boston, MA 02210

Assessor's Map 115: Lot 1000

Sheet Index

Reference Drawings

No.	Drawing Title	Latest Issue
Sv-1 - Sv-6	Existing Conditions Plan of Land	January 12, 2021

COMMONWEALTH OF MASSACHUSETTS
SARAH EBAUGH
CIVIL
No. 63515
REGISTERED PROFESSIONAL ENGINEER
09/25/2023

VHB Project : 15225.01 Proposed Solar Array
Issued for : Local Approvals - 9/22/2023

\\VHBGB\PRO\WAT-EV\15225.01 LONGROAD TO1 WAREHAM\CAD\LD\PLANSET\LOCAL APPROVALS RESUBMISSION - NO BESS\15225.01_CV
19 September 2023

Legend

Exist.	Prop.	
		PROPERTY LINE
		PROJECT LIMIT LINE
		RIGHT-OF-WAY/PROPERTY LINE
		EASEMENT
		BUILDING SETBACK
		PARKING SETBACK
10+00	10+00	BASELINE
		CONSTRUCTION LAYOUT
		ZONING LINE
		TOWN LINE
		LIMIT OF DISTURBANCE
		WETLAND LINE WITH FLAG
		FLOODPLAIN
BLSF		BORDERING LAND SUBJECT TO FLOODING
BZ		WETLAND BUFFER ZONE
NDZ		NO DISTURB ZONE
200'RA		200' RIVERFRONT AREA
		GRAVEL ROAD
EOP	EOP	EDGE OF PAVEMENT
BB	BB	BITUMINOUS BERM
BC	BC	BITUMINOUS CURB
CC	CC	CONCRETE CURB
CG	CG	CURB AND GUTTER
ECC	ECC	EXTRUDED CONCRETE CURB
MCC	MCC	MONOLITHIC CONCRETE CURB
PCC	PCC	PRECAST CONC. CURB
SGE	SGE	SLOPED GRAN. EDGING
VGC	VGC	VERT. GRAN. CURB
		LIMIT OF CURB TYPE
		SAWCUT
		BUILDING
	EN	BUILDING ENTRANCE
	LD	LOADING DOCK
		BOLLARD
D	D	DUMPSTER PAD
		SIGN
		DOUBLE SIGN
		STEEL GUARDRAIL
		WOOD GUARDRAIL
		PATH
		TREE LINE
		WIRE FENCE
		FENCE
		STOCKADE FENCE
		STONE WALL
		RETAINING WALL
		STREAM / POND / WATER COURSE
		DETENTION BASIN
		STRAW BALES
		SILT FENCE
		STRAW WATTLE
4	4	MINOR CONTOUR
20	20	MAJOR CONTOUR
10	10	PARKING COUNT
	C10	COMPACT PARKING STALLS
DYL	DYL	DOUBLE YELLOW LINE
SL	SL	STOP LINE
		CROSSWALK
		ACCESSIBLE CURB RAMP
		ACCESSIBLE PARKING
VAN	VAN	VAN-ACCESSIBLE PARKING

Exist.	Prop.	
		CONCRETE
		HEAVY DUTY PAVEMENT
		BUILDINGS
		RIPRAP
		CONSTRUCTION EXIT
27.35 TC×	27.35 TC×	TOP OF CURB ELEVATION
26.85 BC×	26.85 BC×	BOTTOM OF CURB ELEVATION
132.75×	132.75×	SPOT ELEVATION
45.0 TW× 38.5 BW×	45.0 TW× 38.5 BW×	TOP & BOTTOM OF WALL ELEVATION
		BORING LOCATION
		TEST PIT LOCATION
MW	MW	MONITORING WELL
UD	UD	UNDERDRAIN
12"D	12"D	DRAIN
6"RD	6"RD	ROOF DRAIN
12"S	12"S	SEWER
FM	FM	FORCE MAIN
OHW	OHW	OVERHEAD WIRE
6"W	6"W	WATER
4"FP	4"FP	FIRE PROTECTION
	2"DW	DOMESTIC WATER
3"G	G	GAS
E	E	ELECTRIC
STM	STM	STEAM
T	T	TELEPHONE
FA	FA	FIRE ALARM
CATV	CATV	CABLE TV
		CATCH BASIN CONCENTRIC
		CATCH BASIN ECCENTRIC
		DOUBLE CATCH BASIN CONCENTRIC
		DOUBLE CATCH BASIN ECCENTRIC
		GUTTER INLET
		DRAIN MANHOLE CONCENTRIC
		DRAIN MANHOLE ECCENTRIC
TD		TRENCH DRAIN
		PLUG OR CAP
CO	CO	CLEANOUT
		FLARED END SECTION
		HEADWALL
S	S	SEWER MANHOLE CONCENTRIC
S	S	SEWER MANHOLE ECCENTRIC
CS	CS	CURB STOP & BOX
WV	WV	WATER VALVE & BOX
TSV	TSV	TAPPING SLEEVE, VALVE & BOX
		FIRE DEPARTMENT CONNECTION
HYD	HYD	FIRE HYDRANT
WM	WM	WATER METER
PIV	PIV	POST INDICATOR VALVE
W	W	WATER WELL
GG	GG	GAS GATE
GM	GM	GAS METER
E	EMH	ELECTRIC MANHOLE
EM	EM	ELECTRIC METER
		LIGHT POLE
T	TMH	TELEPHONE MANHOLE
T	T	TRANSFORMER PAD
		UTILITY POLE
		GUY POLE
		GUY WIRE & ANCHOR
HH	HH	HAND HOLE
PB	PB	PULL BOX
		MATCHLINE

Abbreviations

General

ABAN	ABANDON
ACR	ACCESSIBLE CURB RAMP
ADJ	ADJUST
APPROX	APPROXIMATE
BIT	BITUMINOUS
BS	BOTTOM OF SLOPE
BWLL	BROKEN WHITE LANE LINE
CONC	CONCRETE
DYCL	DOUBLE YELLOW CENTER LINE
EL	ELEVATION
ELEV	ELEVATION
EX	EXISTING
FDN	FOUNDATION
FFE	FIRST FLOOR ELEVATION
GRAN	GRANITE
GTD	GRADE TO DRAIN
LA	LANDSCAPE AREA
LOD	LIMIT OF DISTURBANCE
MAX	MAXIMUM
MIN	MINIMUM
NIC	NOT IN CONTRACT
NTS	NOT TO SCALE
PERF	PERFORATED
PROP	PROPOSED
REM	REMOVE
RET	RETAIN
R&D	REMOVE AND DISPOSE
R&R	REMOVE AND RESET
SWEL	SOLID WHITE EDGE LINE
SWLL	SOLID WHITE LANE LINE
TS	TOP OF SLOPE
TYP	TYPICAL

Utility

CB	CATCH BASIN
CMP	CORRUGATED METAL PIPE
CO	CLEANOUT
DCB	DOUBLE CATCH BASIN
DMH	DRAIN MANHOLE
CIP	CAST IRON PIPE
COND	CONDUIT
DIP	DUCTILE IRON PIPE
FES	FLARED END SECTION
FM	FORCE MAIN
F&G	FRAME AND GRATE
F&C	FRAME AND COVER
GI	GUTTER INLET
GT	GREASE TRAP
HDPE	HIGH DENSITY POLYETHYLENE PIPE
HH	HANDHOLE
HW	HEADWALL
HYD	HYDRANT
INV	INVERT ELEVATION
I=	INVERT ELEVATION
LP	LIGHT POLE
MES	METAL END SECTION
PIV	POST INDICATOR VALVE
PWW	PAVED WATER WAY
PVC	POLYVINYLCHLORIDE PIPE
RCP	REINFORCED CONCRETE PIPE
R=	RIM ELEVATION
RIM=	RIM ELEVATION
SMH	SEWER MANHOLE
TSV	TAPPING SLEEVE, VALVE AND BOX
UG	UNDERGROUND
UP	UTILITY POLE

Notes

General

1. CONTRACTOR SHALL NOTIFY "DIG-SAFE" (1-888-344-7233) AT LEAST 72 HOURS BEFORE EXCAVATING.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR SITE SECURITY AND JOB SAFETY. CONSTRUCTION ACTIVITIES SHALL BE IN ACCORDANCE WITH OSHA STANDARDS AND LOCAL REQUIREMENTS.
3. ACCESSIBLE ROUTES, PARKING SPACES, RAMPS, SIDEWALKS AND WALKWAYS SHALL BE CONSTRUCTED IN CONFORMANCE WITH THE FEDERAL AMERICANS WITH DISABILITIES ACT AND WITH STATE AND LOCAL LAWS AND REGULATIONS (WHICHEVER ARE MORE STRINGENT).
4. AREAS DISTURBED DURING CONSTRUCTION AND NOT RESTORED WITH IMPERVIOUS SURFACES (BUILDINGS, PAVEMENTS, WALKS, ETC.) SHALL RECEIVE 6 INCHES LOAM AND SEED.
5. WITHIN THE LIMITS OF THE BUILDING FOOTPRINT, THE SITE CONTRACTOR SHALL PERFORM EARTHWORK OPERATIONS REQUIRED UP TO SUBGRADE ELEVATIONS.
6. WORK WITHIN THE LOCAL RIGHTS-OF-WAY SHALL CONFORM TO LOCAL MUNICIPAL STANDARDS. WORK WITHIN STATE RIGHTS-OF-WAY SHALL CONFORM TO THE LATEST EDITION OF THE STATE HIGHWAY DEPARTMENTS STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.
7. UPON AWARD OF CONTRACT, CONTRACTOR SHALL MAKE NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN NECESSARY PERMITS, PAY FEES, AND POST BONDS ASSOCIATED WITH THE WORK INDICATED ON THE DRAWINGS, IN THE SPECIFICATIONS, AND IN THE CONTRACT DOCUMENTS. DO NOT CLOSE OR OBSTRUCT ROADWAYS, SIDEWALKS, AND FIRE HYDRANTS, WITHOUT APPROPRIATE PERMITS.
8. TRAFFIC SIGNAGE AND PAVEMENT MARKINGS SHALL CONFORM TO THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.
9. AREAS OUTSIDE THE LIMITS OF PROPOSED WORK DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED BY THE CONTRACTOR TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE.
10. IN THE EVENT THAT SUSPECTED CONTAMINATED SOIL, GROUNDWATER, AND OTHER MEDIA ARE ENCOUNTERED DURING EXCAVATION AND CONSTRUCTION ACTIVITIES BASED ON VISUAL, OLFACTORY, OR OTHER EVIDENCE, THE CONTRACTOR SHALL STOP WORK IN THE VICINITY OF THE SUSPECT MATERIAL TO AVOID FURTHER SPREADING OF THE MATERIAL, AND SHALL NOTIFY THE OWNER IMMEDIATELY SO THAT THE APPROPRIATE TESTING AND SUBSEQUENT ACTION CAN BE TAKEN.
11. CONTRACTOR SHALL PREVENT DUST, SEDIMENT, AND DEBRIS FROM EXITING THE SITE AND SHALL BE RESPONSIBLE FOR CLEANUP, REPAIRS AND CORRECTIVE ACTION IF SUCH OCCURS.
12. DAMAGE RESULTING FROM CONSTRUCTION LOADS SHALL BE REPAIRED BY THE CONTRACTOR AT NO ADDITIONAL COST TO OWNER.
13. CONTRACTOR SHALL CONTROL STORMWATER RUNOFF DURING CONSTRUCTION TO PREVENT ADVERSE IMPACTS TO OFF SITE AREAS, AND SHALL BE RESPONSIBLE TO REPAIR RESULTING DAMAGES, IF ANY, AT NO COST TO OWNER.
14. THIS PROJECT DISTURBS MORE THAN ONE ACRE OF LAND AND FALLS WITHIN THE NPDES CONSTRUCTION GENERAL PERMIT (CGP) PROGRAM AND EPA JURISDICTION. PRIOR TO THE START OF CONSTRUCTION CONTRACTOR IS TO FILE A CGP NOTICE OF INTENT WITH THE EPA AND PREPARE A STORMWATER POLLUTION PREVENTION PLAN IN ACCORDANCE WITH THE NPDES REGULATIONS. CONTRACTOR SHALL CONFIRM THE OWNER HAS ALSO FILED A NOTICE OF INTENT WITH THE EPA.

Utilities

1. THE LOCATIONS, SIZES, AND TYPES OF EXISTING UTILITIES ARE SHOWN AS AN APPROXIMATE REPRESENTATION ONLY. THE OWNER OR ITS REPRESENTATIVE(S) HAVE NOT INDEPENDENTLY VERIFIED THIS INFORMATION AS SHOWN ON THE PLANS. THE UTILITY INFORMATION SHOWN DOES NOT GUARANTEE THE ACTUAL EXISTENCE, SERVICEABILITY, OR OTHER DATA CONCERNING THE UTILITIES, NOR DOES IT GUARANTEE AGAINST THE POSSIBILITY THAT ADDITIONAL UTILITIES MAY BE PRESENT THAT ARE NOT SHOWN ON THE PLANS. PRIOR TO ORDERING MATERIALS AND BEGINNING CONSTRUCTION, THE CONTRACTOR SHALL VERIFY AND DETERMINE THE EXACT LOCATIONS, SIZES, AND ELEVATIONS OF THE POINTS OF CONNECTIONS TO EXISTING UTILITIES AND, SHALL CONFIRM THAT THERE ARE NO INTERFERENCES WITH EXISTING UTILITIES AND THE PROPOSED UTILITY ROUTES, INCLUDING ROUTES WITHIN THE PUBLIC RIGHTS OF WAY.
2. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, OR EXISTING CONDITIONS DIFFER FROM THOSE SHOWN SUCH THAT THE WORK CANNOT BE COMPLETED AS INTENDED, THE LOCATION, ELEVATION, AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR, AND THE INFORMATION FURNISHED IN WRITING TO THE OWNER'S REPRESENTATIVE FOR THE RESOLUTION OF THE CONFLICT AND CONTRACTOR'S FAILURE TO NOTIFY PRIOR TO PERFORMING ADDITIONAL WORK RELEASES OWNER FROM OBLIGATIONS FOR ADDITIONAL PAYMENTS WHICH OTHERWISE MAY BE WARRANTED TO RESOLVE THE CONFLICT.
3. SET CATCH BASIN RIMS, AND INVERTS OF SEWERS, DRAINS, AND DITCHES IN ACCORDANCE WITH ELEVATIONS ON THE GRADING AND UTILITY PLANS.
4. RIM ELEVATIONS FOR DRAIN AND SEWER MANHOLES, WATER VALVE COVERS, GAS GATES, ELECTRIC AND TELEPHONE PULL BOXES, AND MANHOLES, AND OTHER SUCH ITEMS, ARE APPROXIMATE AND SHALL BE SET/RESET AS FOLLOWS:
   A. PAVEMENTS AND CONCRETE SURFACES: FLUSH
   B. ALL SURFACES ALONG ACCESSIBLE ROUTES: FLUSH
   C. LANDSCAPE, LOAM AND SEED, AND OTHER EARTH SURFACE AREAS: ONE INCH ABOVE SURROUNDING AREA AND TAPER EARTH TO THE RIM ELEVATION.
5. THE LOCATION, SIZE, DEPTH, AND SPECIFICATIONS FOR CONSTRUCTION OF PROPOSED PRIVATE UTILITY SERVICES SHALL BE INSTALLED ACCORDING TO THE REQUIREMENTS PROVIDED BY, AND APPROVED BY, THE RESPECTIVE UTILITY COMPANY (GAS, TELEPHONE, ELECTRIC, FIRE ALARM, ETC.). FINAL DESIGN LOADS AND LOCATIONS TO BE COORDINATED WITH OWNER AND ARCHITECT.
6. CONTRACTOR SHALL MAKE ARRANGEMENTS FOR AND SHALL BE RESPONSIBLE FOR PAYING FEES FOR POLE RELOCATION AND FOR THE ALTERATION AND ADJUSTMENT OF GAS, ELECTRIC, TELEPHONE, FIRE ALARM, AND ANY OTHER PRIVATE UTILITIES, WHETHER WORK IS PERFORMED BY CONTRACTOR OR BY THE UTILITIES COMPANY.
7. UTILITY PIPE MATERIALS SHALL BE AS FOLLOWS, UNLESS OTHERWISE NOTED ON THE PLAN:
   A. STORM DRAINAGE PIPES SHALL BE HIGH DENSITY POLYETHYLENE (HDPE)
   B. PIPE INSTALLATION AND MATERIALS SHALL COMPLY WITH THE STATE PLUMBING CODE WHERE APPLICABLE. CONTRACTOR SHALL COORDINATE WITH LOCAL PLUMBING INSPECTOR PRIOR TO BEGINNING WORK.
8. CONTRACTOR SHALL COORDINATE WITH ELECTRICAL CONTRACTOR AND SHALL FURNISH EXCAVATION, INSTALLATION, AND BACKFILL OF ELECTRICAL FURNISHED SITEWORK RELATED ITEMS SUCH AS PULL BOXES, CONDUITS, DUCT BANKS, LIGHT POLE BASES, AND CONCRETE PADS. SITE CONTRACTOR SHALL FURNISH CONCRETE ENCASEMENT OF DUCT BANKS IF REQUIRED BY THE UTILITY COMPANY AND AS INDICATED ON THE DRAWINGS.
9. CONTRACTOR SHALL EXCAVATE AND BACKFILL TRENCHES FOR GAS IN ACCORDANCE WITH GAS COMPANY'S REQUIREMENTS.
10. ALL DRAINAGE AND SANITARY STRUCTURE INTERIOR DIAMETERS (4' MIN.) SHALL BE DETERMINED BY THE MANUFACTURER BASED ON THE PIPE CONFIGURATIONS SHOWN ON THESE PLANS AND LOCAL MUNICIPAL STANDARDS. FOR MANHOLES THAT ARE 20 FEET IN DEPTH AND GREATER, THE MINIMUM DIAMETER SHALL BE 5 FEET.

Plant Maintenance Notes

1. CONTRACTOR SHALL PROVIDE COMPLETE MAINTENANCE OF THE LAWNS AND PLANTINGS. NO IRRIGATION IS PROPOSED FOR THIS SITE. THE CONTRACTOR SHALL SUPPLY SUPPLEMENTAL WATERING FOR NEW LAWNS AND PLANTINGS DURING THE ONE YEAR PLANT GUARANTEE PERIOD.
2. CONTRACTOR SHALL PROVIDE ALL MATERIALS, LABOR, AND EQUIPMENT FOR THE COMPLETE LANDSCAPE MAINTENANCE WORK. WATER SHALL BE PROVIDED BY THE CONTRACTOR.
3. WATERING SHALL BE REQUIRED DURING THE GROWING SEASON, WHEN NATURAL RAINFALL IS BELOW ONE INCH PER WEEK.
4. WATER SHALL BE APPLIED IN SUFFICIENT QUANTITY TO THOROUGHLY SATURATE THE SOIL IN THE ROOT ZONE OF EACH PLANT.
5. CONTRACTOR SHALL REPLACE DEAD OR DYING PLANTS AT THE END OF THE ONE YEAR GUARANTEE PERIOD. CONTRACTOR SHALL TURN OVER MAINTENANCE TO THE FACILITY MAINTENANCE STAFF AT THAT TIME.

Layout and Materials

1. DIMENSIONS ARE FROM THE FACE OF CURB, FACE OF BUILDING, FACE OF WALL, AND CENTER LINE OF PAVEMENT MARKINGS, UNLESS OTHERWISE NOTED.
2. SEE ARCHITECTURAL DRAWINGS FOR EXACT BUILDING DIMENSIONS AND DETAILS CONTIGUOUS TO THE BUILDING, INCLUDING SIDEWALKS, RAMPS, BUILDING ENTRANCES, STAIRWAYS, UTILITY PENETRATIONS, CONCRETE DOOR PADS, COMPACTOR PAD, LOADING DOCKS, BOLLARDS, ETC.
3. PROPOSED BOUNDS AND ANY EXISTING PROPERTY LINE MONUMENTATION DISTURBED DURING CONSTRUCTION SHALL BE SET OR RESET BY A PROFESSIONAL LAND SURVEYOR.
4. PRIOR TO START OF CONSTRUCTION, CONTRACTOR SHALL VERIFY EXISTING PAVEMENT ELEVATIONS AT INTERFACE WITH PROPOSED PAVEMENTS, AND EXISTING GROUND ELEVATIONS ADJACENT TO DRAINAGE OUTLETS TO ASSURE PROPER TRANSITIONS BETWEEN EXISTING AND PROPOSED FACILITIES.

Demolition

1. CONTRACTOR SHALL REMOVE AND DISPOSE OF EXISTING MANMADE SURFACE FEATURES WITHIN THE LIMIT OF WORK INCLUDING BUILDINGS, STRUCTURES, PAVEMENTS, SLABS, CURBING, FENCES, UTILITY POLES, SIGNS, ETC. UNLESS INDICATED OTHERWISE ON THE DRAWINGS. REMOVE AND DISPOSE OF EXISTING UTILITIES, FOUNDATIONS AND UNSUITABLE MATERIAL BENEATH AND FOR A DISTANCE OF 10 FEET BEYOND THE PROPOSED BUILDING FOOTPRINT INCLUDING EXTERIOR COLUMNS.
2. EXISTING UTILITIES SHALL BE TERMINATED, UNLESS OTHERWISE NOTED, IN CONFORMANCE WITH LOCAL, STATE AND INDIVIDUAL UTILITY COMPANY STANDARD SPECIFICATIONS AND DETAILS. THE CONTRACTOR SHALL COORDINATE UTILITY SERVICE DISCONNECTS WITH THE UTILITY REPRESENTATIVES.
3. CONTRACTOR SHALL DISPOSE OF DEMOLITION DEBRIS IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE AND LOCAL REGULATIONS, ORDINANCES AND STATUTES.
4. THE DEMOLITION LIMITS DEPICTED IN THE PLANS IS INTENDED TO AID THE CONTRACTOR DURING THE BIDDING AND CONSTRUCTION PROCESS AND IS NOT INTENDED TO DEPICT EACH AND EVERY ELEMENT OF DEMOLITION. THE CONTRACTOR IS RESPONSIBLE FOR IDENTIFYING THE DETAILED SCOPE OF DEMOLITION BEFORE SUBMITTING ITS BID/PROPOSAL TO PERFORM THE WORK AND SHALL MAKE NO CLAIMS AND SEEK NO ADDITIONAL COMPENSATION FOR CHANGED CONDITIONS OR UNFORESEEN OR LATENT SITE CONDITIONS RELATED TO ANY CONDITIONS DISCOVERED DURING EXECUTION OF THE WORK.
5. UNLESS OTHERWISE SPECIFICALLY PROVIDED ON THE PLANS OR IN THE SPECIFICATIONS, THE ENGINEER HAS NOT PREPARED DESIGNS FOR AND SHALL HAVE NO RESPONSIBILITY FOR THE PRESENCE, DISCOVERY, REMOVAL, ABATEMENT OR DISPOSAL OF HAZARDOUS MATERIALS, TOXIC WASTES OR POLLUTANTS AT THE PROJECT SITE. THE ENGINEER SHALL NOT BE RESPONSIBLE FOR ANY CLAIMS OF LOSS, DAMAGE, EXPENSE, DELAY, INJURY OR DEATH ARISING FROM THE PRESENCE OF HAZARDOUS MATERIAL AND CONTRACTOR SHALL INDEMNIFY AND HOLD HARMLESS THE ENGINEER FROM ANY CLAIMS MADE IN CONNECTION THEREWITH. MOREOVER, THE ENGINEER SHALL HAVE NO ADMINISTRATIVE OBLIGATIONS OF ANY TYPE WITH REGARD TO ANY CONTRACTOR AMENDMENT INVOLVING THE ISSUES OF PRESENCE, DISCOVERY, REMOVAL, ABATEMENT OR DISPOSAL OF ASBESTOS OR OTHER HAZARDOUS MATERIALS.

Erosion Control

1. PRIOR TO STARTING ANY OTHER WORK ON THE SITE, THE CONTRACTOR SHALL NOTIFY APPROPRIATE AGENCIES AND SHALL INSTALL SEDIMENT CONTROL MEASURES AS SHOWN ON THE PLANS AND AS IDENTIFIED IN FEDERAL, STATE, AND LOCAL APPROVAL DOCUMENTS PERTAINING TO THIS PROJECT.
2. CONTRACTOR SHALL INSPECT AND MAINTAIN EROSION PREVENTION AND SEDIMENT CONTROL MEASURES ON A WEEKLY BASIS (MINIMUM) OR AS REQUIRED PER THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP). THE CONTRACTOR SHALL ADDRESS DEFICIENCIES AND MAINTENANCE ITEMS WITHIN TWENTY-FOUR HOURS OF INSPECTION. CONTRACTOR SHALL PROPERLY DISPOSE OF SEDIMENT SUCH THAT IT DOES NOT ENCUMBER OTHER DRAINAGE STRUCTURES AND PROTECTED AREAS.
3. CONTRACTOR SHALL BE FULLY RESPONSIBLE TO CONTROL CONSTRUCTION SUCH THAT SEDIMENTATION SHALL NOT AFFECT REGULATORY PROTECTED AREAS, WHETHER SUCH SEDIMENTATION IS CAUSED BY WATER, WIND, OR DIRECT DEPOSIT.
4. CONTRACTOR SHALL PERFORM CONSTRUCTION SEQUENCING SUCH THAT EARTH MATERIALS ARE EXPOSED FOR A MINIMUM OF TIME BEFORE THEY ARE COVERED, SEEDED, OR OTHERWISE STABILIZED TO PREVENT EROSION. REFER TO PROJECT SWPPP FOR SPECIFIC TIMEFRAMES.
5. UPON COMPLETION OF CONSTRUCTION AND ESTABLISHMENT OF PERMANENT GROUND COVER, CONTRACTOR SHALL REMOVE AND DISPOSE OF SEDIMENT CONTROL MEASURES AND CLEAN SEDIMENT AND DEBRIS FROM ENTIRE DRAINAGE AND SEWER SYSTEMS.

Existing Conditions Information

1. BASE PLAN: "EXISTING CONDITIONS PLAN OF LAND" DATED JANUARY 12 2021, PREPARED BY VHB.
2. TOPOGRAPHY: ELEVATIONS ARE BASED ON NAVD 1988.

Document Use

1. THESE PLANS AND CORRESPONDING CADD DOCUMENTS ARE INSTRUMENTS OF PROFESSIONAL SERVICE, AND SHALL NOT BE USED, IN WHOLE OR IN PART, FOR ANY PURPOSE OTHER THAN FOR WHICH IT WAS CREATED WITHOUT THE EXPRESSED, WRITTEN CONSENT OF VHB. ANY UNAUTHORIZED USE, REUSE, MODIFICATION OR ALTERATION, INCLUDING AUTOMATED CONVERSION OF THIS DOCUMENT SHALL BE AT THE USER'S SOLE RISK WITHOUT LIABILITY OR LEGAL EXPOSURE TO VHB.
2. CONTRACTOR SHALL NOT RELY SOLELY ON ELECTRONIC VERSIONS OF PLANS, SPECIFICATIONS, AND DATA FILES THAT ARE OBTAINED FROM THE DESIGNERS, BUT SHALL VERIFY LOCATION OF PROJECT FEATURES IN ACCORDANCE WITH THE PAPER COPIES OF THE PLANS AND SPECIFICATIONS THAT ARE SUPPLIED AS PART OF THE CONTRACT DOCUMENTS.
3. SYMBOLS AND LEGENDS OF PROJECT FEATURES ARE GRAPHIC REPRESENTATIONS AND ARE NOT NECESSARILY SCALED TO THEIR ACTUAL DIMENSIONS OR LOCATIONS ON THE DRAWINGS. THE CONTRACTOR SHALL REFER TO THE DETAIL SHEET DIMENSIONS, MANUFACTURERS' LITERATURE, SHOP DRAWINGS AND FIELD MEASUREMENTS OF SUPPLIED PRODUCTS FOR LAYOUT OF THE PROJECT FEATURES.

Planting Notes

1. ALL PROPOSED PLANTING LOCATIONS SHALL BE STAKED AS SHOWN ON THE PLANS FOR FIELD REVIEW AND APPROVAL BY THE LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
2. CONTRACTOR SHALL VERIFY LOCATIONS OF ALL BELOW GRADE AND ABOVE GROUND UTILITIES AND NOTIFY OWNERS REPRESENTATIVE OF CONFLICTS.
3. NO PLANT MATERIALS SHALL BE INSTALLED UNTIL ALL GRADING AND CONSTRUCTION HAS BEEN COMPLETED IN THE IMMEDIATE AREA. CONTRACTOR SHALL NOTIFY OWNER'S REPRESENTATIVE OF ANY CONFLICT.
4. A 3-INCH DEEP MULCH PER SPECIFICATION SHALL BE INSTALLED UNDER ALL TREES AND SHRUBS, AND IN ALL PLANTING BEDS, UNLESS OTHERWISE INDICATED ON THE PLANS, OR AS DIRECTED BY OWNER'S REPRESENTATIVE.
5. ALL TREES SHALL BE BALLED AND BURLAPPED, UNLESS OTHERWISE NOTED IN THE DRAWINGS OR SPECIFICATION, OR APPROVED BY THE OWNER'S REPRESENTATIVE.
6. FINAL QUANTITY FOR EACH PLANT TYPE SHALL BE AS GRAPHICALLY SHOWN ON THE PLAN. THIS NUMBER SHALL TAKE PRECEDENCE IN CASE OF ANY DISCREPANCY BETWEEN QUANTITIES SHOWN ON THE PLANT LIST AND ON THE PLAN. THE CONTRACTOR SHALL REPORT ANY DISCREPANCIES BETWEEN THE NUMBER OF PLANTS SHOWN ON THE PLANT LIST AND PLANT LABELS PRIOR TO BIDDING.
7. ANY PROPOSED PLANT SUBSTITUTIONS MUST BE REVIEWED BY LANDSCAPE ARCHITECT AND APPROVED IN WRITING BY THE OWNER'S REPRESENTATIVE.
8. ALL PLANT MATERIALS INSTALLED SHALL MEET THE SPECIFICATIONS OF THE "AMERICAN STANDARDS FOR NURSERY STOCK" BY THE AMERICAN ASSOCIATION OF NURSERYMEN AND CONTRACT DOCUMENTS.
9. ALL PLANT MATERIALS SHALL BE GUARANTEED FOR ONE YEAR FOLLOWING DATE OF FINAL ACCEPTANCE.
10. AREAS DESIGNATED "LOAM & SEED" SHALL RECEIVE MINIMUM 6" OF LOAM AND SPECIFIED SEED MIX. LAWNS OVER 2:1 SLOPE SHALL BE PROTECTED WITH EROSION CONTROL FABRIC.
11. ALL DISTURBED AREAS NOT OTHERWISE NOTED ON CONTRACT DOCUMENTS SHALL BE LOAM AND SEEDED OR MULCHED AS DIRECTED BY OWNER'S REPRESENTATIVE.
12. THIS PLAN IS INTENDED FOR PLANTING PURPOSES. REFER TO SITE / CIVIL DRAWINGS FOR ALL OTHER SITE CONSTRUCTION INFORMATION.

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COMMONWEALTH OF MASSACHUSETTS
SARAH EBAUGH
CIVIL
No. 62584
REGISTERED PROFESSIONAL ENGINEER
09/25/2023

Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation

0 Route 25
Wareham, MA

No.	Revision	Date	Appvd.

Designed by: LMT
Checked by: SKE
Issued for: Local Approvals
Date: June 26, 2023

Drawing Title
Legend and General Notes

Drawing Number
C1.00

COMMONWEALTH OF MASSACHUSETTS
ERIK BEDNARZ
No. 1508
REGISTERED LANDSCAPE ARCHITECT

Sheet 1 of 7

Project Number
15225.01

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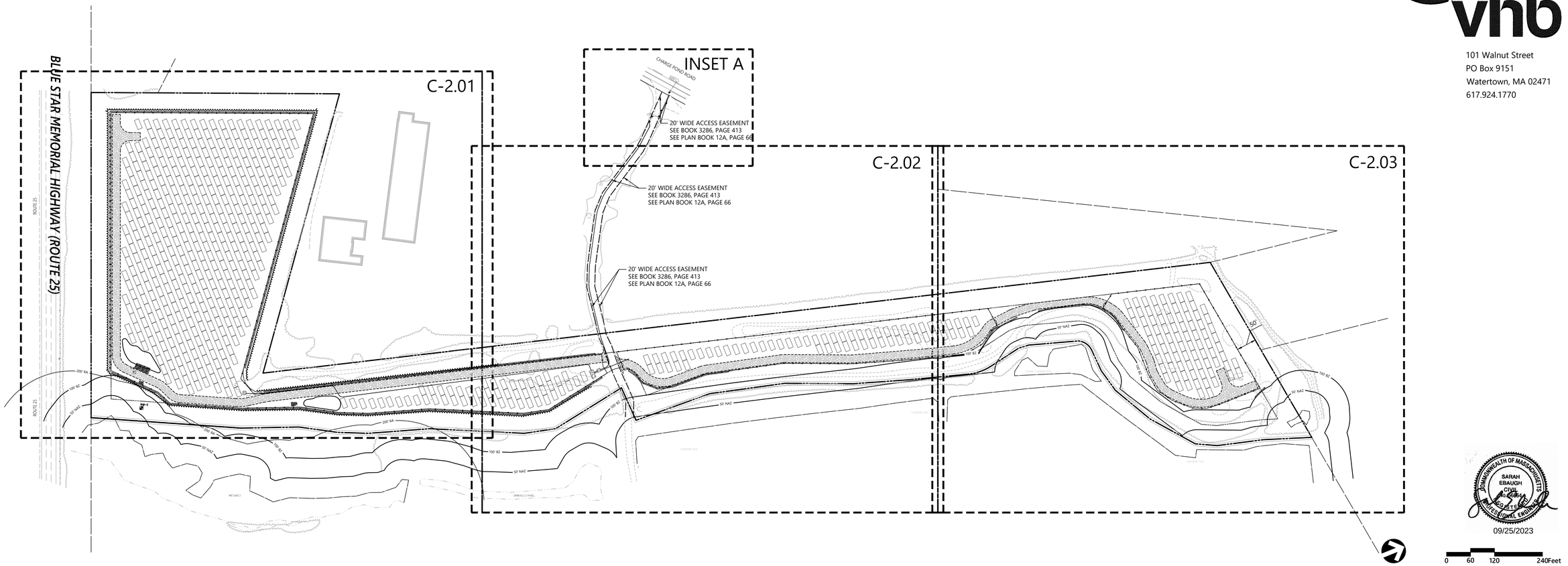

09/25/2023

NORTHEAST SOLAR POLLINATOR 3' MIX

% SEED	BOTANICAL NAME	COMMON NAME
35.0%	Elymus canadensis	Canada Wildrye
35.0%	Schizachyrium scoparium 'Camper'	Little Bluestem, 'Camper'
10.0%	Dichanthelium sphaerocarpon	Roundseed Panicgrass
4.0%	Asclepias tuberosa	Butterfly Milkweed
4.0%	Chamaecrista fasciculata	Patridge Pea
4.0%	Coreopsis lanceolata	Lanceleaf Coreopsis
4.0%	Rudbeckia hirta	Black-eyed Susan
0.9%	Pycnanthemum tenuifolium	Narrowleaf Mountain Mint
0.7%	Aster oblongifolius	Aromatic Aster
0.5%	Aster prenanthoides	Zigzag Aster
0.5%	Penstemon digitalis	Tall White Beardtongue
0.5%	Tradescantia ohiensis	Ohio Spiderwort
0.5%	Zizia aurea	Golden Alexanders
0.3%	Oenothera fruticosa var. fruticosa	Sundrops
0.1%	Solidago nemoralis	Gray Goldenrod

Total 100%

NOTE:
SEEDING RATE TO BE 40 LBS/ACRE USING A SEED DRILL WITH AN ADDITIONAL 30 LBS/ACRE OF COVER CROP. REFER TO "SOLAR ARRAY SEEDING SCHEDULE AND PROTOCOLS, WAREHAM, MASSACHUSETTS" DOCUMENT REVISED JUNE 14, 2023.

Zoning Summary Chart

Zoning District(s):	Residential 130 (R-130)	
Zoning Regulation Requirements	Required[1]	Provided
MINIMUM LOT AREA[2]	≥3 Acres	22.4 Acres
FRONTAGE[3]	Not Applicable	Not Applicable
MINIMUM FRONT YARD SETBACK	50 Feet	Not Applicable
MINIMUM SIDE YARD SETBACK	50 Feet	50 Feet
MINIMUM REAR YARD SETBACK	50 Feet	Not Applicable
MAXIMUM BUILDING HEIGHT[4]	35 Feet	Not Applicable

(1) Zoning requirements as specified in "Zoning By-Laws Town of Wareham Massachusetts" (revised October 2018) (hereinafter "Zoning By-Laws").

(2) Per Section 594.1.1 of Zoning By-Laws.

(3) Per Section 611 of Zoning By-Laws, R-130 district minimum frontage requirement is not applicable because proposed project is not "principal building" or "accessory building" as those terms are defined in Article 16 of Zoning By-Laws.

(4) Per Section 611 of Zoning By-Laws, R-130 district maximum allowed height requirement is not applicable because proposed project is not "principal building" or "accessory building" as those terms are defined in Article 16 of Zoning By-Laws.

Notes

1. 0 Route 25 (Map 115, Lot 1000) (the "Project Parcel") is located outside the 100-year flood plain as noted on the FEMA Flood Insurance Rate Map (FIRM) Panels Number 25023C0487K & 25023C0489L last revised July 6, 2021.
2. Access to the Project Parcel is via an existing 20-foot wide access easement from Charge Pond Road taken by MassDOT predecessor Massachusetts Department of Public Works on behalf of certain landowners (including the owner of the Project Parcel) in 1966 in connection with the development of Route 25 as a limited access highway. See Layout 5560 and Order of Taking dated April 14, 1966, recorded at the Plymouth County Registry of Deeds in Book 3286, Page 413 and Plan Book 12A, Page 66.

COMMONWEALTH OF MASSACHUSETTS
SARAH EBAUCH
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REGISTERED PROFESSIONAL ENGINEER

Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation

0 Route 25
Wareham, MA

No.	Revision	Date	Appvd.
1	Response to Comments	09/22/2023	SKE

Designed by LMT | Checked by SKE

Issued for: Local Approvals | Date: June 26, 2023

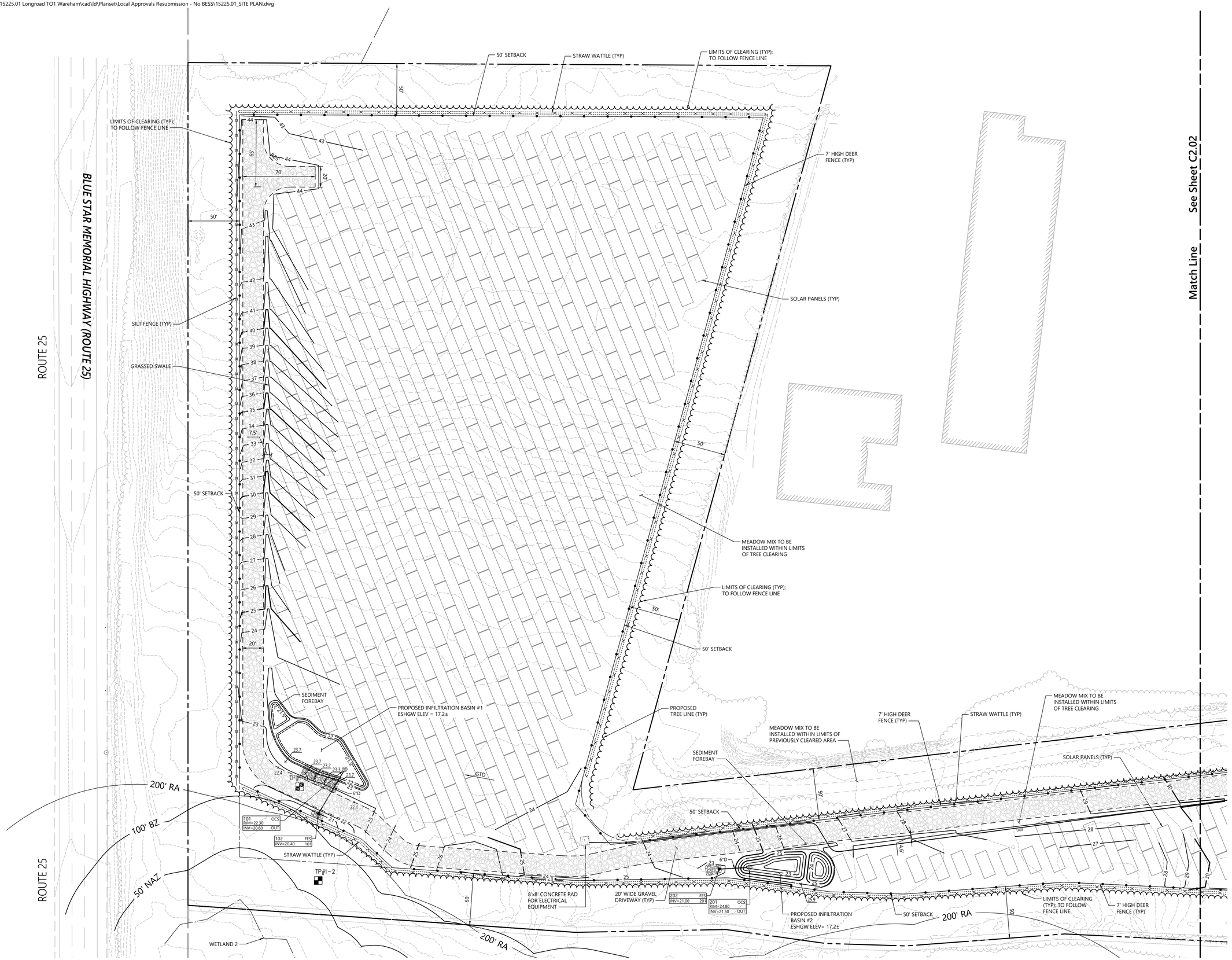
Drawing Title
Overall Site Plan

Drawing Number
C2.00

Sheet 2 of 7

Project Number
15225.01

COMMONWEALTH OF MASSACHUSETTS
ERIK BEDNARCZYK
NO. 1608
REGISTERED LANDSCAPE ARCHITECT



Match Line
See Sheet C2.02

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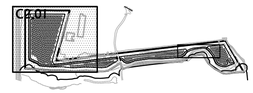


Key
Not To Scale

0 20 40 80 Feet

Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation

0 Route 25
Wareham, MA

No.	Revision	Date	Appvd.
1	Response to Comments	09/22/2023	SKE

Designed by LMT | Checked by SKE

Issued for: **Local Approvals** | Date: **June 26, 2023**

Drawing Title
Layout, Grading, Drainage, and Erosion Control Plan

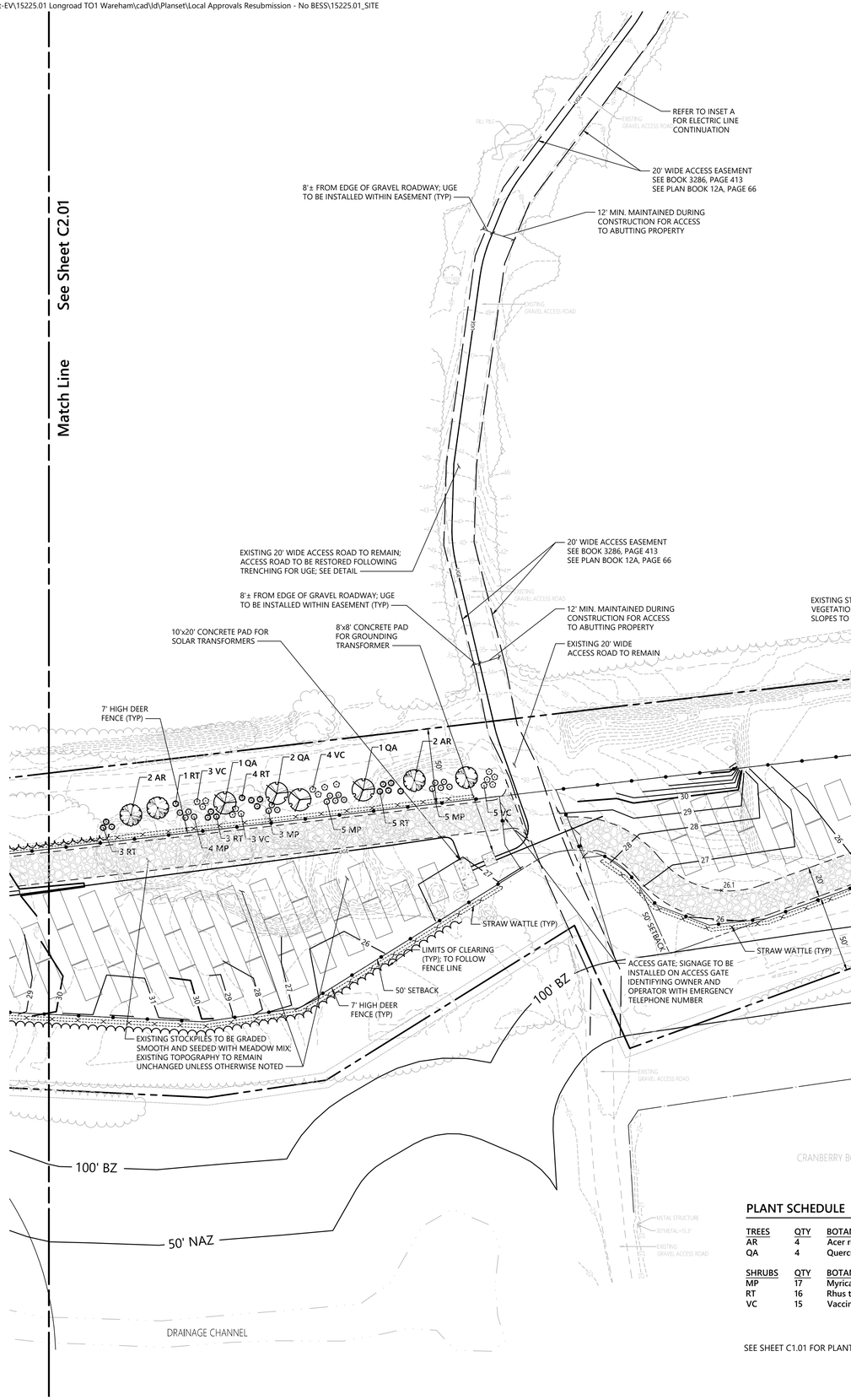
Drawing Number
C2.01

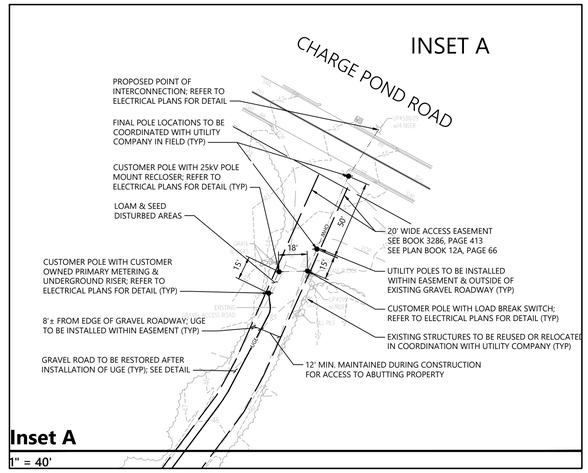
Sheet 3 of 7

Project Number
15225.01

COMMONWEALTH OF MASSACHUSETTS
SARAH EBAUGH
CIVIL
REGISTERED PROFESSIONAL ENGINEER
09/25/2023

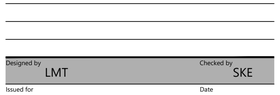
Match Line See Sheet C2.01





Inset A
1" = 40'

Match Line See Sheet C2.03



Key
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PLANT SCHEDULE

TREES	QTY	BOTANICAL NAME	COMMON NAME	SIZE	REMARKS
AR	4	Acer rubrum	Red Maple	2 1/2 - 3" CAL.	12' Ht. Min.
QA	4	Quercus alba	White Oak	2 1/2 - 3" CAL.	12' Ht. Min.

SHRUBS	QTY	BOTANICAL NAME	COMMON NAME	SIZE
MP	17	Myrica pensylvanica	Bayberry Shrub - Northern	3` Ht. Min.
RT	16	Rhus typhina	Sumac Shrub - Staghorn	3` Ht. Min.
VC	15	Vaccinium corymbosum	Blueberry - Highbush	3` Ht. Min.

SEE SHEET C1.01 FOR PLANTING NOTES.

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COMMONWEALTH OF MASSACHUSETTS
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09/25/2023

0 20 40 80 Feet

Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation

0 Route 25
Wareham, MA

No.	Revision	Date	Appvd.
1	Response to Comments	09/22/2023	SKE

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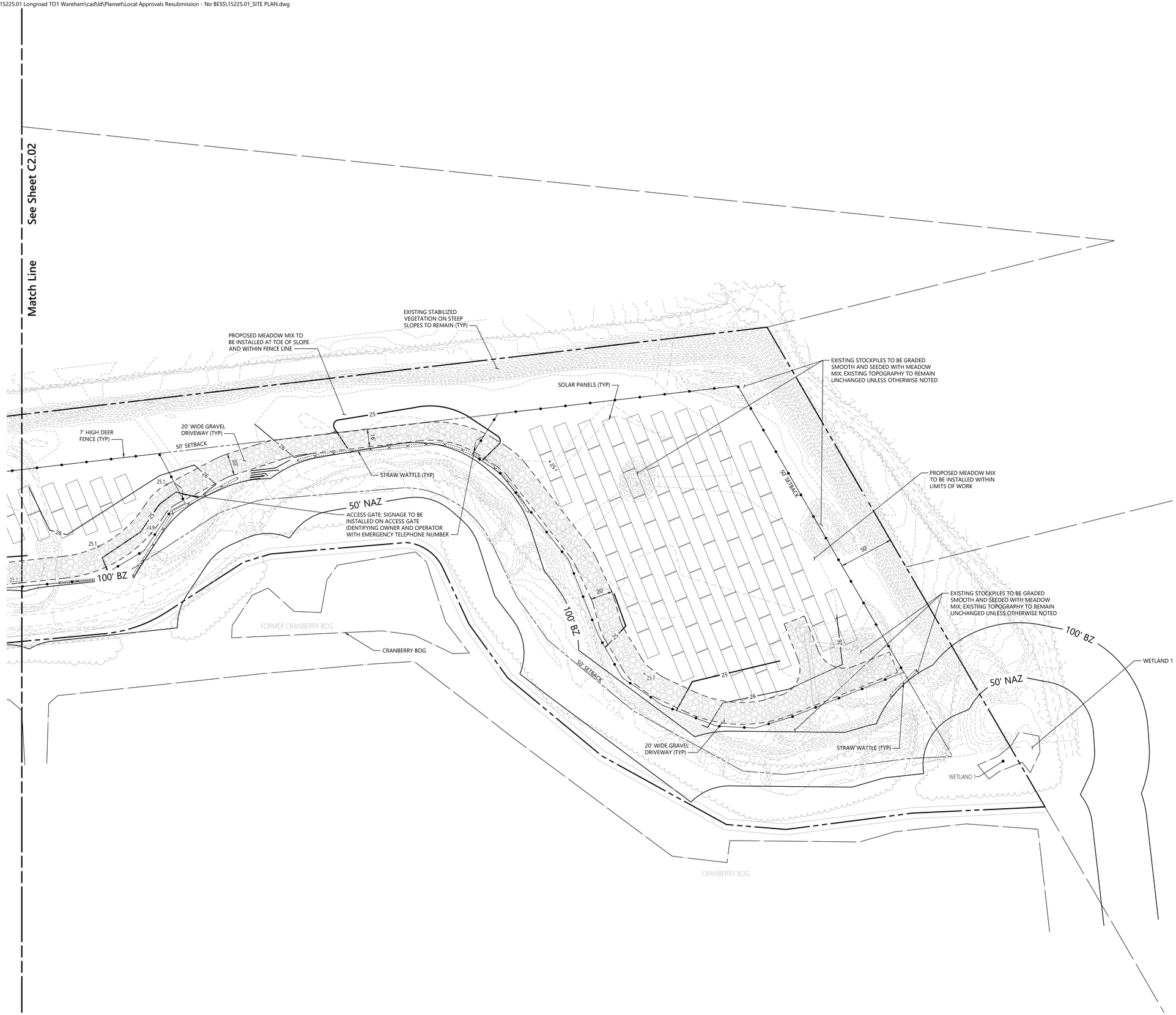
Drawing Title
Layout, Grading, Drainage, and Erosion Control Plan

Drawing Number
C2.02

COMMONWEALTH OF MASSACHUSETTS
ERIK BEDNARZ
No. 1908
REGISTERED LANDSCAPE ARCHITECT

Sheet 4 of 7

Project Number
15225.01



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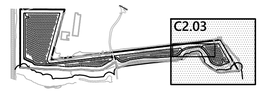

Key
Not To Scale

0 20 40 80 Feet

Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation

0 Route 25
Wareham, MA

No.	Revision	Date	Appvd.

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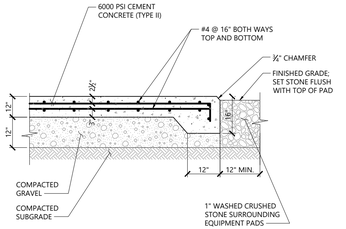
Drawing Title
Layout, Grading, Drainage, and Erosion Control Plan

Drawing Number
C2.03

Sheet 5 of 7

Project Number
15225.01

COMMONWEALTH OF MASSACHUSETTS
SARAH EBAUGH
CIVIL
No. 62511
REGISTERED PROFESSIONAL ENGINEER
09/25/2023



NOTES

1. SIZE OF EQUIPMENT PAD TO BE AS INDICATED ON PLANS.
2. CONSTRUCTION JOINTS SHALL BE SPACED NO MORE THAN 30 FEET ON CENTER AND SHALL BE EQUALLY SPACED OVER THE LENGTH AND WIDTH OF THE PAD.
3. SHOWN FOR REFERENCE; FINAL PAD DESIGN TO BE PROVIDED PRIOR TO CONSTRUCTION

SPECIFICATIONS

1. GRAVEL SHALL CONSIST OF INERT MATERIAL THAT IS HARD, DURABLE STONE AND COARSE SAND, FREE FROM LOAM, CLAY, SURFACE COATINGS AND DELETERIOUS MATERIALS, AND SHALL CONFORM TO THE FOLLOWING GRADATION:

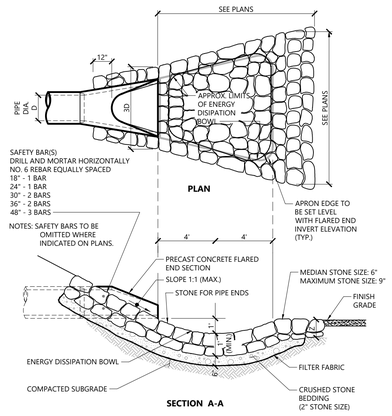
Sieve (ASTM D422)	Percent Passing by Weight
3"	100
1/2-inch	50 - 85
No. 4	40 - 75
No. 50	8-28
No. 200	0 - 10

* Three (3) inches when placed as subgrade within four (4) feet below pavements and slabs (MassDOT Specifications M1.03.0 Type b); one and one-half inches (1-1/2") where placed as pavement base and pipe bedding and backfill up to 24 inches above pipe (MassDOT Specifications M1.03.0 Type d); and elsewhere two thirds (2/3) the loose lift thickness.

Concrete Pad

1/16

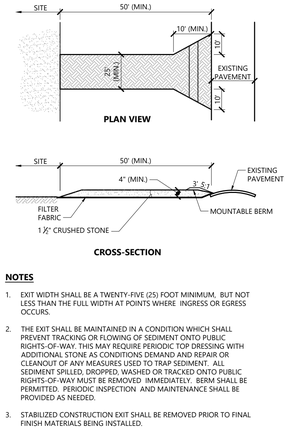
N.T.S. Source: VHB LD_712A



Flared End Section (FES) with Stone Protection

3/19

N.T.S. Source: VHB REV LD_134



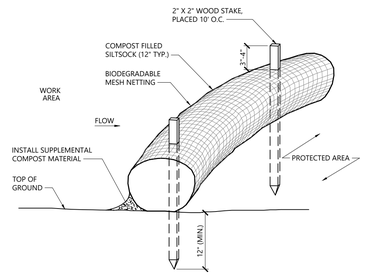
NOTES

1. EXIT WIDTH SHALL BE A TWENTY-FIVE (25) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS.
2. THE EXIT SHALL BE MAINTAINED IN A CONDITION WHICH SHALL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE PERIODIC TOP DRESSING WITH ADDITIONAL STONE AS CONDITIONS DEMAND AND REPAIR OR CLEANOUT OF ANY MEASURES USED TO TRAP SEDIMENT. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACKED ONTO PUBLIC RIGHTS-OF-WAY MUST BE REMOVED IMMEDIATELY. BERM SHALL BE PERMITTED. PERIODIC INSPECTION AND MAINTENANCE SHALL BE PROVIDED AS NEEDED.
3. STABILIZED CONSTRUCTION EXIT SHALL BE REMOVED PRIOR TO FINAL FINISH MATERIALS BEING INSTALLED.

Stabilized Construction Exit

1/16

N.T.S. Source: VHB LD_682



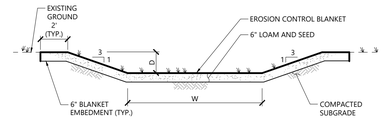
NOTES

1. SILTSOCK SHALL BE FILTREXX SILTSOXX, OR APPROVED EQUAL.
2. SILTSOCKS SHALL OVERLAP A MINIMUM OF 12 INCHES.
3. SILTSOCK SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS, AND REPAIR OR REPLACEMENT SHALL BE PERFORMED PROMPTLY AS NEEDED.
4. COMPOST MATERIAL SHALL BE DISPERSED ON SITE, AS DETERMINED BY THE ENGINEER.
5. IF NON BIODEGRADABLE NETTING IS USED THE NETTING SHALL BE COLLECTED AND DISPOSED OF OFFSITE.

Siltsock - Sediment Control Barrier

1/16

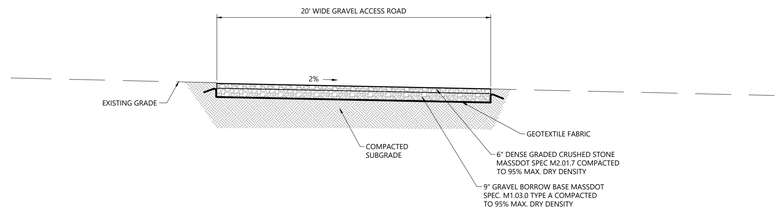
N.T.S. Source: VHB REV LD_658



Grassed Swale

1/16

N.T.S. Source: VHB REV LD_171



NOTES

1. GRAVEL ACCESS ROAD SHALL HAVE A SURFACE BEARING CAPACITY OF 20,000 LBS (MIN).
2. STONE MATTRESS TO BE INSTALLED AS NEEDED TO PROVIDE FOR ADEQUATE DRAINAGE OF SURFACE RUNOFF AND PREVENT EROSION.
3. DETAIL TO BE USED FOR INTERNAL ACCESS DRIVE THROUGHOUT SITE AS WELL AS RECONSTRUCTION OF GRAVEL ROAD WITHIN ACCESS EASEMENT TO CHARGE POND ROAD.

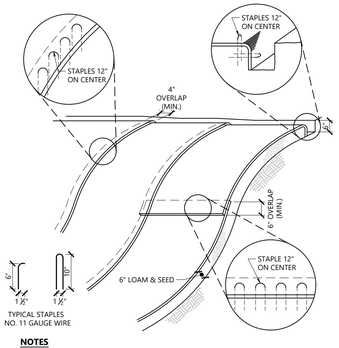
Gravel Access Road - Typical Section

N.T.S. Source: VHB

Silt Fence Barrier

1/16

N.T.S. Source: VHB LD_650



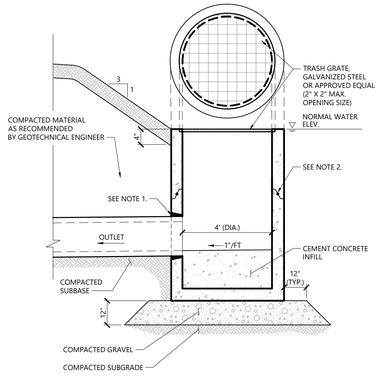
NOTES

1. BEGIN AT THE TOP OF BLANKET INSTALLATION AREA BY ANCHORING BLANKET IN A 6" DEEP TRENCH BACKFILL AND COMPACT TRENCH AFTER STAPLING.
2. ROLL THE BLANKET DOWN THE SWALE IN THE DIRECTION OF THE WATER FLOW.
3. THE EDGES OF BLANKETS MUST BE STAPLED WITH APPROX. 4 INCH OVERLAP WHERE 2 OR MORE STRIP WIDTHS ARE REQUIRED.
4. WHEN BLANKETS MUST BE SPLICED DOWN THE SWALE, PLACE UPPER BLANKET END OVER LOWER END WITH 6 INCH (MIN.) OVERLAP AND STAPLE BOTH TOGETHER.
5. METHOD OF INSTALLATION SHALL BE AS PER MANUFACTURER'S RECOMMENDATIONS.
6. EROSION CONTROL BLANKETS SHALL BE USED IN ALL AREAS WHERE SLOPES EXCEED 3:1.

Erosion Control Blanket Slope Installation

1/16

N.T.S. Source: VHB LD_680



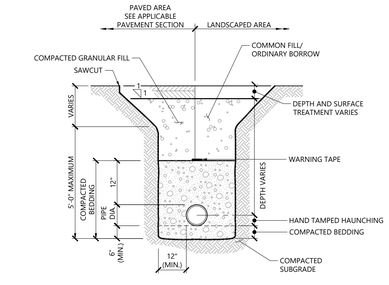
NOTES

1. PROVIDE OPENINGS FOR PIPES WITH 2" MAX. CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
2. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.

Outlet Control Structure

1/16

N.T.S. Source: VHB LD_163



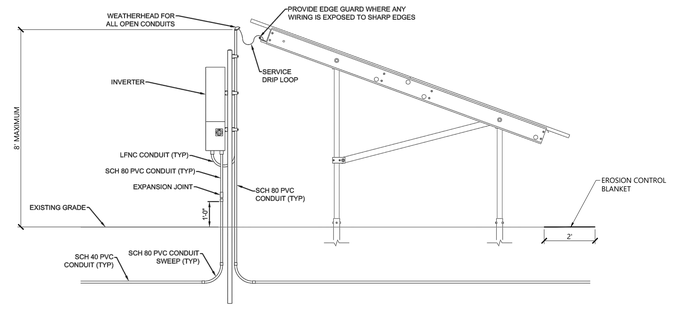
NOTES

1. WHERE UTILITY TRENCHES ARE CONSTRUCTED THROUGH DETENTION BASIN BERMS OR OTHER SUCH SPECIAL SECTIONS, PLACE TRENCH BACKFILL WITH MATERIALS SIMILAR TO THE SPECIAL SECTION REQUIREMENTS.
2. USE METALLIC TRACING/WARNING TAPE OVER ALL PIPES.

Utility Trench

1/16

N.T.S. Source: VHB LD_300



SHOWN FOR REFERENCE ONLY. FINAL PANEL AND RACKING DESIGN DETERMINED BY ELECTRICAL ENGINEER/SOLAR INSTALLER

Inverter and Array Detail (Side)

N.T.S. Source: Ameresco Inc.

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Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation

0 Route 25
Wareham, MA

No.	Revision	Date	Appvd.

Designed by LMT Checked by SKE

Issued for Date

Local Approvals June 26, 2023

Drawing Title

Site Details

Drawing Number

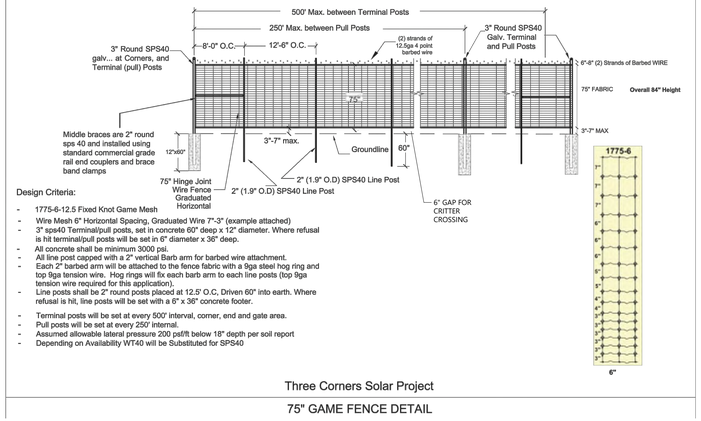
C3.01

Sheet 6 of 7

Project Number 15225.01

COMMONWEALTH OF MASSACHUSETTS
SARAH EBAUGH
CIVIL
No. 52454
REGISTERED PROFESSIONAL ENGINEER

09/25/2023



Design Criteria:

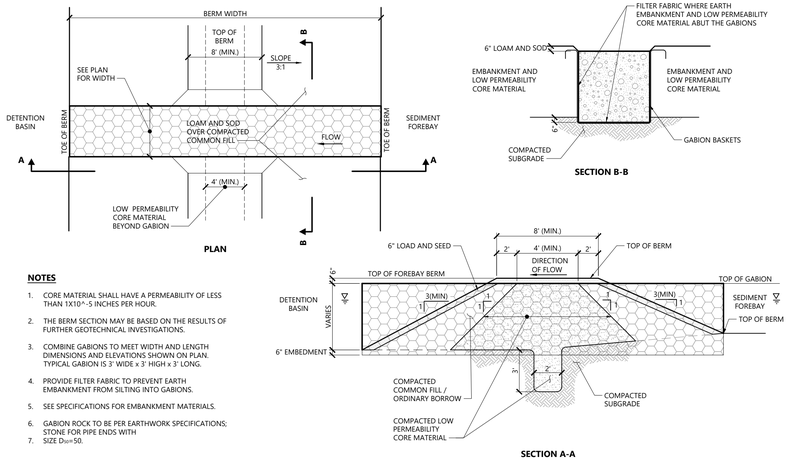
- 1775-6-12.5 Fixed Knot Game Mesh
- Wire Mesh 6" Horizontal Spacing, Graduated Wire 7"-3" (example attached)
- 3" sps40 Terminal/pull posts, set in concrete 60" deep x 12" diameter. Where refusal is hit terminal/pull posts will be set in 6" diameter x 36" deep.
- All concrete shall be minimum 3000 psi.
- All line post capped with a 2" vertical Barb arm for barbed wire attachment.
- Each 2" barbed arm will be attached to the fence fabric with a 9ga steel hog ring and top 9ga tension wire. Hog rings will fix each barb arm to each line posts (top 9ga tension wire required for this application).
- Line posts shall be 2" round posts placed at 12.5' O.C, Driven 60" into earth. Where refusal is hit, line posts will be set with a 6" x 36" concrete footer.
- Terminal posts will be set at every 500' interval, corner, end and gate area.
- Pull posts will be set at every 250' internal.
- Assumed allowable lateral pressure 200 psf/ft below 18" depth per soil report
- Depending on Availability WT40 will be Substituted for SPS40

Three Corners Solar Project

75" GAME FENCE DETAIL

Deer Fencing

N.T.S.



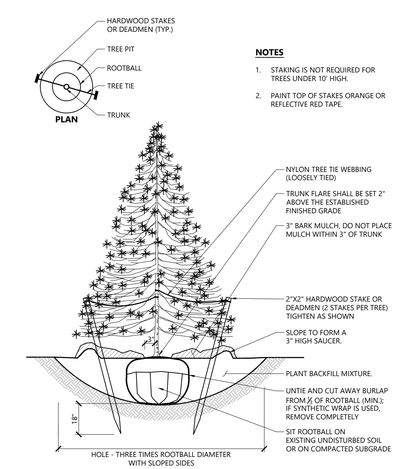
NOTES

1. CORE MATERIAL SHALL HAVE A PERMEABILITY OF LESS THAN 1X10^-5 INCHES PER HOUR.
2. THE BERM SECTION MAY BE BASED ON THE RESULTS OF FURTHER GEOTECHNICAL INVESTIGATIONS.
3. COMBINE GABIONS TO MEET WIDTH AND LENGTH DIMENSIONS AND ELEVATIONS SHOWN ON PLAN. TYPICAL GABION IS 3' WIDE x 3' HIGH x 3' LONG.
4. PROVIDE FILTER FABRIC TO PREVENT EARTH EMBANKMENT FROM SILTING INTO GABIONS.
5. SEE SPECIFICATIONS FOR EMBANKMENT MATERIALS.
6. GABION ROCK TO BE PER EARTHWORK SPECIFICATIONS; STONE FOR PIPE ENDS WITH
7. SIZE D_{50}=50.

Sediment Forebay Berm

1/16

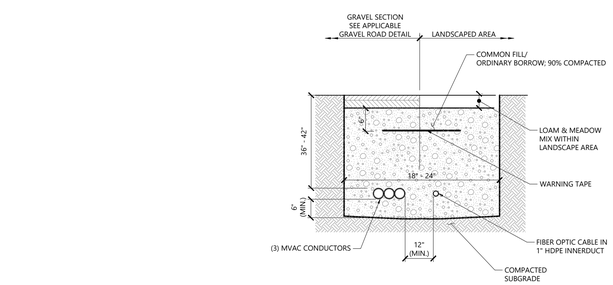
N.T.S. Source: VHB LD_164



Evergreen Tree Planting

1/16

N.T.S. Source: VHB LD_604

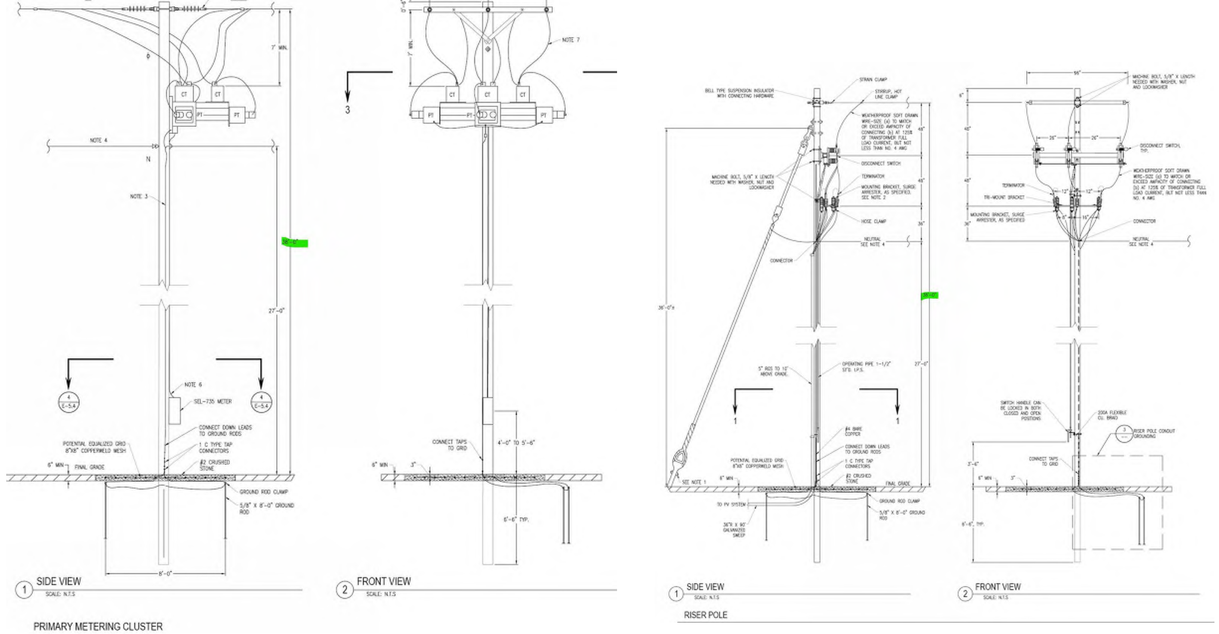


NOTES

1. WHERE UTILITY TRENCHES ARE CONSTRUCTED THROUGH DETENTION BASIN BERMS OR OTHER SUCH SPECIAL SECTIONS, PLACE TRENCH BACKFILL WITH MATERIALS SIMILAR TO THE SPECIAL SECTION REQUIREMENTS.
2. USE METALLIC TRACING/WARNING TAPE OVER ALL PIPES.

Underground Electric Trench

N.T.S. Source: Longroad REV



Primary Meter & Riser TYP Details

N.T.S. Source: Longroad

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PO Box 9151
Watertown, MA 02471
617.924.1770

Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation

0 Route 25
Wareham, MA

No.	Revision	Date	Appvd.

Designed by LMT | Checked by SKE

Issued for: Local Approvals

Date: June 26, 2023

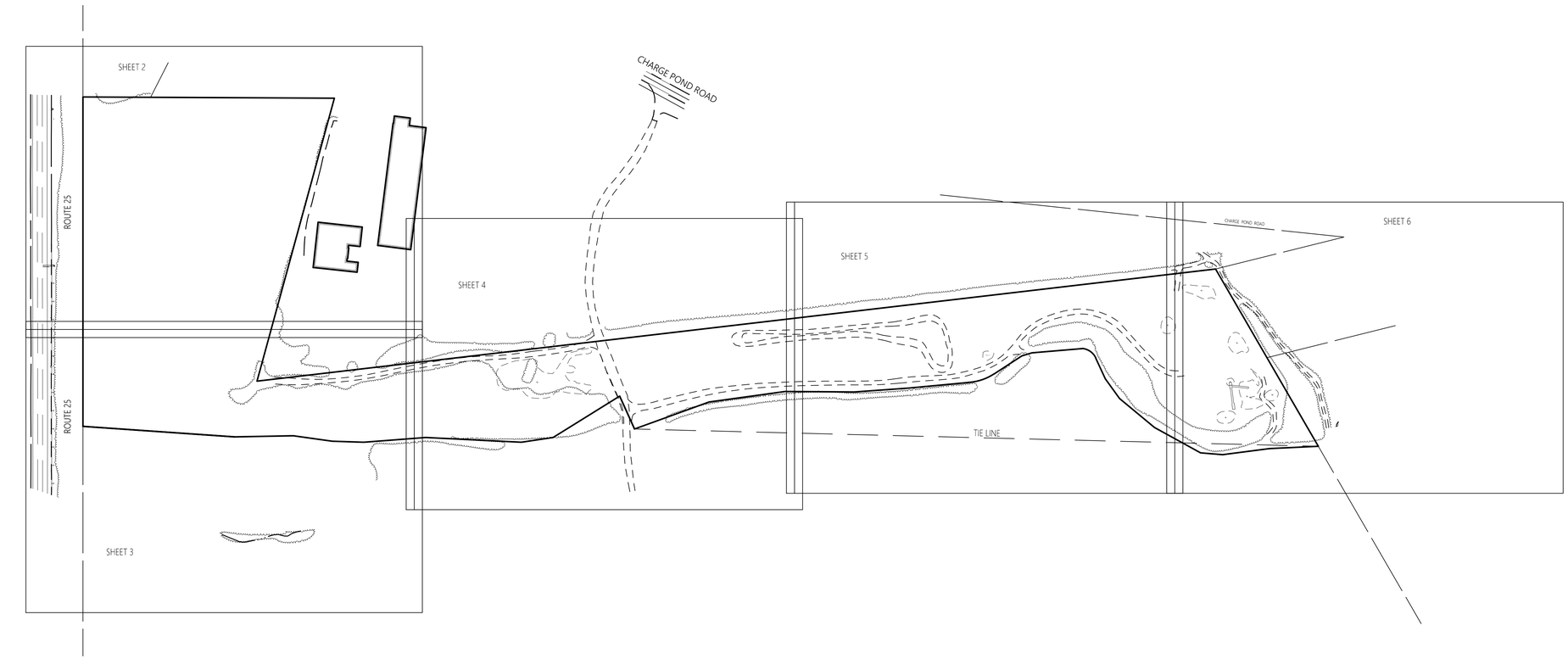
Drawing Title: Site Details

Drawing Number: C3.02

Sheet 7 of 7

Project Number: 15225.01

COMMONWEALTH OF MASSACHUSETTS
SARAH EBAUGH
CIVIL
No. 60514
REGISTERED PROFESSIONAL ENGINEER
09/25/2023



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General Notes

1) THE PROPERTY LINES SHOWN ON THIS PLAN ARE BASED UPON AN ACTUAL FIELD SURVEY CONDUCTED BY VHB, INC. IN DECEMBER, 2020 AND FROM DEEDS AND PLANS OF RECORD.
2) THE EXISTING CONDITIONS SHOWN ON THIS PLAN WERE DEVELOPED FROM A COMBINED EFFORT OF AERIAL PHOTOGRAMMETRIC AND LIDAR METHOD MAPPING BY EASTERN TOPOGRAPHICS, INC., BASED ON AERIAL PHOTOGRAPHS TAKEN ON NOVEMBER 29, 2020 AND FROM AN ACTUAL ON-THE-GROUND INSTRUMENT SURVEY PERFORMED BY VHB, INC. IN MAY, 2021.
3) THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES SHOWN ON THIS PLAN ARE BASED ON FIELD OBSERVATIONS AND INFORMATION OF RECORD. THEY ARE NOT WARRANTED TO BE EXACTLY LOCATED NOR IS IT WARRANTED THAT ALL UNDERGROUND UTILITIES OR OTHER STRUCTURES ARE SHOWN ON THIS PLAN.
4) HORIZONTAL DATUM IS BASED ON MASS. GRID SYSTEM, NAD 1983. ELEVATIONS SHOWN ON THIS PLAN REFER TO NAVD OF 1988.
5) THIS SURVEY WAS PREPARED WITHOUT THE BENEFIT OF A CURRENT TITLE REPORT AND MAY BE SUBJECT TO ADDITIONAL INFORMATION DISCLOSED IN SUCH.
6) THE WETLANDS SHOWN ON THIS PLAN WERE FLAGGED AND LOCATED (USING GPS) BY VHB ENVIRONMENTAL DEPARTMENT IN FEBRUARY, 2020.

Record Owner

DAVID FLETCHER
MAP 115 LOT 1000
BOOK 34514, PAGE 232

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Legend

- DRAIN MANHOLE
- CATCH BASIN
- SEWER MANHOLE
- ELECTRIC MANHOLE
- TELEPHONE MANHOLE
- MANHOLE
- HH HAND HOLE
- WATER GATE
- FIRE HYDRANT
- GAS GATE
- BOLLARD w/LIGHT
- STREET SIGN
- LIGHT POLE
- UTILITY POLE
- GUY POLE
- GUY WIRE
- MONITORING WELL
- FLOOD LIGHT
- W WELL
- MARSH
- F.F.E.=45.27' FINISHED FLOOR ELEVATION
- CNO COULD NOT OPEN
- NPV NO PIPES VISIBLE
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- DWL DASHED WHITE LINE
- SYL SINGLE YELLOW LINE
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- 200'RA 200-FT RIVER FRONT AREA
- AHT-100 LIMIT MEAN ANNUAL HIGH WATER
- BF1-100 LIMIT OF BANK
- WFT-100 VEGETATED WETLAND BOUNDARY

Proposed Solar Array

Route 25
Wareham, Massachusetts

No.	Revision	Date	Appvd.

Designed by | Checked by
Issued for | Date
January 12, 2021

Drawing Title
Existing Conditions Plan of Land

Drawing Number
Sv-1

Sheet 1 of 6

Project Number
14668.03

COMMONWEALTH OF MASSACHUSETTS
RUSSELL J. BOUSQUET
NO. 35389
REGISTERED PROFESSIONAL LAND SURVEYOR
8-3-2021

SHEET 2

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Proposed Solar Array

Route 25
Wareham, Massachusetts

No.	Revision	Date	Appvd.

Designed by | Checked by

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January 12, 2021

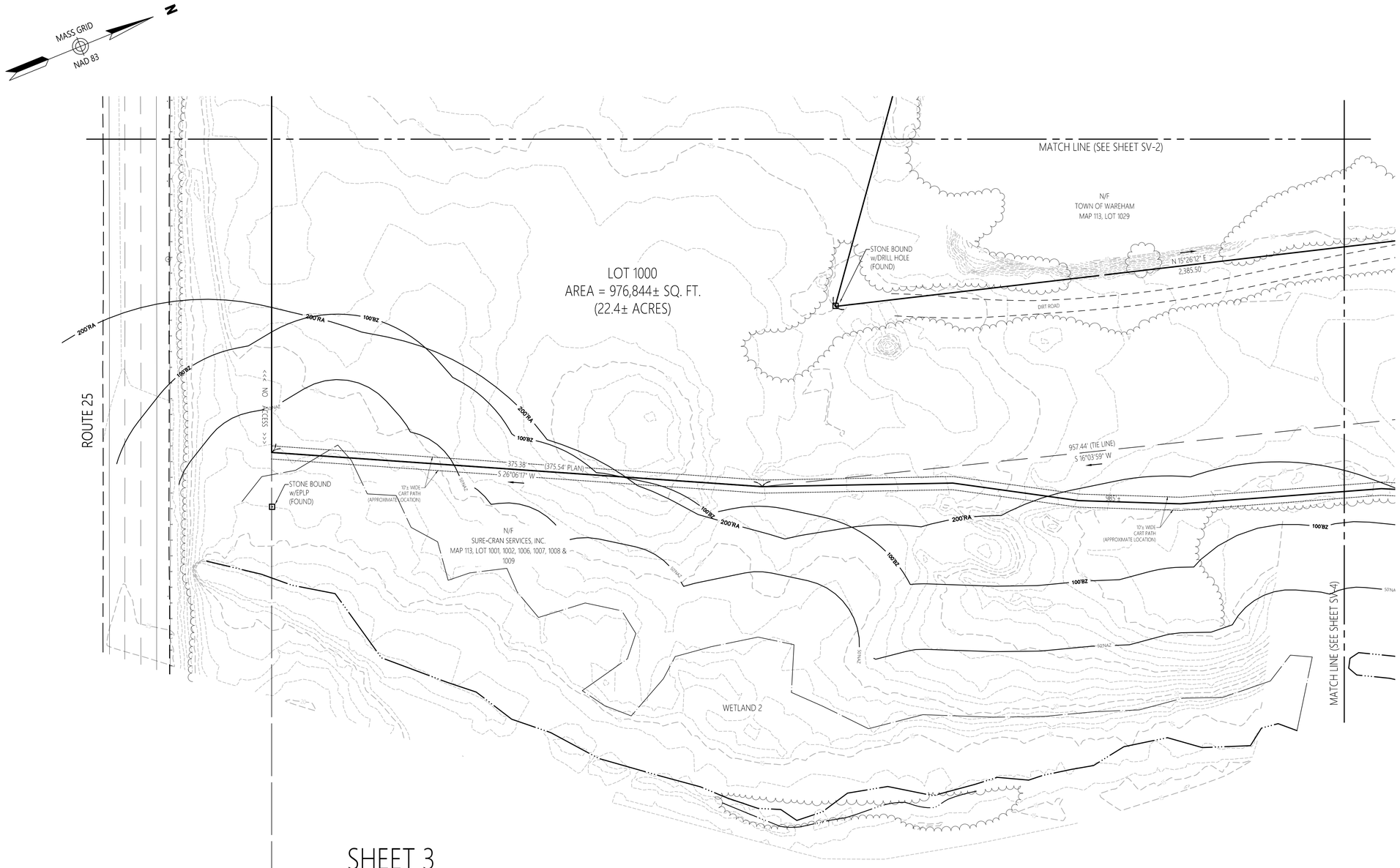
Drawing Title
Existing Conditions Plan of Land

Drawing Number
Sv-2

Sheet 2 of 6

Project Number
14668.03

COMMONWEALTH OF MASSACHUSETTS
RUSSELL J. BOUSQUET
NO. 35389
REGISTERED PROFESSIONAL LAND SURVEYOR
8-3-2021



SHEET 3

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Proposed Solar Array

Route 25
Wareham, Massachusetts

No.	Revision	Date	Appvd.

Designed by | Checked by

Issued for | Date

January 12, 2021

Drawing Title

Existing Conditions Plan of Land

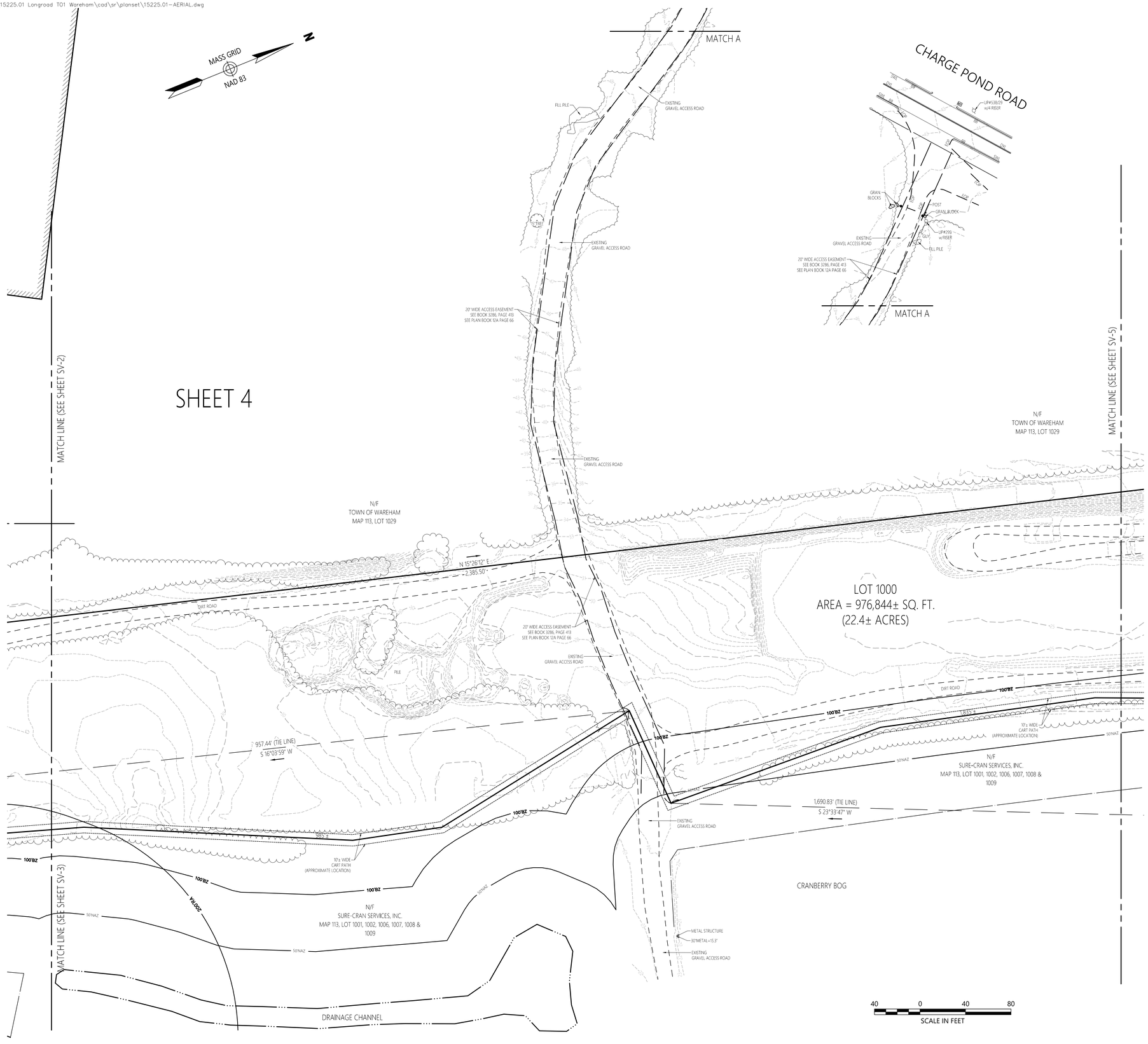
Drawing Number

Sv-3

Sheet 3 of 6

Project Number **14668.03**

COMMONWEALTH OF MASSACHUSETTS
RUSSELL J. BOUSQUET
NO. 35389
REGISTERED PROFESSIONAL LAND SURVEYOR
8-3-2021



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Proposed Solar Array

Route 25
Wareham, Massachusetts

No.	Revision	Date	Appvd.

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January 12, 2021

Drawing Title

Existing Conditions Plan of Land

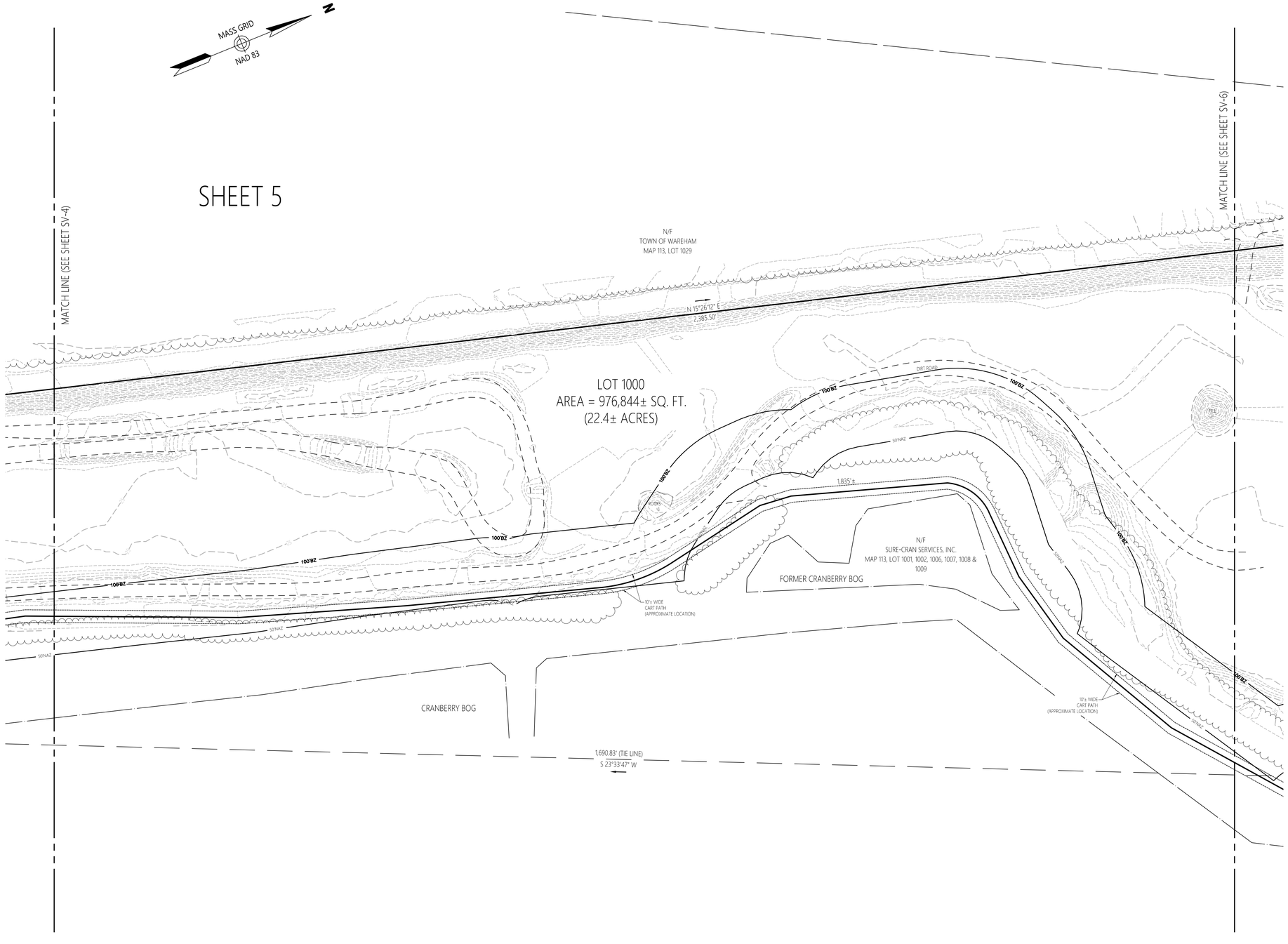
Drawing Number

Sv-4

Sheet 4 of 6

Project Number **14668.03**

COMMONWEALTH OF MASSACHUSETTS
RUSSELL J. BOUSQUET
NO. 35389
REGISTERED
PROFESSIONAL LAND SURVEYOR
8-3-2021



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Proposed Solar Array

Route 25
Wareham, Massachusetts

No.	Revision	Date	Appvd.

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January 12, 2021

Drawing Title

Existing Conditions Plan of Land

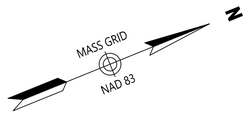
Drawing Number

Sv-5

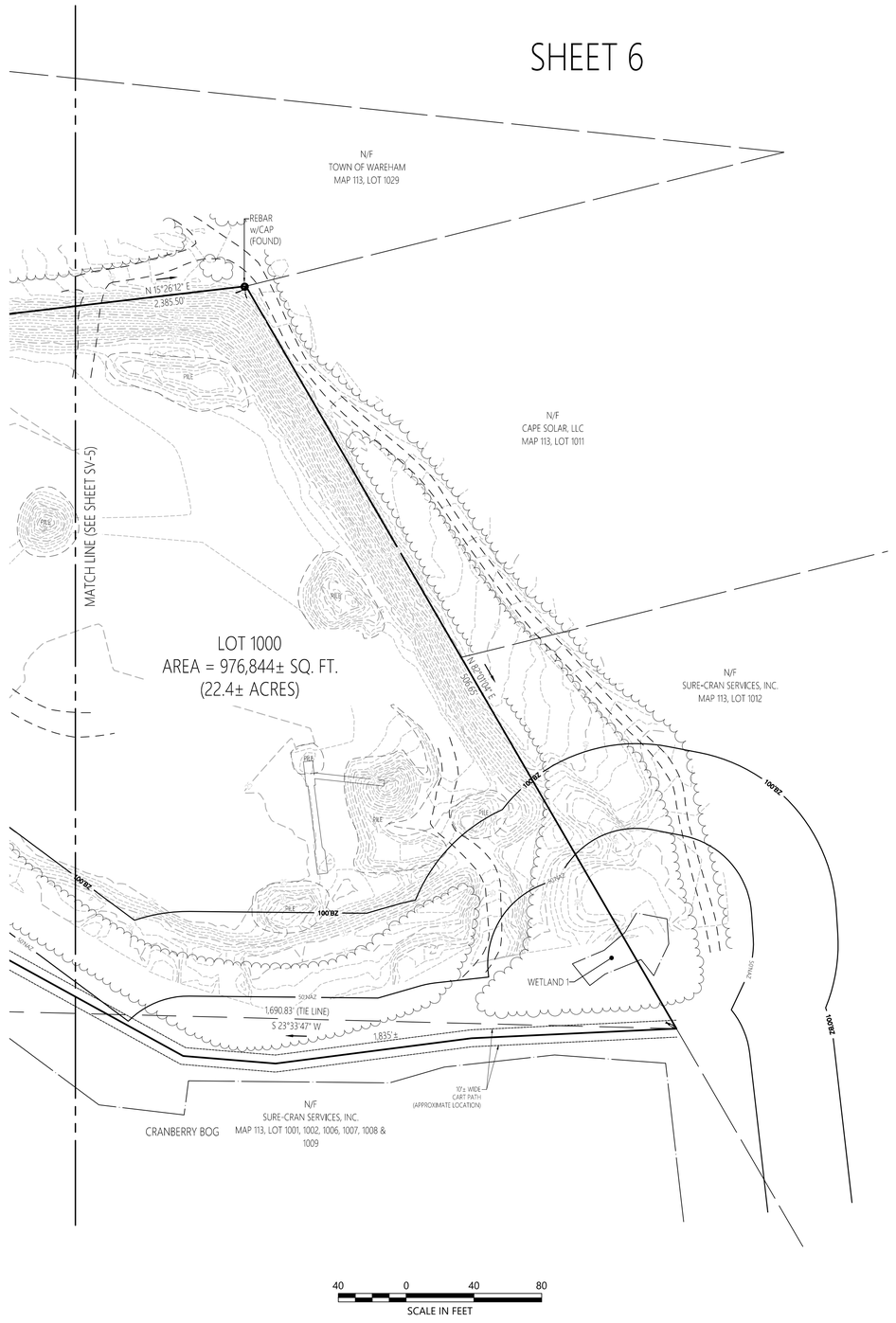
Sheet 5 of 6

Project Number
14668.03

COMMONWEALTH OF MASSACHUSETTS
RUSSELL J. BOUSQUET
NO. 35389
REGISTERED PROFESSIONAL LAND SURVEYOR
8-3-2021



SHEET 6



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Proposed Solar Array

Route 25
Wareham, Massachusetts

No.	Revision	Date	Appvd.

Designed by | Checked by

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January 12, 2021

Drawing Title
Existing Conditions Plan of Land

Drawing Number
Sv-6

Sheet 6 of 6

Project Number
14668.03

Stormwater Management Report

STORMWATER REPORT

Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation

0 Route 25
Wareham, Massachusetts

PREPARED FOR

Wareham PV I, LLC
330 Congress Street, 6th Floor
Boston, MA 02210
617.377.4301

PREPARED BY

101 Walnut Street
PO Box 9151
Watertown, MA 02471
617.924.1770

June 2023
REV September 2023

Table of Contents

List of Tables

List of Figures

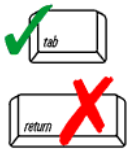
Checklist for Stormwater Report

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

---

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

11/4/2022

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☒ New development

☐ Redevelopment

☐ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☐ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☒ Grass Channel

☐ Green Roof

☒ Other (describe): Surface Infiltration Basins

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☐ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☐ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided. No net increase of impervious area, therefore required recharge volume is 0. Provided volume calculations are included.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☒ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☒ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☐ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

- ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
- ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
- ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
- ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

No net increase of impervious area,
therefore required water quality volume is 0.
Provided volume calculations are included.

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☐ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☐ The BMP is sized (and calculations provided) based on:

- ☐ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs) N/A

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas Project does not discharge to or near a critical area.

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable N/A

☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☐ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☐ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☐ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☐ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

Stormwater Report Narrative

This Stormwater Report has been prepared to demonstrate compliance with the Massachusetts Stormwater Management Standards in accordance with the Massachusetts Wetlands Protection Act Regulations (310 CMR 10.00).

Project Description

The Applicant, Wareham PV I, LLC, is proposing to construct up to a ±3.5-megawatt (AC) large ground-mounted solar energy facility (the Project) located at 0 Route 25 in Wareham, Massachusetts (the Site). As proposed, the Project consists of approximately 12.0 acres of solar panels, utility infrastructure, access road, fencing and related amenities to support this use.

Site Description

The Project Site is a 22.4-acre parcel of land (the Site) located at 0 Route 25 in Wareham, Massachusetts (see Figure 1) which is noted as Map 115, Parcel 1000 according to the Wareham assessor's department. The Site lies within the surface watershed of Buzzards Bay and is bounded by undeveloped woodlands to the north, Route 25 to the south, existing cranberry bogs to the east, and commercial development to the west. See Figure 1, Site Locus Map. The Site is located within the Zone X flood area hazard, with minimal risk of flooding. See Figure 4.

Wetland Resource Areas on the Site include the following:

Table 1 Existing Conditions Hydrologic Data

Name	Critical Area (yes/no)	Zone 1 or Zone A (yes/no)	ORW or SRW (yes/no)	Zone II or IWPA (yes/no)	Other
Wetland 1	No	No	No	No	Isolated Vegetated Wetland
Wetland 2	No	No	No	No	Perennial stream and wetland located off-site, buffer zone encroaches on property

The proposed Project does not impact the wetlands or associated buffer zones on site. The Wareham Conservation Commission issued a negative determination of applicability on October 27, 2022.

VHB conducted two preliminary test pits on April 14, 2021 in the vicinity of proposed infiltration. Information gathered indicated that the soils on site consisted of Sandy Loam from 4" below surface grade to approximately 24"-27". Groundwater was encountered at 44" below surface grade at TP1-1 and 50" below surface grade at TP1-2. These elevations were used as estimated seasonal high ground water (ESHGW) for modeling purposes. Additional test pits will be conducted prior to construction in accordance with the Massachusetts DEP Stormwater Handbook.

According to the National Resources Conservation Service (NRCS), surface soils on the Site include Carver Coarse Sand (252B), Windsor Loamy Sand (255A), Windsor Loamy Sand (255B), and Deerfield Loamy Fine Sand (256A). On-site soils are classified as Hydrologic Soil Groups (HSG) A. Based on the soils information included in Appendix C, the Site is not considered to be within an area of rapid infiltration (soils with a saturated hydraulic conductivity greater than 2.4 inches per hour).

Existing Drainage Conditions

Under existing conditions, the portion of the Site north of the existing gravel access road is predominately cleared land consisting of bare sandy areas with no tree cover, with rolling flat topography of existing mounds of sand and depressions throughout. The existing depressions have been modeled as detention ponds and are shown to pond approximately 6" in the 100-year storm. For storms greater than the 100-year storm, runoff overtops the depressions and overflows to the adjacent cranberry bogs.

The portion of the Site to the south of the gravel access road is mostly undeveloped forest, with portions of bare sandy areas, and an existing gravel path that runs throughout the Site. This area is mostly hilly, with slopes ranging from 2% to 15%. Based on existing grades, it appears that there is overflow runoff onto the Site from the municipal building directly to the east.

Figure 2 illustrates the existing drainage conditions. Currently, the Site is divided into eight (8) drainage areas as stormwater runoff flows to three (3) Design Points, which have been identified as DP-1: Off-Site, DP-2: Wetlands, and DP-3: Existing Cranberry Bogs. DP-1 is located at the southwestern corner of the site, just north of Route 25. DP-2 is designated as the area of wetlands to the southeast and northern corner of the site, and DP-3 is designated as the existing cranberry bogs to the east of the site along the eastern edge of the site.

Table 2 below provides a summary of the existing conditions hydrologic data.

Table 2 Existing Conditions Hydrologic Data

Drainage Area	Discharge Location	Design Point	Area (Acres)	Curve Number	Time of Concentration (min)
EX-1	Off-Site	1	2.79	31	45.4
EX-2	Wetlands	2	7.86	31	36.6
EX-3	Existing Bogs	3	1.92	39	30.9
EX-4	Existing Bogs	3	2.01	58	20.1
EX-5	Existing Bogs	3	3.78	72	6.5
EX-6	Existing Bogs	3	1.93	67	4.3
EX-7	Existing Bogs	3	2.48	63	1.8
EX-8	Wetlands	2	0.14	40	7.1

Proposed Drainage Conditions

Figure 3 illustrates the proposed "post construction" drainage conditions for the project. As shown, the Site will be divided into nine (9) drainage areas that discharge treated stormwater to the three existing Design Points. Table 3 below provides a summary of the proposed conditions hydrologic data.

Table 3 Proposed Conditions Hydrologic Data

Drainage Area	Discharge Location	Design Point	Area (Acres)	Curve Number	Time of Concentration (min)
PR-1	Off-site	DP-1	2.35	30	14.4
PR-2	Wetlands	DP-2	5.95	34	19.0
PR-3	Wetlands	DP-2	1.23	43	22.2
PR-4A	Wetlands	DP-2	2.36	35	21.7
PR-4B	Existing Bogs	DP-3	0.67	31	10.9
PR-5	Existing Bogs	DP-3	2.01	38	12.8
PR-6	Existing Bogs	DP-3	3.78	35	22.0
PR-7	Existing Bogs	DP-3	1.93	33	17.1
PR-8	Existing Bogs	DP-3	2.48	34	8.4
PR-9	Wetlands	DP-2	0.14	36	11.6

Overall, there are no changes to the drainage patterns on site as there is minimal grading proposed on site. Any grading occurring on site will be due to the construction of a level gravel access path, or from partially leveling out the sand stockpiles in order to install the panels. Any runoff from the adjacent municipal site will continue to take the same drainage path as it currently does under existing conditions.

Within the limit of work, excluding the proposed gravel drive and infiltration basins, a meadow mix seed mix is proposed for groundcover. The meadow mix has no impact on the rate of runoff from the wooded areas of the project and provides a decreased curve number in the areas of existing sand.

A 20' wide gravel path has been proposed for fire and maintenance access to the panels. Where feasible, the path follows the alignment of the existing path to minimize disturbance. New gravel roads have been graded to drain towards grassed swales, conveying runoff to the surface infiltration basins. Electrical conduit is proposed to be installed underground within the limits of the existing 20' wide access easement from the Site to Charge Pond Road. Where disturbance for construction occurs, the gravel road will be rebuilt in kind, and the landscape area adjacent to the road will be loamed and seeded.

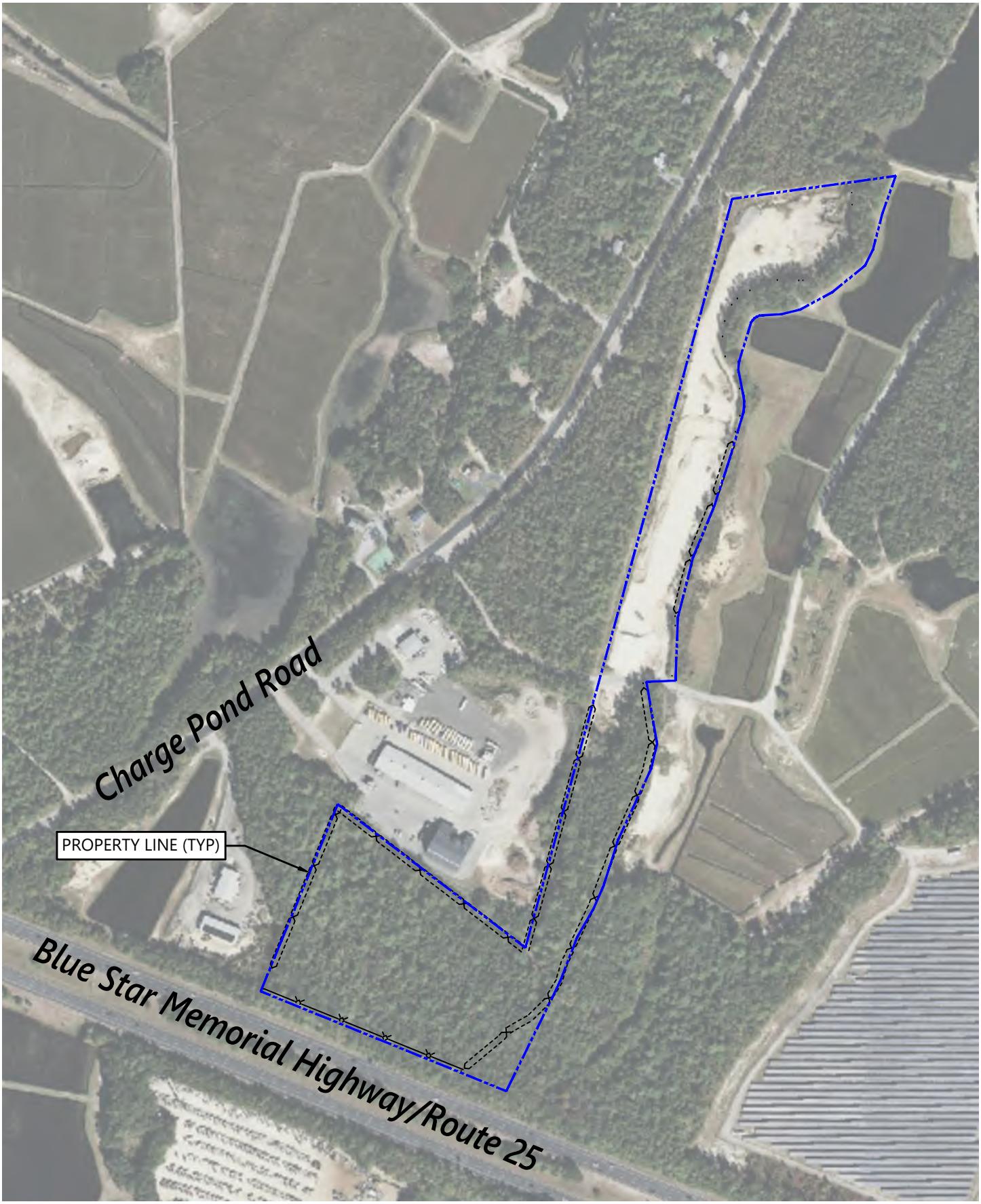
In general, stormwater runoff from drainage areas of the site where clearing is to occur and the gravel path is proposed, (proposed subcatchments PR-2 and PR-3) is collected by infiltration basins designed to mitigate peak runoff. The basins have been designed to provide a 2-foot separation between the bottom of basin and estimated seasonal high groundwater (ESHGW).

Due to the similar groundcover proposed within the tree clearing of the southeast portion of the site (proposed subcatchment PR-1), and improved groundcover in the remaining drainage areas on the northern portion of the site (proposed subcatchments PR-4 through PR-9), peaks are mitigated without the need of additional infiltration.

As there is a de minimis increase in impervious area based on the installation of three small concrete pads, the site design integrates a comprehensive stormwater management system that has been developed in accordance with the Massachusetts Stormwater Handbook.

Low Impact Development (LID) Techniques

Low Impact Development (LID) techniques and stormwater Best Management Practices (BMPs) implemented into the site design include maintaining existing stormwater runoff conditions, no net increase of impervious area, and no impact to adjacent wetlands.



0 200 400 Feet

Locus Map
0 Route 25
Wareham, MA

Figure 1

8/2/2021

0 50 100 200Feet

Legend

SYMBOLS

- DESIGN POINT
- DRAINAGE AREA DESIGNATION
- POND

LINETYPES

- DRAINAGE AREA BOUNDARY
- TIME OF CONCENTRATION FLOW LINE
- SOIL TYPE BOUNDARY
- 100' BUFFER ZONE
- WETLAND BOUNDARY

- EX-1
- EX-2
- EX-3
- EX-4
- EX-5
- EX-6
- EX-7
- EX-8

SCS SOIL CLASSIFICATIONS

- 37A — MASSASOIT - MASHPEE COMPLEX, 0 TO 3 PERCENT SLOPES, HSG D
- 60A — SWANSEA COARSE SAND, 0 TO 2 PERCENT SLOPES, HSG B/D
- 252B — CARVER COARSE SAND, 3 TO 8 PERCENT SLOPES, HSG A
- 255A — WINDSOR LOAMY SAND, 0 TO 3 PERCENT SLOPES, HSG A
- 255B — WINDSOR LOAMY SAND, 3 TO 8 PERCENT SLOPES, HSG A
- 256A — DEERFIELD LOAMY FINE SAND, 0 TO 3 PERCENT SLOPES, HSG A
- 602B — URBAN LAND, 0 TO 8 PERCENT SLOPES
- 665B — UDIPSAMMENTS, 0 TO 8 PERCENT SLOPES, HSG A

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0 Route 25
Wareham, MA

No.	Revision	Date	Appvd.

Designed by WGM | Checked by SKE

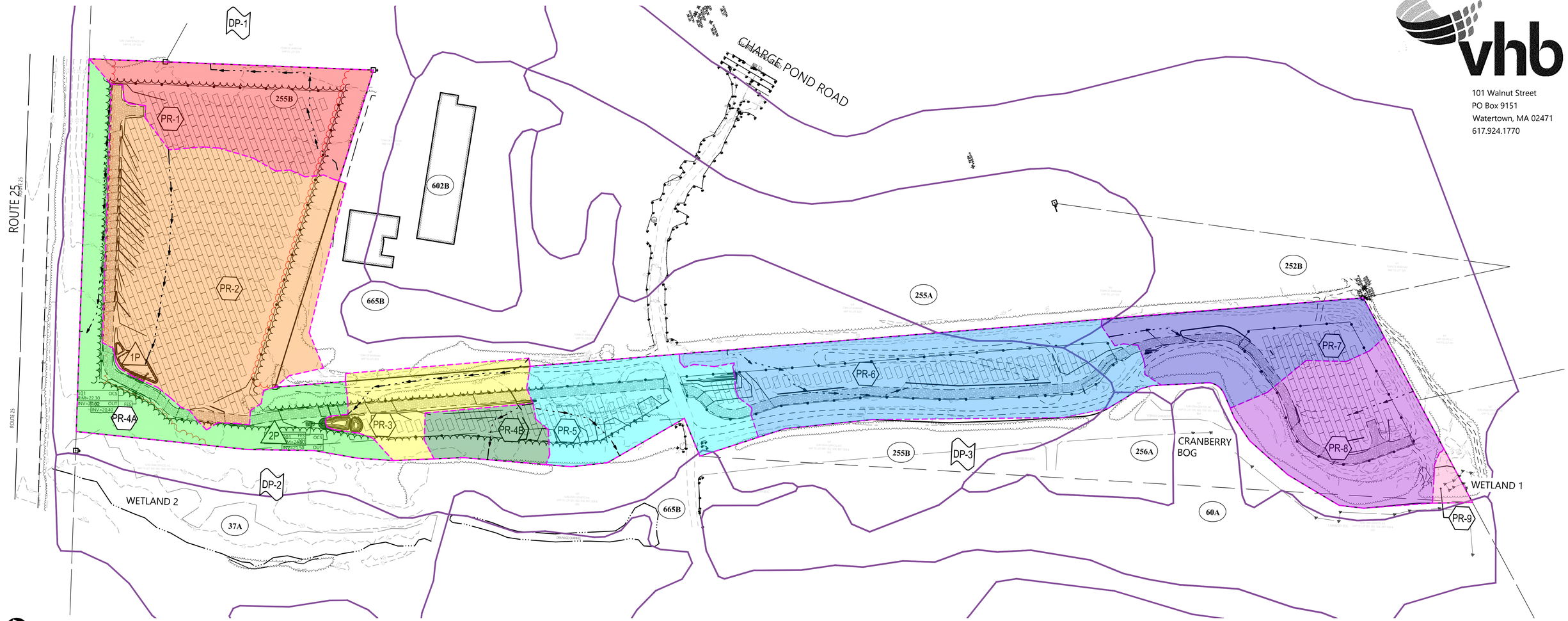
Issued for: Local Approvals | Date: 9/19/2023

Drawing Title
Existing Drainage

Drawing Number
Fig 2

Sheet 2 of 3

Project Number
15225.01



Legend

SYMBOLS

- DESIGN POINT
- DRAINAGE AREA DESIGNATION
- INFILTRATION BASIN

LINETYPES

- DRAINAGE AREA BOUNDARY
- TIME OF CONCENTRATION FLOW LINE
- SOIL TYPE BOUNDARY
- 100' BUFFER ZONE
- WETLAND BOUNDARY

- PR-1
- PR-2
- PR-3
- PR-4A
- PR-4B
- PR-5
- PR-6
- PR-7
- PR-8
- PR-9

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256A	DEERFIELD LOAMY FINE SAND, 0 TO 3 PERCENT SLOPES, HSG A
602B	URBAN LAND, 0 TO 8 PERCENT SLOPES
665B	UDIPSAMMENTS, 0 TO 8 PERCENT SLOPES, HSG A

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0 Route 25
Wareham, MA

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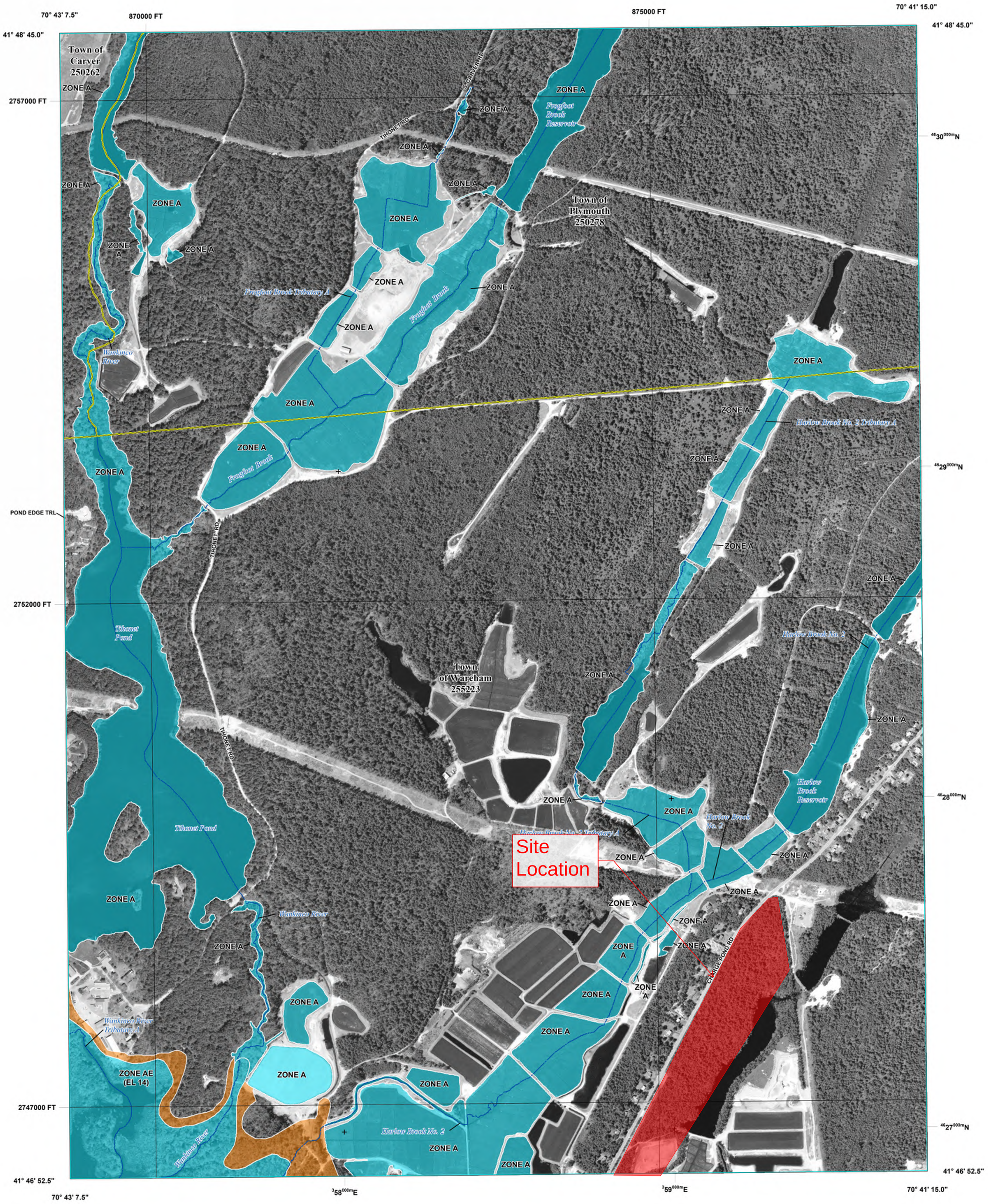
Drawing Title
Proposed Drainage

Drawing Number
Fig 3

Sheet 3 of 3

Project Number
15225.01



FLOOD HAZARD INFORMATION

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTPS://MSC.FEMA.GOV

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE) *Zone A,V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD

- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS

- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES

- E 18.2 / 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation
- 8 Coastal Transect
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on the FIRM uses 2013 and 2014 imagery provided by the U.S. Geological Survey and 2016 transportation data provided by the U.S. Census Bureau, with all other vector data unchanged from the previous FIRM.

SCALE

N

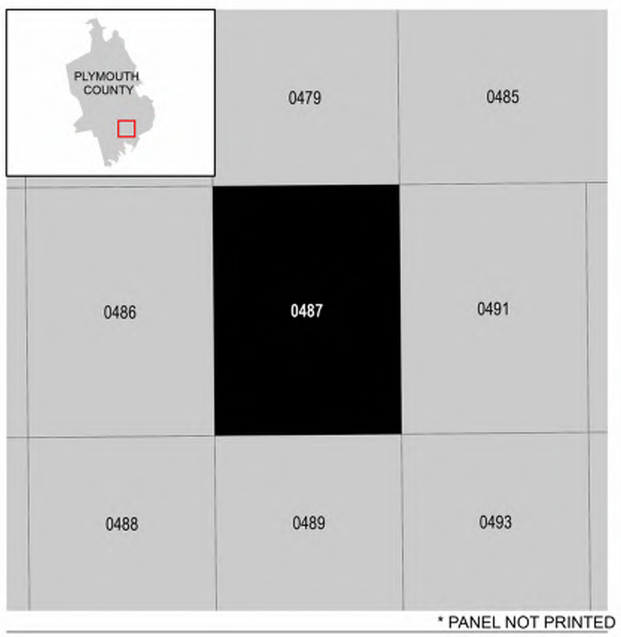
Map Projection:
NAD 1983 State Plane, Massachusetts Mainland, FIPS 2001, Feet; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 500 1,000 2,000 Feet

0 130 260 520 Meters

PANEL LOCATOR



* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

PLYMOUTH COUNTY, MASSACHUSETTS

(ALL JURISDICTIONS)

PANEL 487 OF 650

FEMA

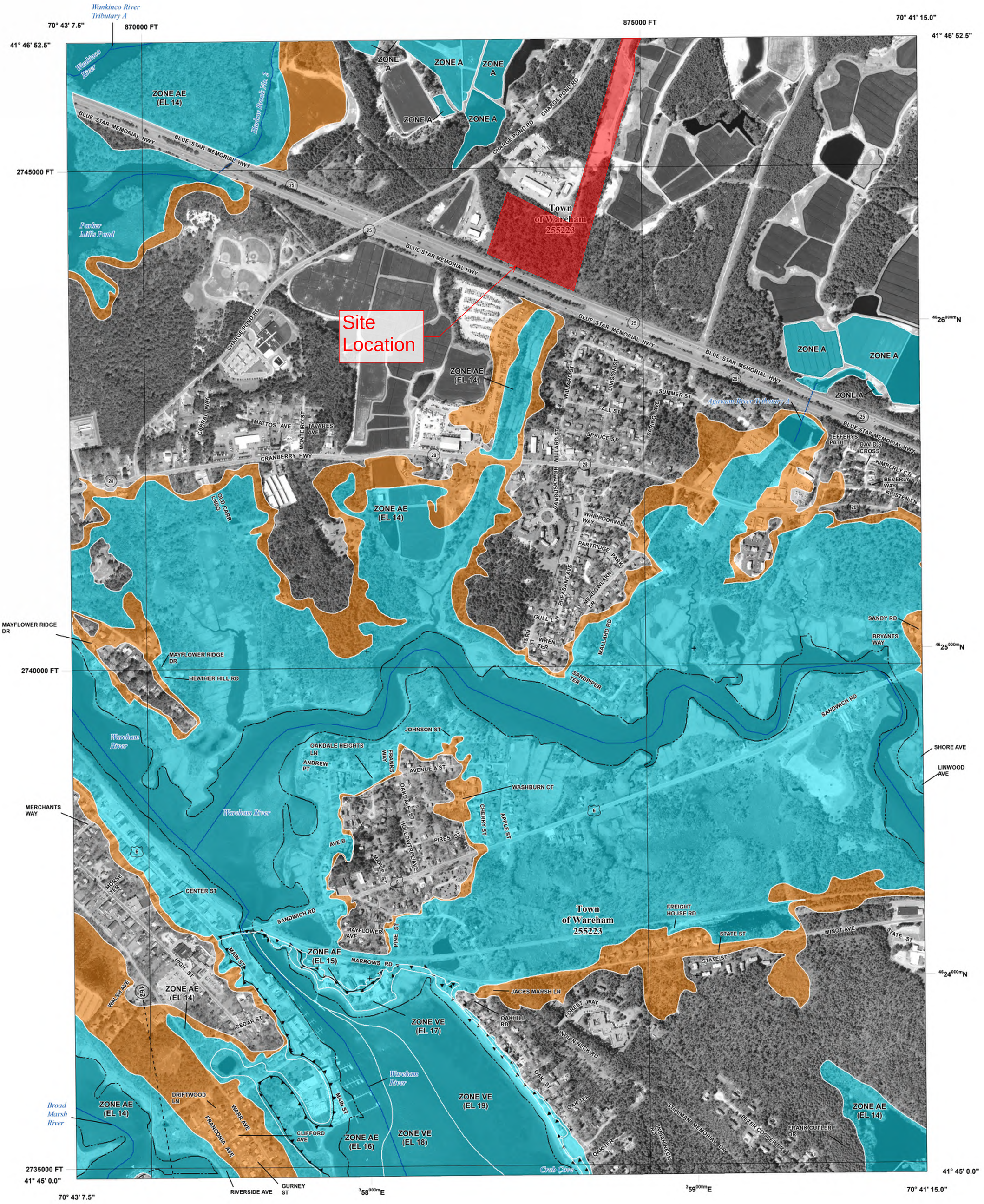
Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
CARVER, TOWN OF	250262	0487	K
PLYMOUTH, TOWN OF	250278	0487	K
WAREHAM, TOWN OF	255223	0487	K

VERSION NUMBER
2.6.3.5

MAP NUMBER
25023C0487K

MAP REVISED
July 6, 2021



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- Jurisdiction Boundary

NOTES TO USERS

For information and questions about this Flood Insurance Rate Map (FIRM), available products associated with this FIRM, including historic versions, the current map date for each FIRM panel, how to order products, or the National Flood Insurance Program (NFIP) in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Flood Map Service Center website at https://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Flood Map Service Center at the number listed above.

For community and countywide map dates refer to the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

Base map information shown on the FIRM uses 2013 and 2014 imagery provided by the U.S. Geological Survey and 2016 transportation data provided by the U.S. Census Bureau, with all other vector data unchanged from the previous FIRM.

LIMIT OF MODERATE WAVE ACTION: Zone AE has been divided by a Limit of Moderate Wave Action (LiMWA). The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between Zone VE and the LiMWA (or between the shoreline and the LiMWA for areas where Zone VE is not identified) will be similar to, but less servere than, those in the Zone VE.

Limit of Moderate Wave Action (LiMWA)

SCALE

N

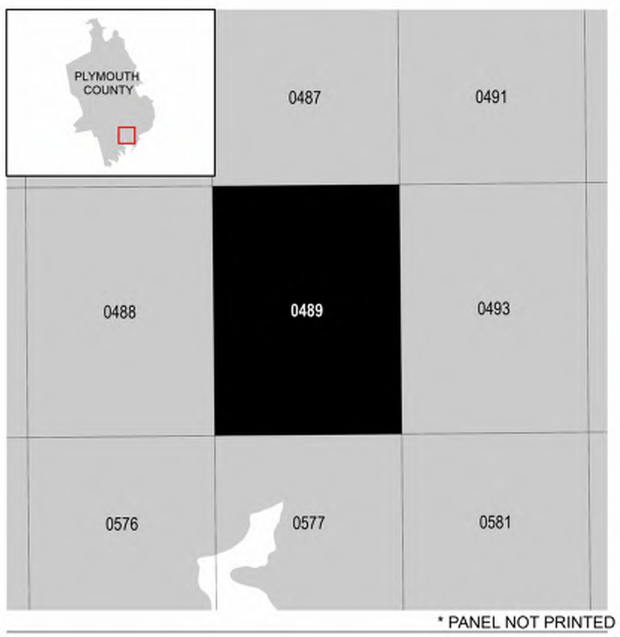
Map Projection:
NAD 1983 State Plane, Massachusetts Mainland, FIPS 2001, Feet; Western Hemisphere; Vertical Datum: NAVD 88

1 inch = 500 feet 1:6,000

0 500 1,000 2,000 Feet

0 130 260 520 Meters

PANEL LOCATOR



* PANEL NOT PRINTED

FEMA

National Flood Insurance Program

NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP

PLYMOUTH COUNTY, MASSACHUSETTS

(ALL JURISDICTIONS)

PANEL 489 OF 650

FEMA

Panel Contains:

COMMUNITY	NUMBER	PANEL	SUFFIX
WAREHAM, TOWN OF	255223	0489	L

VERSION NUMBER
2.6.3.5

MAP NUMBER
25023C0489L

MAP REVISED
July 6, 2021

Regulatory Compliance

Massachusetts Department of Environmental Protection (DEP) – Stormwater Management Standards

As demonstrated below, the proposed Project fully complies with the DEP Stormwater Management Standards.

Standard 1: No New Untreated Discharges or Erosion to Wetlands

The Project has been designed to comply with Standard 1.

The Best Management Practices (BMPs) included in the proposed stormwater management system have been designed in accordance with the Massachusetts Stormwater Handbook. Supporting information and computations demonstrating that no new untreated discharges will result from the Project are presented through compliance with Standards 4 through 6.

All proposed Project stormwater outlets and conveyances from infiltration basins have been designed to not cause erosion or scour to wetlands or receiving waters. Outlets from closed drainage systems have been designed with flared end sections and stone protection to dissipate discharge velocities. Overflows from BMP's that impound stormwater have been designed with stone to protect downgradient areas from erosion.

Calculations and supporting information are included in Appendix A.

Standard 2: Peak Rate Attenuation

The Project has been designed to comply with Standard 2.

The rainfall-runoff response of the Site under existing and proposed conditions was analyzed for storm events with recurrence intervals of 2, 10, 25 and 100 years. Rainfall volumes used for this analysis were based on the Natural Resources Conservation Service (NRCS) Type III, 24-hour storm and NOAA Atlas 14 precipitation depths for the site: 3.44, 5.04, 6.04, and 7.58 inches, respectively. The results of the analysis, as summarized in Table 4 below, indicate that there is no increase in peak discharge rates between the existing and proposed conditions.

Computations and supporting information regarding the hydrologic modeling are included in Appendix B.

Table 4 Peak Discharge Rates (cfs*)

Design Point	2-year	10-year	25-year	100-year
DP-1: Off-Site				
Existing	0.0	0.0	0.0	0.1
Proposed	0.0	0.0	0.0	0.1
DP-2: Wetlands				
Existing	0.0	0.0	0.1	0.6
Proposed	0.0	0.0	0.1	0.6
DP-3: Existing Cranberry Bogs				
Existing	0.4	1.6	2.7	4.7
Proposed	0.0	0.1	0.5	2.6

Standard 3: Stormwater Recharge

The Project has been designed to comply with Standard 3.

The Project does not result in an increase of impervious area. Therefore, in accordance with the Stormwater Handbook, the Required Recharge Volume for the Project is 0 cubic feet. The proposed infiltration basins provide a total Recharge Volume of 5,323 cubic feet.

Soil evaluation (including Geotechnical Report), computations, and supporting information are included in Appendix C.

Standard 4: Water Quality

The Project has been designed to comply with Standard 4.

The Project does not result in an increase of impervious area. Therefore, in accordance with the Stormwater Handbook, the Required Water Quality Treatment Volume is 0 cubic feet.

However, the stormwater management system implements a treatment train of BMPs that have been designed to provide a water quality treatment volume of 5,323 cubic feet within the two infiltration basins.

Supporting calculations are included in Appendix D.

Standard 5: Land Uses with Higher Potential Pollutant Loads (LUHPPLs)

The Project is not considered a LUHPPL.

Standard 6: Critical Areas

The Project will not discharge stormwater near or to a critical area.

Infiltration basins are proposed to mitigate stormwater runoff rates. Runoff will infiltrate or flow overland through undisturbed wooded areas before entering the bordering vegetated wetlands. The infiltration basins are located outside of the 50' no-disturb-zone (NDZ).

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the Maximum Extent Practicable

The Project has been designed to comply with all ten of the Stormwater Management Standards.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Controls

The Project will disturb approximately 19.3 acres of land and is therefore required to obtain coverage under the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Construction General Permit. As required under this permit, a Stormwater Pollution Prevention Plan (SWPPP) will be developed and submitted before land disturbance begins. Recommended construction period pollution prevention and erosion and sedimentation controls to be finalized in the SWPPP are included in Appendix E.

Standard 9: Operation and Maintenance Plan

In compliance with Standard 9, a Post Construction Stormwater Operation and Maintenance (O&M) Plan has been developed for the Project. The O&M Plan is included in Appendix F.

Standard 10: Prohibition of Illicit Discharges

The site was previously undeveloped, and no sanitary sewer or storm drainage infrastructure is known to exist on the site. The design plans submitted with this report have been designed in full compliance with current standards. The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges.

MS4 Compliance

Section 1260 of the Wareham Zoning Bylaws notes the requirements to comply with the US EPA's MS4 permit for Massachusetts. While the MS4 standards do not strictly apply to this Project, as the proposed stormwater design does not discharge to or provide any connection to the municipal system, the system does comply with the MS4 standards as outlined below.

- 1267.1: Adherence to the ten Massachusetts Stormwater Management Standards
    - *As noted in the previous Regulatory Compliance section, the proposed stormwater management system complies with all ten Massachusetts Stormwater Standards*
- 1267.2: Newly developed sites are required to meet the following performance standards:
    - The stormwater management system shall retain the volume of runoff equivalent to one inch multiplied by the total post-construction impervious surface area on the site.
        - *As noted in Standard 3 and 4 of the Massachusetts Standards, the impervious area on site is de minimis and is not considered an increase of impervious area. Therefore, the requirement for retaining the runoff is 0 cubic feet.*
    - Remove 90% of the average annual load of TSS generated from the total post-construction impervious area on the site.
        - *As noted in Standard 3 and 4 of the Massachusetts Standards, the impervious area on site is de minimis and is not considered an increase of impervious area. Additionally, the small area of concrete pads does not generate TSS.*
    - Remove 60% of the average annual load of Total Phosphorus (TP) generated from the total post-construction impervious surface area on the site.
        - *As noted in Standard 3 and 4 of the Massachusetts Standards, the impervious area on site is de minimis and is not considered an increase of impervious area. Additionally, the small area of concrete pads does not generate TP.*
    - Use the best available method to determine the precipitation frequency for the 2-year, 10-year, 25-year, and 100-year, 24-hour storm event.
        - *Precipitation frequency data was used from the latest NOAA Atlas 14 information.*
    - Erosion and sedimentation controls shall be constructed in accordance with the Massachusetts Stormwater Handbook Vol 1 and 2, and any subsequent updates thereto.
        - *As noted in Standard 8 and 9 of the Massachusetts Stormwater Standards, erosion and sedimentation controls will be constructed in accordance with the Massachusetts Stormwater Handbook Vol 1 and 2.*

- 1267.3: Require Stormwater Management Systems on redeveloped sites to meet the following performance standards:
    - *The Project is not considered a redevelopment. See responses to 1267.2 for compliance with performance standards for newly developed sites.*
- 1267.4: Stormwater Management System Design
    - Runoff from impervious surfaces shall be recharged on the site by stormwater infiltration basins, vegetated swales, constructed wetlands or similar systems covered with natural vegetation. Runoff shall not be discharged directly to rivers, streams, or other surface water bodies. Dry wells shall be used only where other methods are not feasible. All such basins and wells shall be preceded by oil, grease, and sediment traps. The inlets of all catch basins shall be fitted with filter fabric during the entire construction process to minimize siltation or such basins shall be designed as temporary siltation basins with provisions made for final cleaning.
        - *Impervious area is de minimis and not considered an increase of impervious area. That said, runoff from the small concrete pads will be recharged through the infiltration basin or vegetated areas.*
    - For discharges to waters impaired for phosphorous, require that BMPs be optimized for phosphorous removal. Requires the use of EPA Region 1 BMP Performance Extrapolation Tool for BMPs and any subsequent update thereto.
        - *Not applicable. The Project does not discharge to waters impaired for phosphorous.*
    - For discharges to waters impaired for nitrogen, require that BMPs be optimized for nitrogen removal. Requires the use of EPA Region 1 BMP Performance Extrapolation Tool for other BMPs. and any subsequent update thereto.
        - *Not applicable. The Project does not discharge to waters impaired for nitrogen.*
    - For discharges to waters impaired for solids, oil and grease (hydrocarbons), or metals, require that: Stormwater management systems designed on commercial and industrial land use area draining to the water quality limited waterbody incorporate designs that allow for shutdown and containment where appropriate to isolate the system in the event of an emergency spill or other unexpected event. Also require any stormwater management system designed to infiltrate stormwater on commercial or industrial sites to provide the level of pollutant removal equal to or greater than the level of pollutant removal provided through the use of biofiltration of the same volume of runoff to be infiltrated, prior to infiltration.
        - *Not applicable. The Project does not discharge to waters impaired for solids, oil and grease (hydrocarbons), or metals.*

- Require regulated projects to comply with the Massachusetts Stormwater Standards and the Massachusetts Stormwater Handbook Vol. 1 and 2, and any subsequent update thereto.
  - *Acknowledged. Refer to the Regulatory Compliance to Massachusetts Standards above.*
- Include the following requirements for construction site stormwater runoff:
  - Projects must implement erosion and sediment controls including best management practices appropriate to site conditions, and efforts to minimize the area of land disturbance;
    - *Acknowledged. Erosion and sedimentation controls are shown on the provided site plans.*
  - Projects must control wastes, including discarded building materials, concrete truck wash-out, chemicals, litter, and sanitary wastes;
    - *Acknowledged. The applicant will make the contractor aware of these requirements.*
- The Permitting Authority or its appointee may inspect sites and implement sanctions to ensure compliance.
  - *Acknowledged.*

- 1267.5: As-built drawings will be submitted no later than six months after completion of construction projects. Said as-builts shall depict all on site controls, both structural and non-structural, designed to manage the stormwater associated with the completed site.
  - *Acknowledged.*
- 1267.6: The applicant shall be required to conduct regular inspections of all erosion and sedimentation control measures on the site to ensure that they are properly functioning as well as to inspect after severe storm events.
  - *Acknowledged. As the Project will be subject to a Construction General Permit, the contractor will be required to adhere to these requirements.*

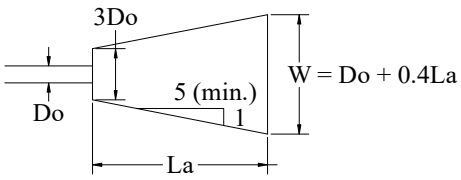
Appendix A: Standard 1 Computations and Supporting Information

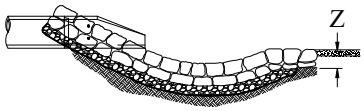
Riprap Sizing & Velocity Calculations

Outfall Riprap Sizing and Velocity Calculations

Project	Proposed Solar Array	**Project #**	15225.01
Calculated by	SKE	**Date**	07/15/21
Checked by	JRG	**Date**	07/15/21

Tw ≥ 0.5Do





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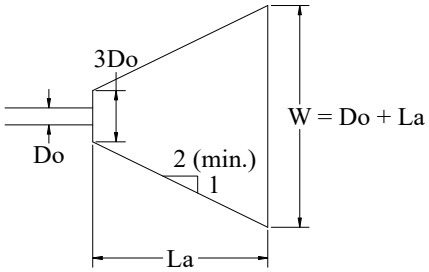
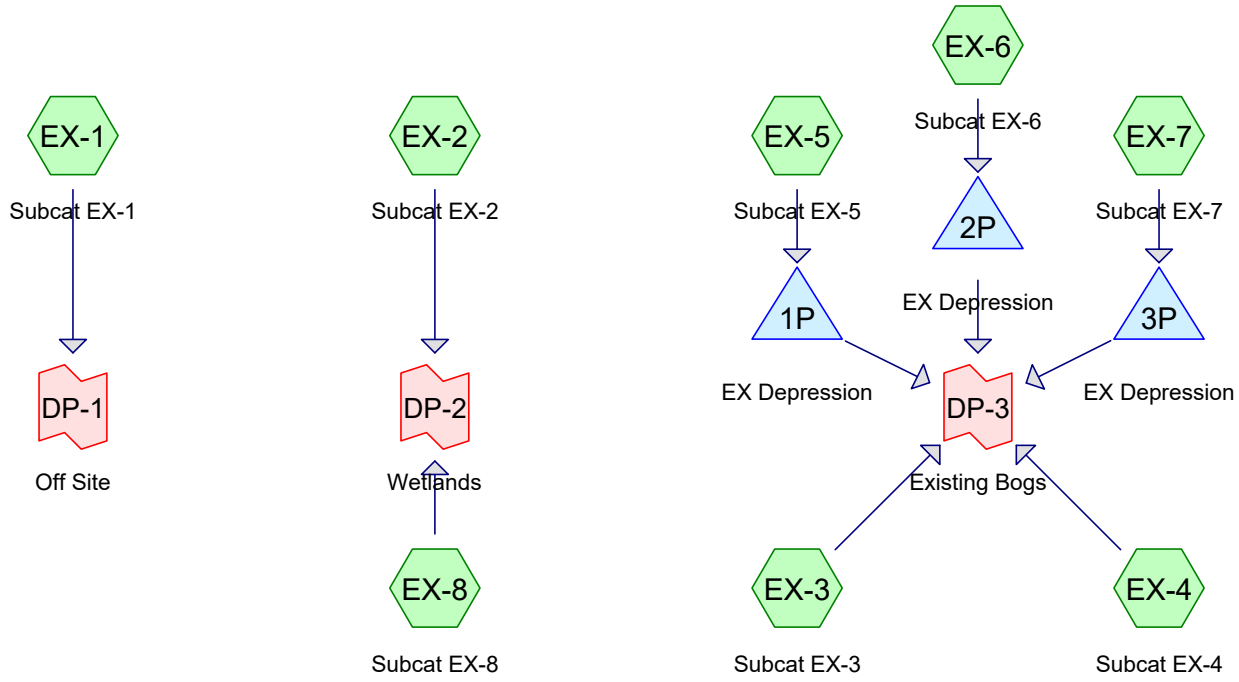


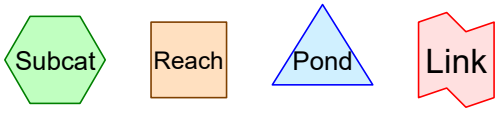
OUTLET DESCRIPTION:		**FES-1**	**FES-2**	
Design Storm	(yr)	100	100	
Flow / Discharge (Q)	(cfs)	0.0	0.2	
Defined Channel ?	-	YES	YES	
Defined Channel Width	(ft)	3	3	
Outlet Pipe Diameter (D_O)	(in)	10	6	
Tailwater Condition (T_W)	(ft)	TW < 0.5D	TW < 0.5D	
Apron Length (L_A)	(ft)	10	10	minimum length
Apron Width at Outlet ($3D_O$)	(ft)	3	3	minimum width
Apron Width at End (W)	(ft)	3	3	minimum width
Median Stone Diameter (d_{50})	(in)	6	6	
Largest Stone Diameter	(in)	9	9	
Apron Depth (Z)	(in)	13.5	13.5	

Appendix B: Standard 2 Computations and Supporting Information

The rainfall-runoff response of the Site under existing and proposed conditions was evaluated for storm events with recurrence intervals of 2, 10, 25 and 100-years. Rainfall volumes used for this analysis were based on the Natural Resources Conservation Service (NRCS) Type III, 24-hour storm and NOAA Atlas 14 precipitation depths for the site: 3.44, 5.04, 6.04, and 7.58 inches, respectively. Runoff coefficients for the pre- and post-development conditions, as previously shown in Tables 2 and 3 respectively, were determined using NRCS Technical Release 55 (TR-55) methodology as provided in HydroCAD. Drainage areas used in the analyses were described in previous sections and shown on Figures 2 and 3. The HydroCAD model is based on the NRCS Technical Release 20 (TR-20) Model for Project Formulation Hydrology.

HydroCAD Analysis: Existing Conditions





Routing Diagram for EX-Drainage
Prepared by VHB, Inc, Printed 9/18/2023

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.44	2
2	10-Year	Type III 24-hr		Default	24.00	1	5.04	2
3	25-Year	Type III 24-hr		Default	24.00	1	6.04	2
4	100-Year	Type III 24-hr		Default	24.00	1	7.58	2

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Subcat EX-1 Runoff Area=2.787 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=357' Tc=45.4 min CN=31 Runoff=0.00 cfs 0.000 af

Subcatchment EX-2: Subcat EX-2 Runoff Area=7.858 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=668' Tc=36.6 min CN=31 Runoff=0.00 cfs 0.000 af

Subcatchment EX-3: Subcat EX-3 Runoff Area=1.925 ac 0.00% Impervious Runoff Depth=0.01"
Flow Length=384' Tc=30.9 min CN=39 Runoff=0.00 cfs 0.001 af

Subcatchment EX-4: Subcat EX-4 Runoff Area=2.008 ac 0.00% Impervious Runoff Depth=0.43"
Flow Length=207' Tc=20.1 min CN=58 Runoff=0.42 cfs 0.072 af

Subcatchment EX-5: Subcat EX-5 Runoff Area=3.781 ac 0.00% Impervious Runoff Depth=1.08"
Flow Length=433' Tc=6.5 min CN=72 Runoff=4.38 cfs 0.341 af

Subcatchment EX-6: Subcat EX-6 Runoff Area=1.931 ac 0.00% Impervious Runoff Depth=0.82"
Flow Length=212' Tc=5.0 min CN=67 Runoff=1.63 cfs 0.131 af

Subcatchment EX-7: Subcat EX-7 Runoff Area=2.478 ac 0.00% Impervious Runoff Depth=0.63"
Flow Length=153' Tc=5.0 min CN=63 Runoff=1.44 cfs 0.130 af

Subcatchment EX-8: Subcat EX-8 Runoff Area=0.138 ac 0.00% Impervious Runoff Depth=0.01"
Flow Length=41' Slope=0.1960 '/' Tc=7.1 min CN=40 Runoff=0.00 cfs 0.000 af

Pond 1P: EX Depression Peak Elev=25.09' Storage=2,493 cf Inflow=4.38 cfs 0.341 af
Discarded=1.66 cfs 0.341 af Primary=0.00 cfs 0.000 af Outflow=1.66 cfs 0.341 af

Pond 2P: EX Depression Peak Elev=25.14' Storage=1,065 cf Inflow=1.63 cfs 0.131 af
Discarded=0.55 cfs 0.131 af Primary=0.00 cfs 0.000 af Outflow=0.55 cfs 0.131 af

Pond 3P: EX Depression Peak Elev=25.02' Storage=378 cf Inflow=1.44 cfs 0.130 af
Discarded=1.07 cfs 0.130 af Primary=0.00 cfs 0.000 af Outflow=1.07 cfs 0.130 af

Link DP-1: Off Site Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link DP-2: Wetlands Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link DP-3: Existing Bogs Inflow=0.42 cfs 0.073 af
Primary=0.42 cfs 0.073 af

Total Runoff Area = 22.906 ac Runoff Volume = 0.675 af Average Runoff Depth = 0.35"
100.00% Pervious = 22.906 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: Subcat EX-1

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-1 : Off Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

	Area (ac)	CN	Description
*	0.001	0	, HSG A
	0.040	72	Dirt roads, HSG A
	2.746	30	Woods, Good, HSG A
	2.787	31	Weighted Average
	2.787		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.4	50	0.0040	0.02		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"
6.0	307	0.0290	0.85		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
45.4	357	Total			

Summary for Subcatchment EX-2: Subcat EX-2

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-2 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

	Area (ac)	CN	Description
*	0.225	39	Grass, Good HSG A
	0.177	72	Dirt roads, HSG A
	7.456	30	Woods, Good, HSG A
	7.858	31	Weighted Average
	7.858		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	50	0.0110	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"
10.3	618	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
36.6	668	Total			

Summary for Subcatchment EX-3: Subcat EX-3

Runoff = 0.00 cfs @ 23.45 hrs, Volume= 0.001 af, Depth= 0.01"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

Area (ac)	CN	Description
* 0.000	0	, HSG A
0.406	72	Dirt roads, HSG A
1.518	30	Woods, Good, HSG A
1.925	39	Weighted Average
1.925		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"
10.2	334	0.0120	0.55		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.9	384	Total			

Summary for Subcatchment EX-4: Subcat EX-4

Runoff = 0.42 cfs @ 12.43 hrs, Volume= 0.072 af, Depth= 0.43"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

Area (ac)	CN	Description
1.331	72	Dirt roads, HSG A
0.677	30	Woods, Good, HSG A
2.008	58	Weighted Average
2.008		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	50	0.0340	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"
3.3	157	0.0250	0.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.1	207	Total			

Summary for Subcatchment EX-5: Subcat EX-5

Runoff = 4.38 cfs @ 12.11 hrs, Volume= 0.341 af, Depth= 1.08"
Routed to Pond 1P : EX Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

Area (ac)	CN	Description
3.778	72	Dirt roads, HSG A
0.003	30	Woods, Good, HSG A
3.781	72	Weighted Average
3.781		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2040	0.94		**Sheet Flow, Dirt** Fallow n= 0.050 P2= 3.44"
5.6	383	0.0050	1.14		**Shallow Concentrated Flow, Dirt** Unpaved Kv= 16.1 fps
6.5	433	Total			

Summary for Subcatchment EX-6: Subcat EX-6

Runoff = 1.63 cfs @ 12.09 hrs, Volume= 0.131 af, Depth= 0.82"
Routed to Pond 2P : EX Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

Area (ac)	CN	Description
1.694	72	Dirt roads, HSG A
0.237	30	Woods, Good, HSG A
1.931	67	Weighted Average
1.931		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.37		**Sheet Flow,** Fallow n= 0.050 P2= 3.44"
2.0	162	0.0070	1.35		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
4.3	212	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment EX-7: Subcat EX-7

Runoff = 1.44 cfs @ 12.10 hrs, Volume= 0.130 af, Depth= 0.63"
Routed to Pond 3P : EX Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

Area (ac)	CN	Description
1.965	72	Dirt roads, HSG A
0.513	30	Woods, Good, HSG A
2.478	63	Weighted Average
2.478		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.3700	1.19		**Sheet Flow,** Fallow n= 0.050 P2= 3.44"
1.1	103	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.8	153	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment EX-8: Subcat EX-8

Runoff = 0.00 cfs @ 21.83 hrs, Volume= 0.000 af, Depth= 0.01"
Routed to Link DP-2 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

	Area (ac)	CN	Description
*	0.013	37	Grass, Good, HSG A
	0.028	72	Dirt roads, HSG A
	0.001	89	Dirt roads, HSG D
	0.096	30	Woods, Good, HSG A
	0.138	40	Weighted Average
	0.138		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	41	0.1960	0.10		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"

Summary for Pond 1P: EX Depression

Inflow Area = 3.781 ac, 0.00% Impervious, Inflow Depth = 1.08" for 2-Year event
Inflow = 4.38 cfs @ 12.11 hrs, Volume= 0.341 af
Outflow = 1.66 cfs @ 12.44 hrs, Volume= 0.341 af, Atten= 62%, Lag= 19.9 min
Discarded = 1.66 cfs @ 12.44 hrs, Volume= 0.341 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Existing Bogs

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 25.09' @ 12.44 hrs Surf.Area= 28,991 sf Storage= 2,493 cf

Plug-Flow detention time= 11.1 min calculated for 0.341 af (100% of inflow)
Center-of-Mass det. time= 11.1 min (875.5 - 864.4)

Volume	Invert	Avail.Storage	Storage Description
#1	25.00'	111,585 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
25.00	25,532	0	0
26.00	63,362	44,447	44,447
27.00	70,913	67,138	111,585

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 21.40'
#2	Primary	26.50'	**30.0' long x 38.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=1.66 cfs @ 12.44 hrs HW=25.09' (Free Discharge)
↑—**1=Exfiltration** (Controls 1.66 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: EX Depression

Inflow Area = 1.931 ac, 0.00% Impervious, Inflow Depth = 0.82" for 2-Year event
Inflow = 1.63 cfs @ 12.09 hrs, Volume= 0.131 af
Outflow = 0.55 cfs @ 12.47 hrs, Volume= 0.131 af, Atten= 66%, Lag= 22.6 min
Discarded = 0.55 cfs @ 12.47 hrs, Volume= 0.131 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Existing Bogs

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 25.14' @ 12.47 hrs Surf.Area= 9,588 sf Storage= 1,065 cf

Plug-Flow detention time= 14.5 min calculated for 0.131 af (100% of inflow)
Center-of-Mass det. time= 14.5 min (894.5 - 880.0)

Volume	Invert	Avail.Storage	Storage Description
#1	25.00'	57,563 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
25.00	5,405	0	0
26.00	34,860	20,133	20,133
27.00	40,000	37,430	57,563

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 21.40'
#2	Primary	26.50'	**68.0' long x 53.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.55 cfs @ 12.47 hrs HW=25.14' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.55 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3P: EX Depression

Inflow Area = 2.478 ac, 0.00% Impervious, Inflow Depth = 0.63" for 2-Year event
Inflow = 1.44 cfs @ 12.10 hrs, Volume= 0.130 af
Outflow = 1.07 cfs @ 12.19 hrs, Volume= 0.130 af, Atten= 26%, Lag= 5.5 min
Discarded = 1.07 cfs @ 12.19 hrs, Volume= 0.130 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Existing Bogs

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 25.02' @ 12.19 hrs Surf.Area= 21,325 sf Storage= 378 cf

Plug-Flow detention time= 5.9 min calculated for 0.130 af (100% of inflow)
Center-of-Mass det. time= 5.9 min (901.8 - 895.9)

Volume	Invert	Avail.Storage	Storage Description
#1	25.00'	72,787 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
25.00	20,982	0	0
26.00	40,160	30,571	30,571
27.00	44,271	42,216	72,787

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 21.40'
#2	Primary	26.50'	**78.0' long x 16.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=1.20 cfs @ 12.19 hrs HW=25.02' (Free Discharge)
↑—**1=Exfiltration** (Controls 1.20 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP-1: Off Site

Inflow Area = 2.787 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Wetlands

Inflow Area = 7.996 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 21.83 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 21.83 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Existing Bogs

Inflow Area = 12.123 ac, 0.00% Impervious, Inflow Depth = 0.07" for 2-Year event
Inflow = 0.42 cfs @ 12.43 hrs, Volume= 0.073 af
Primary = 0.42 cfs @ 12.43 hrs, Volume= 0.073 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Subcat EX-1 Runoff Area=2.787 ac 0.00% Impervious Runoff Depth=0.02"
Flow Length=357' Tc=45.4 min CN=31 Runoff=0.01 cfs 0.004 af

Subcatchment EX-2: Subcat EX-2 Runoff Area=7.858 ac 0.00% Impervious Runoff Depth=0.02"
Flow Length=668' Tc=36.6 min CN=31 Runoff=0.02 cfs 0.010 af

Subcatchment EX-3: Subcat EX-3 Runoff Area=1.925 ac 0.00% Impervious Runoff Depth=0.21"
Flow Length=384' Tc=30.9 min CN=39 Runoff=0.06 cfs 0.033 af

Subcatchment EX-4: Subcat EX-4 Runoff Area=2.008 ac 0.00% Impervious Runoff Depth=1.19"
Flow Length=207' Tc=20.1 min CN=58 Runoff=1.62 cfs 0.199 af

Subcatchment EX-5: Subcat EX-5 Runoff Area=3.781 ac 0.00% Impervious Runoff Depth=2.23"
Flow Length=433' Tc=6.5 min CN=72 Runoff=9.48 cfs 0.702 af

Subcatchment EX-6: Subcat EX-6 Runoff Area=1.931 ac 0.00% Impervious Runoff Depth=1.83"
Flow Length=212' Tc=5.0 min CN=67 Runoff=4.03 cfs 0.295 af

Subcatchment EX-7: Subcat EX-7 Runoff Area=2.478 ac 0.00% Impervious Runoff Depth=1.53"
Flow Length=153' Tc=5.0 min CN=63 Runoff=4.20 cfs 0.317 af

Subcatchment EX-8: Subcat EX-8 Runoff Area=0.138 ac 0.00% Impervious Runoff Depth=0.24"
Flow Length=41' Slope=0.1960 '/' Tc=7.1 min CN=40 Runoff=0.01 cfs 0.003 af

Pond 1P: EX Depression Peak Elev=25.27' Storage=8,357 cf Inflow=9.48 cfs 0.702 af
Discarded=2.13 cfs 0.702 af Primary=0.00 cfs 0.000 af Outflow=2.13 cfs 0.702 af

Pond 2P: EX Depression Peak Elev=25.34' Storage=3,601 cf Inflow=4.03 cfs 0.295 af
Discarded=0.92 cfs 0.295 af Primary=0.00 cfs 0.000 af Outflow=0.92 cfs 0.295 af

Pond 3P: EX Depression Peak Elev=25.12' Storage=2,629 cf Inflow=4.20 cfs 0.317 af
Discarded=1.34 cfs 0.317 af Primary=0.00 cfs 0.000 af Outflow=1.34 cfs 0.317 af

Link DP-1: Off Site Inflow=0.01 cfs 0.004 af
Primary=0.01 cfs 0.004 af

Link DP-2: Wetlands Inflow=0.02 cfs 0.013 af
Primary=0.02 cfs 0.013 af

Link DP-3: Existing Bogs Inflow=1.62 cfs 0.233 af
Primary=1.62 cfs 0.233 af

Total Runoff Area = 22.906 ac Runoff Volume = 1.563 af Average Runoff Depth = 0.82"
100.00% Pervious = 22.906 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: Subcat EX-1

Runoff = 0.01 cfs @ 22.75 hrs, Volume= 0.004 af, Depth= 0.02"
Routed to Link DP-1 : Off Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

	Area (ac)	CN	Description
*	0.001	0	, HSG A
	0.040	72	Dirt roads, HSG A
	2.746	30	Woods, Good, HSG A
	2.787	31	Weighted Average
	2.787		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.4	50	0.0040	0.02		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"
6.0	307	0.0290	0.85		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
45.4	357	Total			

Summary for Subcatchment EX-2: Subcat EX-2

Runoff = 0.02 cfs @ 22.65 hrs, Volume= 0.010 af, Depth= 0.02"
Routed to Link DP-2 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

	Area (ac)	CN	Description
*	0.225	39	Grass, Good HSG A
	0.177	72	Dirt roads, HSG A
	7.456	30	Woods, Good, HSG A
	7.858	31	Weighted Average
	7.858		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	50	0.0110	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"
10.3	618	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
36.6	668	Total			

Summary for Subcatchment EX-3: Subcat EX-3

Runoff = 0.06 cfs @ 13.16 hrs, Volume= 0.033 af, Depth= 0.21"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

Area (ac)	CN	Description
* 0.000	0	, HSG A
0.406	72	Dirt roads, HSG A
1.518	30	Woods, Good, HSG A
1.925	39	Weighted Average
1.925		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"
10.2	334	0.0120	0.55		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.9	384	Total			

Summary for Subcatchment EX-4: Subcat EX-4

Runoff = 1.62 cfs @ 12.32 hrs, Volume= 0.199 af, Depth= 1.19"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

Area (ac)	CN	Description
1.331	72	Dirt roads, HSG A
0.677	30	Woods, Good, HSG A
2.008	58	Weighted Average
2.008		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	50	0.0340	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"
3.3	157	0.0250	0.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.1	207	Total			

Summary for Subcatchment EX-5: Subcat EX-5

Runoff = 9.48 cfs @ 12.10 hrs, Volume= 0.702 af, Depth= 2.23"
Routed to Pond 1P : EX Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

Area (ac)	CN	Description
3.778	72	Dirt roads, HSG A
0.003	30	Woods, Good, HSG A
3.781	72	Weighted Average
3.781		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2040	0.94		**Sheet Flow, Dirt** Fallow n= 0.050 P2= 3.44"
5.6	383	0.0050	1.14		**Shallow Concentrated Flow, Dirt** Unpaved Kv= 16.1 fps
6.5	433	Total			

Summary for Subcatchment EX-6: Subcat EX-6

Runoff = 4.03 cfs @ 12.08 hrs, Volume= 0.295 af, Depth= 1.83"
Routed to Pond 2P : EX Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

Area (ac)	CN	Description
1.694	72	Dirt roads, HSG A
0.237	30	Woods, Good, HSG A
1.931	67	Weighted Average
1.931		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.37		**Sheet Flow,** Fallow n= 0.050 P2= 3.44"
2.0	162	0.0070	1.35		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
4.3	212	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment EX-7: Subcat EX-7

Runoff = 4.20 cfs @ 12.09 hrs, Volume= 0.317 af, Depth= 1.53"
Routed to Pond 3P : EX Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

Area (ac)	CN	Description
1.965	72	Dirt roads, HSG A
0.513	30	Woods, Good, HSG A
2.478	63	Weighted Average
2.478		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.3700	1.19		**Sheet Flow,** Fallow n= 0.050 P2= 3.44"
1.1	103	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.8	153	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment EX-8: Subcat EX-8

Runoff = 0.01 cfs @ 12.45 hrs, Volume= 0.003 af, Depth= 0.24"
Routed to Link DP-2 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

	Area (ac)	CN	Description
*	0.013	37	Grass, Good, HSG A
	0.028	72	Dirt roads, HSG A
	0.001	89	Dirt roads, HSG D
	0.096	30	Woods, Good, HSG A
	0.138	40	Weighted Average
	0.138		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	41	0.1960	0.10		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"

Summary for Pond 1P: EX Depression

Inflow Area = 3.781 ac, 0.00% Impervious, Inflow Depth = 2.23" for 10-Year event
Inflow = 9.48 cfs @ 12.10 hrs, Volume= 0.702 af
Outflow = 2.13 cfs @ 12.55 hrs, Volume= 0.702 af, Atten= 78%, Lag= 26.7 min
Discarded = 2.13 cfs @ 12.55 hrs, Volume= 0.702 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Existing Bogs

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 25.27' @ 12.55 hrs Surf.Area= 35,836 sf Storage= 8,357 cf

Plug-Flow detention time= 29.7 min calculated for 0.702 af (100% of inflow)
Center-of-Mass det. time= 29.7 min (872.3 - 842.6)

Volume	Invert	Avail.Storage	Storage Description
#1	25.00'	111,585 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
25.00	25,532	0	0
26.00	63,362	44,447	44,447
27.00	70,913	67,138	111,585

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 21.40'
#2	Primary	26.50'	**30.0' long x 38.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=2.13 cfs @ 12.55 hrs HW=25.27' (Free Discharge)
↑—**1=Exfiltration** (Controls 2.13 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: EX Depression

Inflow Area = 1.931 ac, 0.00% Impervious, Inflow Depth = 1.83" for 10-Year event
Inflow = 4.03 cfs @ 12.08 hrs, Volume= 0.295 af
Outflow = 0.92 cfs @ 12.52 hrs, Volume= 0.295 af, Atten= 77%, Lag= 26.4 min
Discarded = 0.92 cfs @ 12.52 hrs, Volume= 0.295 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Existing Bogs

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 25.34' @ 12.52 hrs Surf.Area= 15,536 sf Storage= 3,601 cf

Plug-Flow detention time= 34.2 min calculated for 0.294 af (100% of inflow)
Center-of-Mass det. time= 34.2 min (888.3 - 854.1)

Volume	Invert	Avail.Storage	Storage Description
#1	25.00'	57,563 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
25.00	5,405	0	0
26.00	34,860	20,133	20,133
27.00	40,000	37,430	57,563

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 21.40'
#2	Primary	26.50'	**68.0' long x 53.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=0.92 cfs @ 12.52 hrs HW=25.34' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.92 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3P: EX Depression

Inflow Area = 2.478 ac, 0.00% Impervious, Inflow Depth = 1.53" for 10-Year event
Inflow = 4.20 cfs @ 12.09 hrs, Volume= 0.317 af
Outflow = 1.34 cfs @ 12.46 hrs, Volume= 0.317 af, Atten= 68%, Lag= 22.3 min
Discarded = 1.34 cfs @ 12.46 hrs, Volume= 0.317 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Existing Bogs

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 25.12' @ 12.46 hrs Surf.Area= 23,261 sf Storage= 2,629 cf

Plug-Flow detention time= 13.7 min calculated for 0.317 af (100% of inflow)
Center-of-Mass det. time= 13.7 min (878.7 - 865.0)

Volume	Invert	Avail.Storage	Storage Description
#1	25.00'	72,787 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
25.00	20,982	0	0
26.00	40,160	30,571	30,571
27.00	44,271	42,216	72,787

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 21.40'
#2	Primary	26.50'	**78.0' long x 16.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=1.34 cfs @ 12.46 hrs HW=25.12' (Free Discharge)
↑—**1=Exfiltration** (Controls 1.34 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP-1: Off Site

Inflow Area = 2.787 ac, 0.00% Impervious, Inflow Depth = 0.02" for 10-Year event
Inflow = 0.01 cfs @ 22.75 hrs, Volume= 0.004 af
Primary = 0.01 cfs @ 22.75 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Wetlands

Inflow Area = 7.996 ac, 0.00% Impervious, Inflow Depth = 0.02" for 10-Year event
Inflow = 0.02 cfs @ 22.40 hrs, Volume= 0.013 af
Primary = 0.02 cfs @ 22.40 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Existing Bogs

Inflow Area = 12.123 ac, 0.00% Impervious, Inflow Depth = 0.23" for 10-Year event
Inflow = 1.62 cfs @ 12.32 hrs, Volume= 0.233 af
Primary = 1.62 cfs @ 12.32 hrs, Volume= 0.233 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Subcat EX-1 Runoff Area=2.787 ac 0.00% Impervious Runoff Depth=0.11"
Flow Length=357' Tc=45.4 min CN=31 Runoff=0.04 cfs 0.025 af

Subcatchment EX-2: Subcat EX-2 Runoff Area=7.858 ac 0.00% Impervious Runoff Depth=0.11"
Flow Length=668' Tc=36.6 min CN=31 Runoff=0.11 cfs 0.069 af

Subcatchment EX-3: Subcat EX-3 Runoff Area=1.925 ac 0.00% Impervious Runoff Depth=0.46"
Flow Length=384' Tc=30.9 min CN=39 Runoff=0.25 cfs 0.073 af

Subcatchment EX-4: Subcat EX-4 Runoff Area=2.008 ac 0.00% Impervious Runoff Depth=1.78"
Flow Length=207' Tc=20.1 min CN=58 Runoff=2.59 cfs 0.298 af

Subcatchment EX-5: Subcat EX-5 Runoff Area=3.781 ac 0.00% Impervious Runoff Depth=3.03"
Flow Length=433' Tc=6.5 min CN=72 Runoff=12.96 cfs 0.953 af

Subcatchment EX-6: Subcat EX-6 Runoff Area=1.931 ac 0.00% Impervious Runoff Depth=2.56"
Flow Length=212' Tc=5.0 min CN=67 Runoff=5.74 cfs 0.412 af

Subcatchment EX-7: Subcat EX-7 Runoff Area=2.478 ac 0.00% Impervious Runoff Depth=2.20"
Flow Length=153' Tc=5.0 min CN=63 Runoff=6.23 cfs 0.455 af

Subcatchment EX-8: Subcat EX-8 Runoff Area=0.138 ac 0.00% Impervious Runoff Depth=0.51"
Flow Length=41' Slope=0.1960 '/' Tc=7.1 min CN=40 Runoff=0.03 cfs 0.006 af

Pond 1P: EX Depression Peak Elev=25.39' Storage=12,844 cf Inflow=12.96 cfs 0.953 af
Discarded=2.44 cfs 0.953 af Primary=0.00 cfs 0.000 af Outflow=2.44 cfs 0.953 af

Pond 2P: EX Depression Peak Elev=25.46' Storage=5,611 cf Inflow=5.74 cfs 0.412 af
Discarded=1.14 cfs 0.412 af Primary=0.00 cfs 0.000 af Outflow=1.14 cfs 0.412 af

Pond 3P: EX Depression Peak Elev=25.21' Storage=4,908 cf Inflow=6.23 cfs 0.455 af
Discarded=1.47 cfs 0.455 af Primary=0.00 cfs 0.000 af Outflow=1.47 cfs 0.455 af

Link DP-1: Off Site Inflow=0.04 cfs 0.025 af
Primary=0.04 cfs 0.025 af

Link DP-2: Wetlands Inflow=0.11 cfs 0.075 af
Primary=0.11 cfs 0.075 af

Link DP-3: Existing Bogs Inflow=2.65 cfs 0.371 af
Primary=2.65 cfs 0.371 af

Total Runoff Area = 22.906 ac Runoff Volume = 2.292 af Average Runoff Depth = 1.20"
100.00% Pervious = 22.906 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: Subcat EX-1

Runoff = 0.04 cfs @ 15.70 hrs, Volume= 0.025 af, Depth= 0.11"
Routed to Link DP-1 : Off Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

	Area (ac)	CN	Description
*	0.001	0	, HSG A
	0.040	72	Dirt roads, HSG A
	2.746	30	Woods, Good, HSG A
	2.787	31	Weighted Average
	2.787		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.4	50	0.0040	0.02		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"
6.0	307	0.0290	0.85		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
45.4	357	Total			

Summary for Subcatchment EX-2: Subcat EX-2

Runoff = 0.11 cfs @ 15.57 hrs, Volume= 0.069 af, Depth= 0.11"
Routed to Link DP-2 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

	Area (ac)	CN	Description
*	0.225	39	Grass, Good HSG A
	0.177	72	Dirt roads, HSG A
	7.456	30	Woods, Good, HSG A
	7.858	31	Weighted Average
	7.858		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	50	0.0110	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"
10.3	618	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
36.6	668	Total			

Summary for Subcatchment EX-3: Subcat EX-3

Runoff = 0.25 cfs @ 12.71 hrs, Volume= 0.073 af, Depth= 0.46"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

	Area (ac)	CN	Description
*	0.000	0	, HSG A
	0.406	72	Dirt roads, HSG A
	1.518	30	Woods, Good, HSG A
	1.925	39	Weighted Average
	1.925		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"
10.2	334	0.0120	0.55		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.9	384	Total			

Summary for Subcatchment EX-4: Subcat EX-4

Runoff = 2.59 cfs @ 12.31 hrs, Volume= 0.298 af, Depth= 1.78"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

Area (ac)	CN	Description
1.331	72	Dirt roads, HSG A
0.677	30	Woods, Good, HSG A
2.008	58	Weighted Average
2.008		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	50	0.0340	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"
3.3	157	0.0250	0.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.1	207	Total			

Summary for Subcatchment EX-5: Subcat EX-5

Runoff = 12.96 cfs @ 12.10 hrs, Volume= 0.953 af, Depth= 3.03"
Routed to Pond 1P : EX Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

Area (ac)	CN	Description
3.778	72	Dirt roads, HSG A
0.003	30	Woods, Good, HSG A
3.781	72	Weighted Average
3.781		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2040	0.94		**Sheet Flow, Dirt** Fallow n= 0.050 P2= 3.44"
5.6	383	0.0050	1.14		**Shallow Concentrated Flow, Dirt** Unpaved Kv= 16.1 fps
6.5	433	Total			

Summary for Subcatchment EX-6: Subcat EX-6

Runoff = 5.74 cfs @ 12.08 hrs, Volume= 0.412 af, Depth= 2.56"
Routed to Pond 2P : EX Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

Area (ac)	CN	Description
1.694	72	Dirt roads, HSG A
0.237	30	Woods, Good, HSG A
1.931	67	Weighted Average
1.931		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.37		**Sheet Flow,** Fallow n= 0.050 P2= 3.44"
2.0	162	0.0070	1.35		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
4.3	212	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment EX-7: Subcat EX-7

Runoff = 6.23 cfs @ 12.08 hrs, Volume= 0.455 af, Depth= 2.20"
Routed to Pond 3P : EX Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

Area (ac)	CN	Description
1.965	72	Dirt roads, HSG A
0.513	30	Woods, Good, HSG A
2.478	63	Weighted Average
2.478		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.3700	1.19		**Sheet Flow,** Fallow n= 0.050 P2= 3.44"
1.1	103	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.8	153	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment EX-8: Subcat EX-8

Runoff = 0.03 cfs @ 12.33 hrs, Volume= 0.006 af, Depth= 0.51"
Routed to Link DP-2 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

	Area (ac)	CN	Description
*	0.013	37	Grass, Good, HSG A
	0.028	72	Dirt roads, HSG A
	0.001	89	Dirt roads, HSG D
	0.096	30	Woods, Good, HSG A
	0.138	40	Weighted Average
	0.138		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	41	0.1960	0.10		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"

Summary for Pond 1P: EX Depression

Inflow Area = 3.781 ac, 0.00% Impervious, Inflow Depth = 3.03" for 25-Year event
Inflow = 12.96 cfs @ 12.10 hrs, Volume= 0.953 af
Outflow = 2.44 cfs @ 12.58 hrs, Volume= 0.953 af, Atten= 81%, Lag= 28.7 min
Discarded = 2.44 cfs @ 12.58 hrs, Volume= 0.953 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Existing Bogs

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 25.39' @ 12.58 hrs Surf.Area= 40,295 sf Storage= 12,844 cf

Plug-Flow detention time= 43.0 min calculated for 0.953 af (100% of inflow)
Center-of-Mass det. time= 43.0 min (876.7 - 833.7)

Volume	Invert	Avail.Storage	Storage Description
#1	25.00'	111,585 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
25.00	25,532	0	0
26.00	63,362	44,447	44,447
27.00	70,913	67,138	111,585

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 21.40'
#2	Primary	26.50'	**30.0' long x 38.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=2.44 cfs @ 12.58 hrs HW=25.39' (Free Discharge)
↑—**1=Exfiltration** (Controls 2.44 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: EX Depression

Inflow Area = 1.931 ac, 0.00% Impervious, Inflow Depth = 2.56" for 25-Year event
Inflow = 5.74 cfs @ 12.08 hrs, Volume= 0.412 af
Outflow = 1.14 cfs @ 12.55 hrs, Volume= 0.412 af, Atten= 80%, Lag= 27.8 min
Discarded = 1.14 cfs @ 12.55 hrs, Volume= 0.412 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Existing Bogs

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 25.46' @ 12.55 hrs Surf.Area= 18,967 sf Storage= 5,611 cf

Plug-Flow detention time= 45.8 min calculated for 0.412 af (100% of inflow)
Center-of-Mass det. time= 45.8 min (889.8 - 844.1)

Volume	Invert	Avail.Storage	Storage Description
#1	25.00'	57,563 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
25.00	5,405	0	0
26.00	34,860	20,133	20,133
27.00	40,000	37,430	57,563

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 21.40'
#2	Primary	26.50'	**68.0' long x 53.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=1.14 cfs @ 12.55 hrs HW=25.46' (Free Discharge)
↑—**1=Exfiltration** (Controls 1.14 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3P: EX Depression

Inflow Area = 2.478 ac, 0.00% Impervious, Inflow Depth = 2.20" for 25-Year event
Inflow = 6.23 cfs @ 12.08 hrs, Volume= 0.455 af
Outflow = 1.47 cfs @ 12.52 hrs, Volume= 0.455 af, Atten= 76%, Lag= 25.9 min
Discarded = 1.47 cfs @ 12.52 hrs, Volume= 0.455 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Existing Bogs

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 25.21' @ 12.52 hrs Surf.Area= 25,069 sf Storage= 4,908 cf

Plug-Flow detention time= 23.8 min calculated for 0.455 af (100% of inflow)
Center-of-Mass det. time= 23.8 min (877.5 - 853.8)

Volume	Invert	Avail.Storage	Storage Description
#1	25.00'	72,787 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
25.00	20,982	0	0
26.00	40,160	30,571	30,571
27.00	44,271	42,216	72,787

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 21.40'
#2	Primary	26.50'	**78.0' long x 16.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=1.47 cfs @ 12.52 hrs HW=25.21' (Free Discharge)
↑—**1=Exfiltration** (Controls 1.47 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP-1: Off Site

Inflow Area = 2.787 ac, 0.00% Impervious, Inflow Depth = 0.11" for 25-Year event
Inflow = 0.04 cfs @ 15.70 hrs, Volume= 0.025 af
Primary = 0.04 cfs @ 15.70 hrs, Volume= 0.025 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Wetlands

Inflow Area = 7.996 ac, 0.00% Impervious, Inflow Depth = 0.11" for 25-Year event
Inflow = 0.11 cfs @ 15.51 hrs, Volume= 0.075 af
Primary = 0.11 cfs @ 15.51 hrs, Volume= 0.075 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Existing Bogs

Inflow Area = 12.123 ac, 0.00% Impervious, Inflow Depth = 0.37" for 25-Year event
Inflow = 2.65 cfs @ 12.32 hrs, Volume= 0.371 af
Primary = 2.65 cfs @ 12.32 hrs, Volume= 0.371 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment EX-1: Subcat EX-1 Runoff Area=2.787 ac 0.00% Impervious Runoff Depth=0.39"
Flow Length=357' Tc=45.4 min CN=31 Runoff=0.18 cfs 0.090 af

Subcatchment EX-2: Subcat EX-2 Runoff Area=7.858 ac 0.00% Impervious Runoff Depth=0.39"
Flow Length=668' Tc=36.6 min CN=31 Runoff=0.54 cfs 0.252 af

Subcatchment EX-3: Subcat EX-3 Runoff Area=1.925 ac 0.00% Impervious Runoff Depth=0.99"
Flow Length=384' Tc=30.9 min CN=39 Runoff=0.81 cfs 0.158 af

Subcatchment EX-4: Subcat EX-4 Runoff Area=2.008 ac 0.00% Impervious Runoff Depth=2.81"
Flow Length=207' Tc=20.1 min CN=58 Runoff=4.28 cfs 0.471 af

Subcatchment EX-5: Subcat EX-5 Runoff Area=3.781 ac 0.00% Impervious Runoff Depth=4.33"
Flow Length=433' Tc=6.5 min CN=72 Runoff=18.56 cfs 1.363 af

Subcatchment EX-6: Subcat EX-6 Runoff Area=1.931 ac 0.00% Impervious Runoff Depth=3.78"
Flow Length=212' Tc=5.0 min CN=67 Runoff=8.54 cfs 0.607 af

Subcatchment EX-7: Subcat EX-7 Runoff Area=2.478 ac 0.00% Impervious Runoff Depth=3.34"
Flow Length=153' Tc=5.0 min CN=63 Runoff=9.64 cfs 0.690 af

Subcatchment EX-8: Subcat EX-8 Runoff Area=0.138 ac 0.00% Impervious Runoff Depth=1.07"
Flow Length=41' Slope=0.1960 '/' Tc=7.1 min CN=40 Runoff=0.10 cfs 0.012 af

Pond 1P: EX Depression Peak Elev=25.56' Storage=20,440 cf Inflow=18.56 cfs 1.363 af
Discarded=2.92 cfs 1.363 af Primary=0.00 cfs 0.000 af Outflow=2.92 cfs 1.363 af

Pond 2P: EX Depression Peak Elev=25.63' Storage=9,158 cf Inflow=8.54 cfs 0.607 af
Discarded=1.46 cfs 0.607 af Primary=0.00 cfs 0.000 af Outflow=1.46 cfs 0.607 af

Pond 3P: EX Depression Peak Elev=25.37' Storage=9,151 cf Inflow=9.64 cfs 0.690 af
Discarded=1.71 cfs 0.690 af Primary=0.00 cfs 0.000 af Outflow=1.71 cfs 0.690 af

Link DP-1: Off Site Inflow=0.18 cfs 0.090 af
Primary=0.18 cfs 0.090 af

Link DP-2: Wetlands Inflow=0.57 cfs 0.265 af
Primary=0.57 cfs 0.265 af

Link DP-3: Existing Bogs Inflow=4.69 cfs 0.629 af
Primary=4.69 cfs 0.629 af

Total Runoff Area = 22.906 ac Runoff Volume = 3.644 af Average Runoff Depth = 1.91"
100.00% Pervious = 22.906 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment EX-1: Subcat EX-1

Runoff = 0.18 cfs @ 13.17 hrs, Volume= 0.090 af, Depth= 0.39"
Routed to Link DP-1 : Off Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

	Area (ac)	CN	Description
*	0.001	0	, HSG A
	0.040	72	Dirt roads, HSG A
	2.746	30	Woods, Good, HSG A
	2.787	31	Weighted Average
	2.787		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
39.4	50	0.0040	0.02		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"
6.0	307	0.0290	0.85		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
45.4	357	Total			

Summary for Subcatchment EX-2: Subcat EX-2

Runoff = 0.54 cfs @ 12.98 hrs, Volume= 0.252 af, Depth= 0.39"
Routed to Link DP-2 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

	Area (ac)	CN	Description
*	0.225	39	Grass, Good HSG A
	0.177	72	Dirt roads, HSG A
	7.456	30	Woods, Good, HSG A
	7.858	31	Weighted Average
	7.858		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	50	0.0110	0.03		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"
10.3	618	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
36.6	668	Total			

Summary for Subcatchment EX-3: Subcat EX-3

Runoff = 0.81 cfs @ 12.59 hrs, Volume= 0.158 af, Depth= 0.99"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

Area (ac)	CN	Description
* 0.000	0	, HSG A
0.406	72	Dirt roads, HSG A
1.518	30	Woods, Good, HSG A
1.925	39	Weighted Average
1.925		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.7	50	0.0200	0.04		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"
10.2	334	0.0120	0.55		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
30.9	384	Total			

Summary for Subcatchment EX-4: Subcat EX-4

Runoff = 4.28 cfs @ 12.30 hrs, Volume= 0.471 af, Depth= 2.81"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

Area (ac)	CN	Description
1.331	72	Dirt roads, HSG A
0.677	30	Woods, Good, HSG A
2.008	58	Weighted Average
2.008		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.8	50	0.0340	0.05		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"
3.3	157	0.0250	0.79		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
20.1	207	Total			

Summary for Subcatchment EX-5: Subcat EX-5

Runoff = 18.56 cfs @ 12.10 hrs, Volume= 1.363 af, Depth= 4.33"
Routed to Pond 1P : EX Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

Area (ac)	CN	Description
3.778	72	Dirt roads, HSG A
0.003	30	Woods, Good, HSG A
3.781	72	Weighted Average
3.781		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.2040	0.94		**Sheet Flow, Dirt** Fallow n= 0.050 P2= 3.44"
5.6	383	0.0050	1.14		**Shallow Concentrated Flow, Dirt** Unpaved Kv= 16.1 fps
6.5	433	Total			

Summary for Subcatchment EX-6: Subcat EX-6

Runoff = 8.54 cfs @ 12.08 hrs, Volume= 0.607 af, Depth= 3.78"
Routed to Pond 2P : EX Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

Area (ac)	CN	Description
1.694	72	Dirt roads, HSG A
0.237	30	Woods, Good, HSG A
1.931	67	Weighted Average
1.931		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.37		**Sheet Flow,** Fallow n= 0.050 P2= 3.44"
2.0	162	0.0070	1.35		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
4.3	212	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment EX-7: Subcat EX-7

Runoff = 9.64 cfs @ 12.08 hrs, Volume= 0.690 af, Depth= 3.34"
Routed to Pond 3P : EX Depression

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

Area (ac)	CN	Description
1.965	72	Dirt roads, HSG A
0.513	30	Woods, Good, HSG A
2.478	63	Weighted Average
2.478		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.3700	1.19		**Sheet Flow,** Fallow n= 0.050 P2= 3.44"
1.1	103	0.0100	1.61		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
1.8	153	Total, Increased to minimum Tc = 5.0 min			

Summary for Subcatchment EX-8: Subcat EX-8

Runoff = 0.10 cfs @ 12.15 hrs, Volume= 0.012 af, Depth= 1.07"
Routed to Link DP-2 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

	Area (ac)	CN	Description
*	0.013	37	Grass, Good, HSG A
	0.028	72	Dirt roads, HSG A
	0.001	89	Dirt roads, HSG D
	0.096	30	Woods, Good, HSG A
	0.138	40	Weighted Average
	0.138		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.1	41	0.1960	0.10		**Sheet Flow,** Woods: Dense underbrush n= 0.800 P2= 3.44"

Summary for Pond 1P: EX Depression

Inflow Area = 3.781 ac, 0.00% Impervious, Inflow Depth = 4.33" for 100-Year event
Inflow = 18.56 cfs @ 12.10 hrs, Volume= 1.363 af
Outflow = 2.92 cfs @ 12.62 hrs, Volume= 1.363 af, Atten= 84%, Lag= 31.4 min
Discarded = 2.92 cfs @ 12.62 hrs, Volume= 1.363 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Existing Bogs

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 25.56' @ 12.62 hrs Surf.Area= 46,887 sf Storage= 20,440 cf

Plug-Flow detention time= 62.1 min calculated for 1.363 af (100% of inflow)
Center-of-Mass det. time= 62.0 min (885.4 - 823.4)

Volume	Invert	Avail.Storage	Storage Description
#1	25.00'	111,585 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
25.00	25,532	0	0
26.00	63,362	44,447	44,447
27.00	70,913	67,138	111,585

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 21.40'
#2	Primary	26.50'	**30.0' long x 38.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=2.92 cfs @ 12.62 hrs HW=25.56' (Free Discharge)
↑—**1=Exfiltration** (Controls 2.92 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: EX Depression

Inflow Area = 1.931 ac, 0.00% Impervious, Inflow Depth = 3.78" for 100-Year event
Inflow = 8.54 cfs @ 12.08 hrs, Volume= 0.607 af
Outflow = 1.46 cfs @ 12.57 hrs, Volume= 0.607 af, Atten= 83%, Lag= 29.4 min
Discarded = 1.46 cfs @ 12.57 hrs, Volume= 0.607 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Existing Bogs

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 25.63' @ 12.57 hrs Surf.Area= 23,848 sf Storage= 9,158 cf

Plug-Flow detention time= 61.8 min calculated for 0.607 af (100% of inflow)
Center-of-Mass det. time= 61.8 min (894.5 - 832.7)

Volume	Invert	Avail.Storage	Storage Description
#1	25.00'	57,563 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
25.00	5,405	0	0
26.00	34,860	20,133	20,133
27.00	40,000	37,430	57,563

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 21.40'
#2	Primary	26.50'	**68.0' long x 53.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=1.46 cfs @ 12.57 hrs HW=25.63' (Free Discharge)
↑—**1=Exfiltration** (Controls 1.46 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3P: EX Depression

Inflow Area = 2.478 ac, 0.00% Impervious, Inflow Depth = 3.34" for 100-Year event
Inflow = 9.64 cfs @ 12.08 hrs, Volume= 0.690 af
Outflow = 1.71 cfs @ 12.57 hrs, Volume= 0.690 af, Atten= 82%, Lag= 29.3 min
Discarded = 1.71 cfs @ 12.57 hrs, Volume= 0.690 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-3 : Existing Bogs

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 25.37' @ 12.57 hrs Surf.Area= 28,129 sf Storage= 9,151 cf

Plug-Flow detention time= 43.0 min calculated for 0.690 af (100% of inflow)
Center-of-Mass det. time= 42.9 min (884.4 - 841.4)

Volume	Invert	Avail.Storage	Storage Description
#1	25.00'	72,787 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
25.00	20,982	0	0
26.00	40,160	30,571	30,571
27.00	44,271	42,216	72,787

Device	Routing	Invert	Outlet Devices
#1	Discarded	25.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 21.40'
#2	Primary	26.50'	**78.0' long x 16.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60

Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Discarded OutFlow Max=1.71 cfs @ 12.57 hrs HW=25.37' (Free Discharge)
↑—**1=Exfiltration** (Controls 1.71 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=25.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link DP-1: Off Site

Inflow Area = 2.787 ac, 0.00% Impervious, Inflow Depth = 0.39" for 100-Year event
Inflow = 0.18 cfs @ 13.17 hrs, Volume= 0.090 af
Primary = 0.18 cfs @ 13.17 hrs, Volume= 0.090 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Wetlands

Inflow Area = 7.996 ac, 0.00% Impervious, Inflow Depth = 0.40" for 100-Year event
Inflow = 0.57 cfs @ 12.97 hrs, Volume= 0.265 af
Primary = 0.57 cfs @ 12.97 hrs, Volume= 0.265 af, Atten= 0%, Lag= 0.0 min

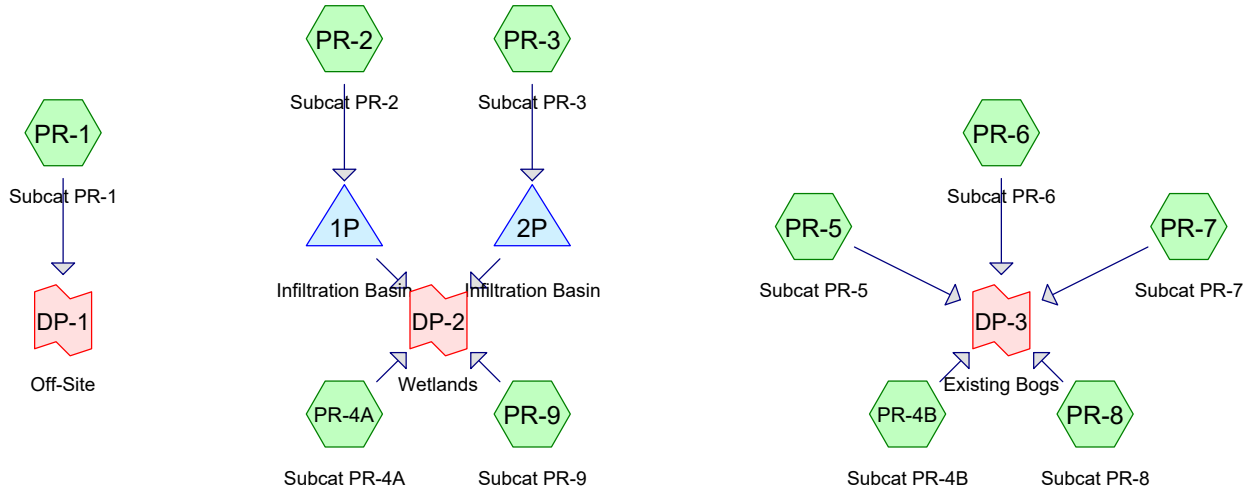
Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Existing Bogs

Inflow Area = 12.123 ac, 0.00% Impervious, Inflow Depth = 0.62" for 100-Year event
Inflow = 4.69 cfs @ 12.32 hrs, Volume= 0.629 af
Primary = 4.69 cfs @ 12.32 hrs, Volume= 0.629 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

HydroCAD Analysis: Proposed Conditions



Subcat Reach Pond Link

Routing Diagram for PR-Drainage - NOBESS
Prepared by VHB, Inc, Printed 9/18/2023

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type III 24-hr		Default	24.00	1	3.44	2
2	10-Year	Type III 24-hr		Default	24.00	1	5.04	2
3	25-Year	Type III 24-hr		Default	24.00	1	6.04	2
4	100-Year	Type III 24-hr		Default	24.00	1	7.58	2

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Subcat PR-1 Runoff Area=102,317 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=357' Tc=14.4 min CN=30 Runoff=0.00 cfs 0.000 af

Subcatchment PR-2: Subcat PR-2 Runoff Area=5.955 ac 0.01% Impervious Runoff Depth=0.00"
Flow Length=610' Tc=19.0 min CN=34 Runoff=0.00 cfs 0.000 af

Subcatchment PR-3: Subcat PR-3 Runoff Area=1.231 ac 0.00% Impervious Runoff Depth=0.04"
Flow Length=430' Tc=22.2 min CN=43 Runoff=0.01 cfs 0.005 af

Subcatchment PR-4A: Subcat PR-4A Runoff Area=102,825 sf 0.03% Impervious Runoff Depth=0.00"
Flow Length=557' Tc=21.7 min CN=35 Runoff=0.00 cfs 0.000 af

Subcatchment PR-4B: Subcat PR-4B Runoff Area=0.674 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=182' Tc=10.9 min CN=31 Runoff=0.00 cfs 0.000 af

Subcatchment PR-5: Subcat PR-5 Runoff Area=87,371 sf 0.30% Impervious Runoff Depth=0.00"
Flow Length=222' Tc=12.8 min CN=38 Runoff=0.00 cfs 0.000 af

Subcatchment PR-6: Subcat PR-6 Runoff Area=3.781 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=433' Tc=22.0 min CN=35 Runoff=0.00 cfs 0.000 af

Subcatchment PR-7: Subcat PR-7 Runoff Area=1.931 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=199' Tc=17.1 min CN=33 Runoff=0.00 cfs 0.000 af

Subcatchment PR-8: Subcat PR-8 Runoff Area=2.478 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=153' Tc=8.4 min CN=34 Runoff=0.00 cfs 0.000 af

Subcatchment PR-9: Subcat PR-9 Runoff Area=0.138 ac 0.00% Impervious Runoff Depth=0.00"
Flow Length=230' Tc=11.6 min CN=36 Runoff=0.00 cfs 0.000 af

Pond 1P: Infiltration Basin Peak Elev=21.50' Storage=0 cf Inflow=0.00 cfs 0.000 af
Discarded=0.00 cfs 0.000 af Primary=0.00 cfs 0.000 af Outflow=0.00 cfs 0.000 af

Pond 2P: Infiltration Basin Peak Elev=22.01' Storage=5 cf Inflow=0.01 cfs 0.005 af
Discarded=0.01 cfs 0.005 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.005 af

Link DP-1: Off-Site Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link DP-2: Wetlands Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link DP-3: Existing Bogs Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Total Runoff Area = 22.902 ac Runoff Volume = 0.005 af Average Runoff Depth = 0.00"
99.97% Pervious = 22.894 ac 0.03% Impervious = 0.008 ac

Summary for Subcatchment PR-1: Subcat PR-1

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-1 : Off-Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

Area (sf)	CN	Description
63,012	30	Meadow, non-grazed, HSG A
39,305	30	Woods, Good, HSG A
102,317	30	Weighted Average
102,317		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0400	0.11		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
6.6	293	0.0400	0.74		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
0.3	14	0.0430	0.77		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
14.4	357	Total			

Summary for Subcatchment PR-2: Subcat PR-2

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond 1P : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

	Area (ac)	CN	Description
*	0.010	0	, HSG A
	0.192	39	>75% Grass cover, Good, HSG A
	0.351	76	Gravel roads, HSG A
	4.590	30	Meadow, non-grazed, HSG A
	0.001	98	Unconnected pavement, HSG A
	0.080	98	Water Surface, 0% imp, HSG A
	0.730	30	Woods, Good, HSG A
	5.955	34	Weighted Average
	5.954		99.99% Pervious Area
	0.001		0.01% Impervious Area
	0.001		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.1200	0.17		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
14.1	560	0.0320	0.66		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
19.0	610	Total			

Summary for Subcatchment PR-3: Subcat PR-3

Runoff = 0.01 cfs @ 15.68 hrs, Volume= 0.005 af, Depth= 0.04"
Routed to Pond 2P : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

	Area (ac)	CN	Description
*	0.047	0	, HSG A
	0.059	72	Dirt roads, HSG A
*	0.036	0	Gravel roads
	0.352	76	Gravel roads, HSG A
	0.561	30	Meadow, non-grazed, HSG A
	0.175	30	Woods, Good, HSG A
	1.231	43	Weighted Average
	1.231		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0300	0.10		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
12.6	330	0.0140	0.44		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
0.9	20	0.0050	0.35		**Shallow Concentrated Flow, Tree** Woodland Kv= 5.0 fps
0.2	30	0.0170	2.10		**Shallow Concentrated Flow, Gravel** Unpaved Kv= 16.1 fps
22.2	430	Total			

Summary for Subcatchment PR-4A: Subcat PR-4A

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-2 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

	Area (sf)	CN	Description
*	7	0	, HSG A
	103	72	Dirt roads, HSG A
	10,095	76	Gravel roads, HSG A
	9,953	30	Meadow, non-grazed, HSG A
	34	98	Unconnected pavement, HSG A
	82,632	30	Woods, Good, HSG A
	102,825	35	Weighted Average
	102,791		99.97% Pervious Area
	34		0.03% Impervious Area
	34		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	50	0.0100	0.06		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
8.6	507	0.0385	0.98		**Shallow Concentrated Flow, Meadow** Woodland Kv= 5.0 fps
21.7	557	Total			

Summary for Subcatchment PR-4B: Subcat PR-4B

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

Area (ac)	CN	Description
0.012	72	Dirt roads, HSG A
0.372	30	Meadow, non-grazed, HSG A
0.290	30	Woods, Good, HSG A
0.674	31	Weighted Average
0.674		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0300	0.10		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
1.7	82	0.0490	0.82		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
0.7	50	0.0540	1.16		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
10.9	182	Total			

Summary for Subcatchment PR-5: Subcat PR-5

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

	Area (sf)	CN	Description
*	0	0	, HSG A
	890	72	Dirt roads, HSG A
	13,736	76	Gravel roads, HSG A
	59,415	30	Meadow, non-grazed, HSG A
	264	98	Unconnected pavement, HSG A
	13,067	30	Woods, Good, HSG A
	87,371	38	Weighted Average
	87,107		99.70% Pervious Area
	264		0.30% Impervious Area
	264		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0300	0.10		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
4.3	172	0.0319	0.66		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
12.8	222	Total			

Summary for Subcatchment PR-6: Subcat PR-6

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

Area (ac)	CN	Description
0.403	76	Gravel roads, HSG A
3.375	30	Meadow, non-grazed, HSG A
0.003	30	Woods, Good, HSG A
3.781	35	Weighted Average
3.781		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.1840	0.90		**Sheet Flow, Dirt** Fallow n= 0.050 P2= 3.44"
0.1	22	0.0450	3.42		**Shallow Concentrated Flow, Dirt** Unpaved Kv= 16.1 fps
21.0	361	0.0060	0.29		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
22.0	433	Total			

Summary for Subcatchment PR-7: Subcat PR-7

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

	Area (ac)	CN	Description
*	0.006	0	, HSG A
	0.147	76	Gravel roads, HSG A
	1.536	30	Meadow, non-grazed, HSG A
	0.241	30	Woods, Good, HSG A
	1.931	33	Weighted Average
	1.931		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.0140	0.07		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
5.2	122	0.0110	0.39		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
0.4	27	0.0040	1.02		**Shallow Concentrated Flow, Gravel** Unpaved Kv= 16.1 fps
17.1	199	Total			

Summary for Subcatchment PR-8: Subcat PR-8

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

	Area (ac)	CN	Description
*	0.004	0	, HSG A
	0.212	76	Gravel roads, HSG A
	1.736	30	Meadow, non-grazed, HSG A
	0.527	30	Woods, Good, HSG A
	2.478	34	Weighted Average
	2.478		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	38	0.4870	1.26		**Sheet Flow, Dirt** Fallow n= 0.050 P2= 3.44"
3.5	12	0.0160	0.06		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
4.4	103	0.0110	0.39		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
8.4	153	Total			

Summary for Subcatchment PR-9: Subcat PR-9

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link DP-2 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.44"

	Area (ac)	CN	Description
*	0.000	0	, HSG A
*	0.000	0	, HSG D
	0.028	30	Meadow, non-grazed, HSG A
	0.001	78	Meadow, non-grazed, HSG D
	0.011	98	Water Surface, 0% imp, HSG A
	0.098	30	Woods, Good, HSG A
	0.138	36	Weighted Average
	0.138		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
3.4	180	0.0306	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.6	230	Total			

Summary for Pond 1P: Infiltration Basin

Inflow Area = 5.955 ac, 0.01% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-2 : Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 21.50' @ 0.00 hrs Surf.Area= 2,420 sf Storage= 0 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	21.50'	6,478 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
21.50	2,420	0	0
22.00	2,850	1,318	1,318
23.50	4,031	5,161	6,478

Device	Routing	Invert	Outlet Devices
#1	Discarded	21.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 17.30'
#2	Primary	20.60'	**6.0" Round Culvert** L= 41.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 20.60' / 20.40' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Device 2	22.40'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	23.00'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.3' Crest Height

Discarded OutFlow Max=0.00 cfs @ 0.00 hrs HW=21.50' (Free Discharge)
└**1=Exfiltration** (Passes 0.00 cfs of 0.14 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=21.50' (Free Discharge)
└**2=Culvert** (Passes 0.00 cfs of 0.56 cfs potential flow)
└**3=Orifice/Grate** (Controls 0.00 cfs)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: Infiltration Basin

Inflow Area = 1.231 ac, 0.00% Impervious, Inflow Depth = 0.04" for 2-Year event
Inflow = 0.01 cfs @ 15.68 hrs, Volume= 0.005 af
Outflow = 0.01 cfs @ 15.87 hrs, Volume= 0.005 af, Atten= 1%, Lag= 11.7 min
Discarded = 0.01 cfs @ 15.87 hrs, Volume= 0.005 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-2 : Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 22.01' @ 15.87 hrs Surf.Area= 359 sf Storage= 5 cf

Plug-Flow detention time= 11.3 min calculated for 0.005 af (100% of inflow)
Center-of-Mass det. time= 11.3 min (1,139.3 - 1,128.0)

Volume	Invert	Avail.Storage	Storage Description
#1	22.00'	4,714 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
22.00	354	0	0
23.00	756	555	555
24.00	922	839	1,394
25.00	1,830	1,376	2,770
25.90	2,491	1,944	4,714

Device	Routing	Invert	Outlet Devices
#1	Discarded	22.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 17.30'
#2	Primary	21.50'	**6.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 21.50' / 21.00' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Device 2	24.80'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.02 cfs @ 15.87 hrs HW=22.01' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=22.00' (Free Discharge)
↑—**2=Culvert** (Passes 0.00 cfs of 0.47 cfs potential flow)
↑—**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Link DP-1: Off-Site

Inflow Area = 2.349 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Wetlands

Inflow Area = 9.684 ac, 0.02% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Existing Bogs

Inflow Area = 10.869 ac, 0.06% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Subcat PR-1 Runoff Area=102,317 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=357' Tc=14.4 min CN=30 Runoff=0.00 cfs 0.001 af

Subcatchment PR-2: Subcat PR-2 Runoff Area=5.955 ac 0.01% Impervious Runoff Depth=0.07"
Flow Length=610' Tc=19.0 min CN=34 Runoff=0.05 cfs 0.032 af

Subcatchment PR-3: Subcat PR-3 Runoff Area=1.231 ac 0.00% Impervious Runoff Depth=0.36"
Flow Length=430' Tc=22.2 min CN=43 Runoff=0.14 cfs 0.037 af

Subcatchment PR-4A: Subcat PR-4A Runoff Area=102,825 sf 0.03% Impervious Runoff Depth=0.09"
Flow Length=557' Tc=21.7 min CN=35 Runoff=0.03 cfs 0.017 af

Subcatchment PR-4B: Subcat PR-4B Runoff Area=0.674 ac 0.00% Impervious Runoff Depth=0.02"
Flow Length=182' Tc=10.9 min CN=31 Runoff=0.00 cfs 0.001 af

Subcatchment PR-5: Subcat PR-5 Runoff Area=87,371 sf 0.30% Impervious Runoff Depth=0.17"
Flow Length=222' Tc=12.8 min CN=38 Runoff=0.05 cfs 0.029 af

Subcatchment PR-6: Subcat PR-6 Runoff Area=3.781 ac 0.00% Impervious Runoff Depth=0.09"
Flow Length=433' Tc=22.0 min CN=35 Runoff=0.04 cfs 0.028 af

Subcatchment PR-7: Subcat PR-7 Runoff Area=1.931 ac 0.00% Impervious Runoff Depth=0.05"
Flow Length=199' Tc=17.1 min CN=33 Runoff=0.01 cfs 0.007 af

Subcatchment PR-8: Subcat PR-8 Runoff Area=2.478 ac 0.00% Impervious Runoff Depth=0.07"
Flow Length=153' Tc=8.4 min CN=34 Runoff=0.02 cfs 0.013 af

Subcatchment PR-9: Subcat PR-9 Runoff Area=0.138 ac 0.00% Impervious Runoff Depth=0.11"
Flow Length=230' Tc=11.6 min CN=36 Runoff=0.00 cfs 0.001 af

Pond 1P: Infiltration Basin Peak Elev=21.51' Storage=17 cf Inflow=0.05 cfs 0.032 af
Discarded=0.05 cfs 0.032 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.032 af

Pond 2P: Infiltration Basin Peak Elev=22.81' Storage=422 cf Inflow=0.14 cfs 0.037 af
Discarded=0.04 cfs 0.037 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.037 af

Link DP-1: Off-Site Inflow=0.00 cfs 0.001 af
Primary=0.00 cfs 0.001 af

Link DP-2: Wetlands Inflow=0.03 cfs 0.019 af
Primary=0.03 cfs 0.019 af

Link DP-3: Existing Bogs Inflow=0.12 cfs 0.079 af
Primary=0.12 cfs 0.079 af

Total Runoff Area = 22.902 ac Runoff Volume = 0.168 af Average Runoff Depth = 0.09"
99.97% Pervious = 22.894 ac 0.03% Impervious = 0.008 ac

Summary for Subcatchment PR-1: Subcat PR-1

Runoff = 0.00 cfs @ 23.77 hrs, Volume= 0.001 af, Depth= 0.01"
Routed to Link DP-1 : Off-Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

Area (sf)	CN	Description
63,012	30	Meadow, non-grazed, HSG A
39,305	30	Woods, Good, HSG A
102,317	30	Weighted Average
102,317		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0400	0.11		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
6.6	293	0.0400	0.74		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
0.3	14	0.0430	0.77		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
14.4	357	Total			

Summary for Subcatchment PR-2: Subcat PR-2

Runoff = 0.05 cfs @ 15.63 hrs, Volume= 0.032 af, Depth= 0.07"
Routed to Pond 1P : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

	Area (ac)	CN	Description
*	0.010	0	, HSG A
	0.192	39	>75% Grass cover, Good, HSG A
	0.351	76	Gravel roads, HSG A
	4.590	30	Meadow, non-grazed, HSG A
	0.001	98	Unconnected pavement, HSG A
	0.080	98	Water Surface, 0% imp, HSG A
	0.730	30	Woods, Good, HSG A
	5.955	34	Weighted Average
	5.954		99.99% Pervious Area
	0.001		0.01% Impervious Area
	0.001		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.1200	0.17		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
14.1	560	0.0320	0.66		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
19.0	610	Total			

Summary for Subcatchment PR-3: Subcat PR-3

Runoff = 0.14 cfs @ 12.59 hrs, Volume= 0.037 af, Depth= 0.36"
Routed to Pond 2P : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

	Area (ac)	CN	Description
*	0.047	0	, HSG A
	0.059	72	Dirt roads, HSG A
*	0.036	0	Gravel roads
	0.352	76	Gravel roads, HSG A
	0.561	30	Meadow, non-grazed, HSG A
	0.175	30	Woods, Good, HSG A
	1.231	43	Weighted Average
	1.231		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0300	0.10		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
12.6	330	0.0140	0.44		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
0.9	20	0.0050	0.35		**Shallow Concentrated Flow, Tree** Woodland Kv= 5.0 fps
0.2	30	0.0170	2.10		**Shallow Concentrated Flow, Gravel** Unpaved Kv= 16.1 fps
22.2	430	Total			

Summary for Subcatchment PR-4A: Subcat PR-4A

Runoff = 0.03 cfs @ 15.33 hrs, Volume= 0.017 af, Depth= 0.09"
Routed to Link DP-2 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

	Area (sf)	CN	Description
*	7	0	, HSG A
	103	72	Dirt roads, HSG A
	10,095	76	Gravel roads, HSG A
	9,953	30	Meadow, non-grazed, HSG A
	34	98	Unconnected pavement, HSG A
	82,632	30	Woods, Good, HSG A
	102,825	35	Weighted Average
	102,791		99.97% Pervious Area
	34		0.03% Impervious Area
	34		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	50	0.0100	0.06		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
8.6	507	0.0385	0.98		**Shallow Concentrated Flow, Meadow** Woodland Kv= 5.0 fps
21.7	557	Total			

Summary for Subcatchment PR-4B: Subcat PR-4B

Runoff = 0.00 cfs @ 22.23 hrs, Volume= 0.001 af, Depth= 0.02"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

Area (ac)	CN	Description
0.012	72	Dirt roads, HSG A
0.372	30	Meadow, non-grazed, HSG A
0.290	30	Woods, Good, HSG A
0.674	31	Weighted Average
0.674		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0300	0.10		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
1.7	82	0.0490	0.82		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
0.7	50	0.0540	1.16		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
10.9	182	Total			

Summary for Subcatchment PR-5: Subcat PR-5

Runoff = 0.05 cfs @ 13.76 hrs, Volume= 0.029 af, Depth= 0.17"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

	Area (sf)	CN	Description
*	0	0	, HSG A
	890	72	Dirt roads, HSG A
	13,736	76	Gravel roads, HSG A
	59,415	30	Meadow, non-grazed, HSG A
	264	98	Unconnected pavement, HSG A
	13,067	30	Woods, Good, HSG A
	87,371	38	Weighted Average
	87,107		99.70% Pervious Area
	264		0.30% Impervious Area
	264		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0300	0.10		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
4.3	172	0.0319	0.66		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
12.8	222	Total			

Summary for Subcatchment PR-6: Subcat PR-6

Runoff = 0.04 cfs @ 15.34 hrs, Volume= 0.028 af, Depth= 0.09"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

Area (ac)	CN	Description
0.403	76	Gravel roads, HSG A
3.375	30	Meadow, non-grazed, HSG A
0.003	30	Woods, Good, HSG A
3.781	35	Weighted Average
3.781		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.1840	0.90		**Sheet Flow, Dirt** Fallow n= 0.050 P2= 3.44"
0.1	22	0.0450	3.42		**Shallow Concentrated Flow, Dirt** Unpaved Kv= 16.1 fps
21.0	361	0.0060	0.29		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
22.0	433	Total			

Summary for Subcatchment PR-7: Subcat PR-7

Runoff = 0.01 cfs @ 16.96 hrs, Volume= 0.007 af, Depth= 0.05"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

	Area (ac)	CN	Description
*	0.006	0	, HSG A
	0.147	76	Gravel roads, HSG A
	1.536	30	Meadow, non-grazed, HSG A
	0.241	30	Woods, Good, HSG A
	1.931	33	Weighted Average
	1.931		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.0140	0.07		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
5.2	122	0.0110	0.39		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
0.4	27	0.0040	1.02		**Shallow Concentrated Flow, Gravel** Unpaved Kv= 16.1 fps
17.1	199	Total			

Summary for Subcatchment PR-8: Subcat PR-8

Runoff = 0.02 cfs @ 15.46 hrs, Volume= 0.013 af, Depth= 0.07"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

	Area (ac)	CN	Description
*	0.004	0	, HSG A
	0.212	76	Gravel roads, HSG A
	1.736	30	Meadow, non-grazed, HSG A
	0.527	30	Woods, Good, HSG A
	2.478	34	Weighted Average
	2.478		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	38	0.4870	1.26		**Sheet Flow, Dirt** Fallow n= 0.050 P2= 3.44"
3.5	12	0.0160	0.06		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
4.4	103	0.0110	0.39		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
8.4	153	Total			

Summary for Subcatchment PR-9: Subcat PR-9

Runoff = 0.00 cfs @ 14.89 hrs, Volume= 0.001 af, Depth= 0.11"
Routed to Link DP-2 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=5.04"

	Area (ac)	CN	Description
*	0.000	0	, HSG A
*	0.000	0	, HSG D
	0.028	30	Meadow, non-grazed, HSG A
	0.001	78	Meadow, non-grazed, HSG D
	0.011	98	Water Surface, 0% imp, HSG A
	0.098	30	Woods, Good, HSG A
	0.138	36	Weighted Average
	0.138		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
3.4	180	0.0306	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.6	230	Total			

Summary for Pond 1P: Infiltration Basin

Inflow Area = 5.955 ac, 0.01% Impervious, Inflow Depth = 0.07" for 10-Year event
Inflow = 0.05 cfs @ 15.63 hrs, Volume= 0.032 af
Outflow = 0.05 cfs @ 15.73 hrs, Volume= 0.032 af, Atten= 0%, Lag= 6.0 min
Discarded = 0.05 cfs @ 15.73 hrs, Volume= 0.032 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-2 : Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 21.51' @ 15.73 hrs Surf.Area= 2,426 sf Storage= 17 cf

Plug-Flow detention time= 6.0 min calculated for 0.032 af (100% of inflow)
Center-of-Mass det. time= 5.9 min (1,130.7 - 1,124.7)

Volume	Invert	Avail.Storage	Storage Description
#1	21.50'	6,478 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
21.50	2,420	0	0
22.00	2,850	1,318	1,318
23.50	4,031	5,161	6,478

Device	Routing	Invert	Outlet Devices
#1	Discarded	21.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 17.30'
#2	Primary	20.60'	**6.0" Round Culvert** L= 41.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 20.60' / 20.40' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Device 2	22.40'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	23.00'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.3' Crest Height

Discarded OutFlow Max=0.14 cfs @ 15.73 hrs HW=21.51' (Free Discharge)
└**1=Exfiltration** (Controls 0.14 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=21.50' (Free Discharge)
└**2=Culvert** (Passes 0.00 cfs of 0.56 cfs potential flow)
└**3=Orifice/Grate** (Controls 0.00 cfs)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: Infiltration Basin

Inflow Area = 1.231 ac, 0.00% Impervious, Inflow Depth = 0.36" for 10-Year event
Inflow = 0.14 cfs @ 12.59 hrs, Volume= 0.037 af
Outflow = 0.04 cfs @ 15.88 hrs, Volume= 0.037 af, Atten= 70%, Lag= 197.6 min
Discarded = 0.04 cfs @ 15.88 hrs, Volume= 0.037 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-2 : Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 22.81' @ 15.88 hrs Surf.Area= 682 sf Storage= 422 cf

Plug-Flow detention time= 123.5 min calculated for 0.037 af (100% of inflow)
Center-of-Mass det. time= 123.4 min (1,099.9 - 976.5)

Volume	Invert	Avail.Storage	Storage Description
#1	22.00'	4,714 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
22.00	354	0	0
23.00	756	555	555
24.00	922	839	1,394
25.00	1,830	1,376	2,770
25.90	2,491	1,944	4,714

Device	Routing	Invert	Outlet Devices
#1	Discarded	22.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 17.30'
#2	Primary	21.50'	**6.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 21.50' / 21.00' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Device 2	24.80'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.04 cfs @ 15.88 hrs HW=22.81' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=22.00' (Free Discharge)
↑—**2=Culvert** (Passes 0.00 cfs of 0.47 cfs potential flow)
↑—**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Link DP-1: Off-Site

Inflow Area = 2.349 ac, 0.00% Impervious, Inflow Depth = 0.01" for 10-Year event
Inflow = 0.00 cfs @ 23.77 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 23.77 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Wetlands

Inflow Area = 9.684 ac, 0.02% Impervious, Inflow Depth = 0.02" for 10-Year event
Inflow = 0.03 cfs @ 15.31 hrs, Volume= 0.019 af
Primary = 0.03 cfs @ 15.31 hrs, Volume= 0.019 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Existing Bogs

Inflow Area = 10.869 ac, 0.06% Impervious, Inflow Depth = 0.09" for 10-Year event
Inflow = 0.12 cfs @ 15.25 hrs, Volume= 0.079 af
Primary = 0.12 cfs @ 15.25 hrs, Volume= 0.079 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Subcat PR-1 Runoff Area=102,317 sf 0.00% Impervious Runoff Depth=0.08"
Flow Length=357' Tc=14.4 min CN=30 Runoff=0.02 cfs 0.015 af

Subcatchment PR-2: Subcat PR-2 Runoff Area=5.955 ac 0.01% Impervious Runoff Depth=0.22"
Flow Length=610' Tc=19.0 min CN=34 Runoff=0.18 cfs 0.107 af

Subcatchment PR-3: Subcat PR-3 Runoff Area=1.231 ac 0.00% Impervious Runoff Depth=0.69"
Flow Length=430' Tc=22.2 min CN=43 Runoff=0.38 cfs 0.071 af

Subcatchment PR-4A: Subcat PR-4A Runoff Area=102,825 sf 0.03% Impervious Runoff Depth=0.26"
Flow Length=557' Tc=21.7 min CN=35 Runoff=0.10 cfs 0.051 af

Subcatchment PR-4B: Subcat PR-4B Runoff Area=0.674 ac 0.00% Impervious Runoff Depth=0.11"
Flow Length=182' Tc=10.9 min CN=31 Runoff=0.01 cfs 0.006 af

Subcatchment PR-5: Subcat PR-5 Runoff Area=87,371 sf 0.30% Impervious Runoff Depth=0.40"
Flow Length=222' Tc=12.8 min CN=38 Runoff=0.27 cfs 0.068 af

Subcatchment PR-6: Subcat PR-6 Runoff Area=3.781 ac 0.00% Impervious Runoff Depth=0.26"
Flow Length=433' Tc=22.0 min CN=35 Runoff=0.16 cfs 0.082 af

Subcatchment PR-7: Subcat PR-7 Runoff Area=1.931 ac 0.00% Impervious Runoff Depth=0.18"
Flow Length=199' Tc=17.1 min CN=33 Runoff=0.05 cfs 0.028 af

Subcatchment PR-8: Subcat PR-8 Runoff Area=2.478 ac 0.00% Impervious Runoff Depth=0.22"
Flow Length=153' Tc=8.4 min CN=34 Runoff=0.08 cfs 0.045 af

Subcatchment PR-9: Subcat PR-9 Runoff Area=0.138 ac 0.00% Impervious Runoff Depth=0.30"
Flow Length=230' Tc=11.6 min CN=36 Runoff=0.01 cfs 0.003 af

Pond 1P: Infiltration Basin Peak Elev=21.64' Storage=352 cf Inflow=0.18 cfs 0.107 af
Discarded=0.15 cfs 0.107 af Primary=0.00 cfs 0.000 af Outflow=0.15 cfs 0.107 af

Pond 2P: Infiltration Basin Peak Elev=23.78' Storage=1,198 cf Inflow=0.38 cfs 0.071 af
Discarded=0.06 cfs 0.071 af Primary=0.00 cfs 0.000 af Outflow=0.06 cfs 0.071 af

Link DP-1: Off-Site Inflow=0.02 cfs 0.015 af
Primary=0.02 cfs 0.015 af

Link DP-2: Wetlands Inflow=0.11 cfs 0.054 af
Primary=0.11 cfs 0.054 af

Link DP-3: Existing Bogs Inflow=0.45 cfs 0.228 af
Primary=0.45 cfs 0.228 af

Total Runoff Area = 22.902 ac Runoff Volume = 0.475 af Average Runoff Depth = 0.25"
99.97% Pervious = 22.894 ac 0.03% Impervious = 0.008 ac

Summary for Subcatchment PR-1: Subcat PR-1

Runoff = 0.02 cfs @ 15.57 hrs, Volume= 0.015 af, Depth= 0.08"
Routed to Link DP-1 : Off-Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

Area (sf)	CN	Description
63,012	30	Meadow, non-grazed, HSG A
39,305	30	Woods, Good, HSG A
102,317	30	Weighted Average
102,317		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0400	0.11		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
6.6	293	0.0400	0.74		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
0.3	14	0.0430	0.77		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
14.4	357	Total			

Summary for Subcatchment PR-2: Subcat PR-2

Runoff = 0.18 cfs @ 13.82 hrs, Volume= 0.107 af, Depth= 0.22"
Routed to Pond 1P : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

	Area (ac)	CN	Description
*	0.010	0	, HSG A
	0.192	39	>75% Grass cover, Good, HSG A
	0.351	76	Gravel roads, HSG A
	4.590	30	Meadow, non-grazed, HSG A
	0.001	98	Unconnected pavement, HSG A
	0.080	98	Water Surface, 0% imp, HSG A
	0.730	30	Woods, Good, HSG A
	5.955	34	Weighted Average
	5.954		99.99% Pervious Area
	0.001		0.01% Impervious Area
	0.001		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.1200	0.17		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
14.1	560	0.0320	0.66		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
19.0	610	Total			

Summary for Subcatchment PR-3: Subcat PR-3

Runoff = 0.38 cfs @ 12.49 hrs, Volume= 0.071 af, Depth= 0.69"
Routed to Pond 2P : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

	Area (ac)	CN	Description
*	0.047	0	, HSG A
	0.059	72	Dirt roads, HSG A
*	0.036	0	Gravel roads
	0.352	76	Gravel roads, HSG A
	0.561	30	Meadow, non-grazed, HSG A
	0.175	30	Woods, Good, HSG A
	1.231	43	Weighted Average
	1.231		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0300	0.10		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
12.6	330	0.0140	0.44		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
0.9	20	0.0050	0.35		**Shallow Concentrated Flow, Tree** Woodland Kv= 5.0 fps
0.2	30	0.0170	2.10		**Shallow Concentrated Flow, Gravel** Unpaved Kv= 16.1 fps
22.2	430	Total			

Summary for Subcatchment PR-4A: Subcat PR-4A

Runoff = 0.10 cfs @ 12.76 hrs, Volume= 0.051 af, Depth= 0.26"
Routed to Link DP-2 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

	Area (sf)	CN	Description
*	7	0	, HSG A
	103	72	Dirt roads, HSG A
	10,095	76	Gravel roads, HSG A
	9,953	30	Meadow, non-grazed, HSG A
	34	98	Unconnected pavement, HSG A
	82,632	30	Woods, Good, HSG A
	102,825	35	Weighted Average
	102,791		99.97% Pervious Area
	34		0.03% Impervious Area
	34		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	50	0.0100	0.06		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
8.6	507	0.0385	0.98		**Shallow Concentrated Flow, Meadow** Woodland Kv= 5.0 fps
21.7	557	Total			

Summary for Subcatchment PR-4B: Subcat PR-4B

Runoff = 0.01 cfs @ 15.16 hrs, Volume= 0.006 af, Depth= 0.11"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

Area (ac)	CN	Description
0.012	72	Dirt roads, HSG A
0.372	30	Meadow, non-grazed, HSG A
0.290	30	Woods, Good, HSG A
0.674	31	Weighted Average
0.674		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0300	0.10		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
1.7	82	0.0490	0.82		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
0.7	50	0.0540	1.16		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
10.9	182	Total			

Summary for Subcatchment PR-5: Subcat PR-5

Runoff = 0.27 cfs @ 12.47 hrs, Volume= 0.068 af, Depth= 0.40"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

	Area (sf)	CN	Description
*	0	0	, HSG A
	890	72	Dirt roads, HSG A
	13,736	76	Gravel roads, HSG A
	59,415	30	Meadow, non-grazed, HSG A
	264	98	Unconnected pavement, HSG A
	13,067	30	Woods, Good, HSG A
	87,371	38	Weighted Average
	87,107		99.70% Pervious Area
	264		0.30% Impervious Area
	264		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0300	0.10		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
4.3	172	0.0319	0.66		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
12.8	222	Total			

Summary for Subcatchment PR-6: Subcat PR-6

Runoff = 0.16 cfs @ 12.77 hrs, Volume= 0.082 af, Depth= 0.26"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

Area (ac)	CN	Description
0.403	76	Gravel roads, HSG A
3.375	30	Meadow, non-grazed, HSG A
0.003	30	Woods, Good, HSG A
3.781	35	Weighted Average
3.781		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.1840	0.90		**Sheet Flow, Dirt** Fallow n= 0.050 P2= 3.44"
0.1	22	0.0450	3.42		**Shallow Concentrated Flow, Dirt** Unpaved Kv= 16.1 fps
21.0	361	0.0060	0.29		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
22.0	433	Total			

Summary for Subcatchment PR-7: Subcat PR-7

Runoff = 0.05 cfs @ 14.69 hrs, Volume= 0.028 af, Depth= 0.18"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

	Area (ac)	CN	Description
*	0.006	0	, HSG A
	0.147	76	Gravel roads, HSG A
	1.536	30	Meadow, non-grazed, HSG A
	0.241	30	Woods, Good, HSG A
	1.931	33	Weighted Average
	1.931		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.0140	0.07		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
5.2	122	0.0110	0.39		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
0.4	27	0.0040	1.02		**Shallow Concentrated Flow, Gravel** Unpaved Kv= 16.1 fps
17.1	199	Total			

Summary for Subcatchment PR-8: Subcat PR-8

Runoff = 0.08 cfs @ 13.65 hrs, Volume= 0.045 af, Depth= 0.22"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

	Area (ac)	CN	Description
*	0.004	0	, HSG A
	0.212	76	Gravel roads, HSG A
	1.736	30	Meadow, non-grazed, HSG A
	0.527	30	Woods, Good, HSG A
	2.478	34	Weighted Average
	2.478		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	38	0.4870	1.26		**Sheet Flow, Dirt** Fallow n= 0.050 P2= 3.44"
3.5	12	0.0160	0.06		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
4.4	103	0.0110	0.39		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
8.4	153	Total			

Summary for Subcatchment PR-9: Subcat PR-9

Runoff = 0.01 cfs @ 12.51 hrs, Volume= 0.003 af, Depth= 0.30"
Routed to Link DP-2 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=6.04"

	Area (ac)	CN	Description
*	0.000	0	, HSG A
*	0.000	0	, HSG D
	0.028	30	Meadow, non-grazed, HSG A
	0.001	78	Meadow, non-grazed, HSG D
	0.011	98	Water Surface, 0% imp, HSG A
	0.098	30	Woods, Good, HSG A
	0.138	36	Weighted Average
	0.138		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
3.4	180	0.0306	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.6	230	Total			

Summary for Pond 1P: Infiltration Basin

Inflow Area = 5.955 ac, 0.01% Impervious, Inflow Depth = 0.22" for 25-Year event
Inflow = 0.18 cfs @ 13.82 hrs, Volume= 0.107 af
Outflow = 0.15 cfs @ 15.83 hrs, Volume= 0.107 af, Atten= 19%, Lag= 120.7 min
Discarded = 0.15 cfs @ 15.83 hrs, Volume= 0.107 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-2 : Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 21.64' @ 15.83 hrs Surf.Area= 2,542 sf Storage= 352 cf

Plug-Flow detention time= 19.7 min calculated for 0.107 af (100% of inflow)
Center-of-Mass det. time= 19.7 min (1,052.0 - 1,032.3)

Volume	Invert	Avail.Storage	Storage Description
#1	21.50'	6,478 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
21.50	2,420	0	0
22.00	2,850	1,318	1,318
23.50	4,031	5,161	6,478

Device	Routing	Invert	Outlet Devices
#1	Discarded	21.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 17.30'
#2	Primary	20.60'	**6.0" Round Culvert** L= 41.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 20.60' / 20.40' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Device 2	22.40'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	23.00'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.3' Crest Height

Discarded OutFlow Max=0.15 cfs @ 15.83 hrs HW=21.64' (Free Discharge)
└**1=Exfiltration** (Controls 0.15 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=21.50' (Free Discharge)
└**2=Culvert** (Passes 0.00 cfs of 0.56 cfs potential flow)
└**3=Orifice/Grate** (Controls 0.00 cfs)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: Infiltration Basin

Inflow Area = 1.231 ac, 0.00% Impervious, Inflow Depth = 0.69" for 25-Year event
Inflow = 0.38 cfs @ 12.49 hrs, Volume= 0.071 af
Outflow = 0.06 cfs @ 16.25 hrs, Volume= 0.071 af, Atten= 83%, Lag= 225.6 min
Discarded = 0.06 cfs @ 16.25 hrs, Volume= 0.071 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link DP-2 : Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 23.78' @ 16.25 hrs Surf.Area= 886 sf Storage= 1,198 cf

Plug-Flow detention time= 245.2 min calculated for 0.071 af (100% of inflow)
Center-of-Mass det. time= 245.0 min (1,188.0 - 943.0)

Volume	Invert	Avail.Storage	Storage Description
#1	22.00'	4,714 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
22.00	354	0	0
23.00	756	555	555
24.00	922	839	1,394
25.00	1,830	1,376	2,770
25.90	2,491	1,944	4,714

Device	Routing	Invert	Outlet Devices
#1	Discarded	22.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 17.30'
#2	Primary	21.50'	**6.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 21.50' / 21.00' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Device 2	24.80'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.06 cfs @ 16.25 hrs HW=23.78' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.06 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=22.00' (Free Discharge)
↑—**2=Culvert** (Passes 0.00 cfs of 0.47 cfs potential flow)
↑—**3=Orifice/Grate** (Controls 0.00 cfs)

Summary for Link DP-1: Off-Site

Inflow Area = 2.349 ac, 0.00% Impervious, Inflow Depth = 0.08" for 25-Year event
Inflow = 0.02 cfs @ 15.57 hrs, Volume= 0.015 af
Primary = 0.02 cfs @ 15.57 hrs, Volume= 0.015 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Wetlands

Inflow Area = 9.684 ac, 0.02% Impervious, Inflow Depth = 0.07" for 25-Year event
Inflow = 0.11 cfs @ 12.75 hrs, Volume= 0.054 af
Primary = 0.11 cfs @ 12.75 hrs, Volume= 0.054 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Existing Bogs

Inflow Area = 10.869 ac, 0.06% Impervious, Inflow Depth = 0.25" for 25-Year event
Inflow = 0.45 cfs @ 12.58 hrs, Volume= 0.228 af
Primary = 0.45 cfs @ 12.58 hrs, Volume= 0.228 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PR-1: Subcat PR-1 Runoff Area=102,317 sf 0.00% Impervious Runoff Depth=0.32"
Flow Length=357' Tc=14.4 min CN=30 Runoff=0.14 cfs 0.063 af

Subcatchment PR-2: Subcat PR-2 Runoff Area=5.955 ac 0.01% Impervious Runoff Depth=0.59"
Flow Length=610' Tc=19.0 min CN=34 Runoff=1.24 cfs 0.294 af

Subcatchment PR-3: Subcat PR-3 Runoff Area=1.231 ac 0.00% Impervious Runoff Depth=1.34"
Flow Length=430' Tc=22.2 min CN=43 Runoff=0.94 cfs 0.137 af

Subcatchment PR-4A: Subcat PR-4A Runoff Area=102,825 sf 0.03% Impervious Runoff Depth=0.67"
Flow Length=557' Tc=21.7 min CN=35 Runoff=0.58 cfs 0.131 af

Subcatchment PR-4B: Subcat PR-4B Runoff Area=0.674 ac 0.00% Impervious Runoff Depth=0.39"
Flow Length=182' Tc=10.9 min CN=31 Runoff=0.07 cfs 0.022 af

Subcatchment PR-5: Subcat PR-5 Runoff Area=87,371 sf 0.30% Impervious Runoff Depth=0.90"
Flow Length=222' Tc=12.8 min CN=38 Runoff=0.93 cfs 0.151 af

Subcatchment PR-6: Subcat PR-6 Runoff Area=3.781 ac 0.00% Impervious Runoff Depth=0.67"
Flow Length=433' Tc=22.0 min CN=35 Runoff=0.93 cfs 0.210 af

Subcatchment PR-7: Subcat PR-7 Runoff Area=1.931 ac 0.00% Impervious Runoff Depth=0.52"
Flow Length=199' Tc=17.1 min CN=33 Runoff=0.32 cfs 0.084 af

Subcatchment PR-8: Subcat PR-8 Runoff Area=2.478 ac 0.00% Impervious Runoff Depth=0.59"
Flow Length=153' Tc=8.4 min CN=34 Runoff=0.59 cfs 0.122 af

Subcatchment PR-9: Subcat PR-9 Runoff Area=0.138 ac 0.00% Impervious Runoff Depth=0.74"
Flow Length=230' Tc=11.6 min CN=36 Runoff=0.05 cfs 0.009 af

Pond 1P: Infiltration Basin Peak Elev=22.44' Storage=2,644 cf Inflow=1.24 cfs 0.294 af
Discarded=0.21 cfs 0.236 af Primary=0.31 cfs 0.057 af Outflow=0.53 cfs 0.294 af

Pond 2P: Infiltration Basin Peak Elev=24.81' Storage=2,441 cf Inflow=0.94 cfs 0.137 af
Discarded=0.12 cfs 0.131 af Primary=0.06 cfs 0.006 af Outflow=0.18 cfs 0.137 af

Link DP-1: Off-Site Inflow=0.14 cfs 0.063 af
Primary=0.14 cfs 0.063 af

Link DP-2: Wetlands Inflow=0.62 cfs 0.202 af
Primary=0.62 cfs 0.202 af

Link DP-3: Existing Bogs Inflow=2.64 cfs 0.588 af
Primary=2.64 cfs 0.588 af

Total Runoff Area = 22.902 ac Runoff Volume = 1.222 af Average Runoff Depth = 0.64"
99.97% Pervious = 22.894 ac 0.03% Impervious = 0.008 ac

Summary for Subcatchment PR-1: Subcat PR-1

Runoff = 0.14 cfs @ 12.60 hrs, Volume= 0.063 af, Depth= 0.32"
Routed to Link DP-1 : Off-Site

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

Area (sf)	CN	Description
63,012	30	Meadow, non-grazed, HSG A
39,305	30	Woods, Good, HSG A
102,317	30	Weighted Average
102,317		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0400	0.11		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
6.6	293	0.0400	0.74		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
0.3	14	0.0430	0.77		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
14.4	357	Total			

Summary for Subcatchment PR-2: Subcat PR-2

Runoff = 1.24 cfs @ 12.53 hrs, Volume= 0.294 af, Depth= 0.59"
Routed to Pond 1P : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

	Area (ac)	CN	Description
*	0.010	0	, HSG A
	0.192	39	>75% Grass cover, Good, HSG A
	0.351	76	Gravel roads, HSG A
	4.590	30	Meadow, non-grazed, HSG A
	0.001	98	Unconnected pavement, HSG A
	0.080	98	Water Surface, 0% imp, HSG A
	0.730	30	Woods, Good, HSG A
	5.955	34	Weighted Average
	5.954		99.99% Pervious Area
	0.001		0.01% Impervious Area
	0.001		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.1200	0.17		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
14.1	560	0.0320	0.66		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
19.0	610	Total			

Summary for Subcatchment PR-3: Subcat PR-3

Runoff = 0.94 cfs @ 12.40 hrs, Volume= 0.137 af, Depth= 1.34"
Routed to Pond 2P : Infiltration Basin

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

	Area (ac)	CN	Description
*	0.047	0	, HSG A
	0.059	72	Dirt roads, HSG A
*	0.036	0	Gravel roads
	0.352	76	Gravel roads, HSG A
	0.561	30	Meadow, non-grazed, HSG A
	0.175	30	Woods, Good, HSG A
	1.231	43	Weighted Average
	1.231		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0300	0.10		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
12.6	330	0.0140	0.44		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
0.9	20	0.0050	0.35		**Shallow Concentrated Flow, Tree** Woodland Kv= 5.0 fps
0.2	30	0.0170	2.10		**Shallow Concentrated Flow, Gravel** Unpaved Kv= 16.1 fps
22.2	430	Total			

Summary for Subcatchment PR-4A: Subcat PR-4A

Runoff = 0.58 cfs @ 12.54 hrs, Volume= 0.131 af, Depth= 0.67"
Routed to Link DP-2 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

	Area (sf)	CN	Description
*	7	0	, HSG A
	103	72	Dirt roads, HSG A
	10,095	76	Gravel roads, HSG A
	9,953	30	Meadow, non-grazed, HSG A
	34	98	Unconnected pavement, HSG A
	82,632	30	Woods, Good, HSG A
	102,825	35	Weighted Average
	102,791		99.97% Pervious Area
	34		0.03% Impervious Area
	34		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.1	50	0.0100	0.06		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
8.6	507	0.0385	0.98		**Shallow Concentrated Flow, Meadow** Woodland Kv= 5.0 fps
21.7	557	Total			

Summary for Subcatchment PR-4B: Subcat PR-4B

Runoff = 0.07 cfs @ 12.50 hrs, Volume= 0.022 af, Depth= 0.39"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

Area (ac)	CN	Description
0.012	72	Dirt roads, HSG A
0.372	30	Meadow, non-grazed, HSG A
0.290	30	Woods, Good, HSG A
0.674	31	Weighted Average
0.674		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0300	0.10		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
1.7	82	0.0490	0.82		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
0.7	50	0.0540	1.16		**Shallow Concentrated Flow, Woods** Woodland Kv= 5.0 fps
10.9	182	Total			

Summary for Subcatchment PR-5: Subcat PR-5

Runoff = 0.93 cfs @ 12.31 hrs, Volume= 0.151 af, Depth= 0.90"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

	Area (sf)	CN	Description
*	0	0	, HSG A
	890	72	Dirt roads, HSG A
	13,736	76	Gravel roads, HSG A
	59,415	30	Meadow, non-grazed, HSG A
	264	98	Unconnected pavement, HSG A
	13,067	30	Woods, Good, HSG A
	87,371	38	Weighted Average
	87,107		99.70% Pervious Area
	264		0.30% Impervious Area
	264		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	50	0.0300	0.10		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
4.3	172	0.0319	0.66		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
12.8	222	Total			

Summary for Subcatchment PR-6: Subcat PR-6

Runoff = 0.93 cfs @ 12.55 hrs, Volume= 0.210 af, Depth= 0.67"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

Area (ac)	CN	Description
0.403	76	Gravel roads, HSG A
3.375	30	Meadow, non-grazed, HSG A
0.003	30	Woods, Good, HSG A
3.781	35	Weighted Average
3.781		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.9	50	0.1840	0.90		**Sheet Flow, Dirt** Fallow n= 0.050 P2= 3.44"
0.1	22	0.0450	3.42		**Shallow Concentrated Flow, Dirt** Unpaved Kv= 16.1 fps
21.0	361	0.0060	0.29		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
22.0	433	Total			

Summary for Subcatchment PR-7: Subcat PR-7

Runoff = 0.32 cfs @ 12.53 hrs, Volume= 0.084 af, Depth= 0.52"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

	Area (ac)	CN	Description
*	0.006	0	, HSG A
	0.147	76	Gravel roads, HSG A
	1.536	30	Meadow, non-grazed, HSG A
	0.241	30	Woods, Good, HSG A
	1.931	33	Weighted Average
	1.931		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.5	50	0.0140	0.07		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
5.2	122	0.0110	0.39		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
0.4	27	0.0040	1.02		**Shallow Concentrated Flow, Gravel** Unpaved Kv= 16.1 fps
17.1	199	Total			

Summary for Subcatchment PR-8: Subcat PR-8

Runoff = 0.59 cfs @ 12.37 hrs, Volume= 0.122 af, Depth= 0.59"
Routed to Link DP-3 : Existing Bogs

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

	Area (ac)	CN	Description
*	0.004	0	, HSG A
	0.212	76	Gravel roads, HSG A
	1.736	30	Meadow, non-grazed, HSG A
	0.527	30	Woods, Good, HSG A
	2.478	34	Weighted Average
	2.478		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.5	38	0.4870	1.26		**Sheet Flow, Dirt** Fallow n= 0.050 P2= 3.44"
3.5	12	0.0160	0.06		**Sheet Flow, Meadow** n= 0.320 P2= 3.44"
4.4	103	0.0110	0.39		**Shallow Concentrated Flow, Meadow** Kv= 3.7 fps
8.4	153	Total			

Summary for Subcatchment PR-9: Subcat PR-9

Runoff = 0.05 cfs @ 12.37 hrs, Volume= 0.009 af, Depth= 0.74"
Routed to Link DP-2 : Wetlands

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=7.58"

	Area (ac)	CN	Description
*	0.000	0	, HSG A
*	0.000	0	, HSG D
	0.028	30	Meadow, non-grazed, HSG A
	0.001	78	Meadow, non-grazed, HSG D
	0.011	98	Water Surface, 0% imp, HSG A
	0.098	30	Woods, Good, HSG A
	0.138	36	Weighted Average
	0.138		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.2	50	0.0500	0.10		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.44"
3.4	180	0.0306	0.87		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
11.6	230	Total			

Summary for Pond 1P: Infiltration Basin

Inflow Area = 5.955 ac, 0.01% Impervious, Inflow Depth = 0.59" for 100-Year event
Inflow = 1.24 cfs @ 12.53 hrs, Volume= 0.294 af
Outflow = 0.53 cfs @ 13.57 hrs, Volume= 0.294 af, Atten= 57%, Lag= 62.3 min
Discarded = 0.21 cfs @ 13.57 hrs, Volume= 0.236 af
Primary = 0.31 cfs @ 13.57 hrs, Volume= 0.057 af
Routed to Link DP-2 : Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 22.44' @ 13.57 hrs Surf.Area= 3,195 sf Storage= 2,644 cf

Plug-Flow detention time= 135.7 min calculated for 0.293 af (100% of inflow)
Center-of-Mass det. time= 135.7 min (1,103.5 - 967.8)

Volume	Invert	Avail.Storage	Storage Description
#1	21.50'	6,478 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
21.50	2,420	0	0
22.00	2,850	1,318	1,318
23.50	4,031	5,161	6,478

Device	Routing	Invert	Outlet Devices
#1	Discarded	21.50'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 17.30'
#2	Primary	20.60'	**6.0" Round Culvert** L= 41.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 20.60' / 20.40' S= 0.0049 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Device 2	22.40'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Primary	23.00'	**10.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s) 1.3' Crest Height

Discarded OutFlow Max=0.21 cfs @ 13.57 hrs HW=22.44' (Free Discharge)
└**1=Exfiltration** (Controls 0.21 cfs)

Primary OutFlow Max=0.31 cfs @ 13.57 hrs HW=22.44' (Free Discharge)
└**2=Culvert** (Passes 0.31 cfs of 0.90 cfs potential flow)
└**3=Orifice/Grate** (Weir Controls 0.31 cfs @ 0.64 fps)
└**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: Infiltration Basin

Inflow Area = 1.231 ac, 0.00% Impervious, Inflow Depth = 1.34" for 100-Year event
Inflow = 0.94 cfs @ 12.40 hrs, Volume= 0.137 af
Outflow = 0.18 cfs @ 14.20 hrs, Volume= 0.137 af, Atten= 81%, Lag= 108.0 min
Discarded = 0.12 cfs @ 14.20 hrs, Volume= 0.131 af
Primary = 0.06 cfs @ 14.20 hrs, Volume= 0.006 af
Routed to Link DP-2 : Wetlands

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 24.81' @ 14.20 hrs Surf.Area= 1,659 sf Storage= 2,441 cf

Plug-Flow detention time= 293.3 min calculated for 0.137 af (100% of inflow)
Center-of-Mass det. time= 293.5 min (1,207.8 - 914.3)

Volume	Invert	Avail.Storage	Storage Description
#1	22.00'	4,714 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
22.00	354	0	0
23.00	756	555	555
24.00	922	839	1,394
25.00	1,830	1,376	2,770
25.90	2,491	1,944	4,714

Device	Routing	Invert	Outlet Devices
#1	Discarded	22.00'	**2.410 in/hr Exfiltration over Surface area** Conductivity to Groundwater Elevation = 17.30'
#2	Primary	21.50'	**6.0" Round Culvert** L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 21.50' / 21.00' S= 0.0167 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.20 sf
#3	Device 2	24.80'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.12 cfs @ 14.20 hrs HW=24.81' (Free Discharge)
↑—**1=Exfiltration** (Controls 0.12 cfs)

Primary OutFlow Max=0.05 cfs @ 14.20 hrs HW=24.81' (Free Discharge)
↑—**2=Culvert** (Passes 0.05 cfs of 1.46 cfs potential flow)
↑—**3=Orifice/Grate** (Weir Controls 0.05 cfs @ 0.35 fps)

Summary for Link DP-1: Off-Site

Inflow Area = 2.349 ac, 0.00% Impervious, Inflow Depth = 0.32" for 100-Year event
Inflow = 0.14 cfs @ 12.60 hrs, Volume= 0.063 af
Primary = 0.14 cfs @ 12.60 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: Wetlands

Inflow Area = 9.684 ac, 0.02% Impervious, Inflow Depth = 0.25" for 100-Year event
Inflow = 0.62 cfs @ 12.53 hrs, Volume= 0.202 af
Primary = 0.62 cfs @ 12.53 hrs, Volume= 0.202 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Summary for Link DP-3: Existing Bogs

Inflow Area = 10.869 ac, 0.06% Impervious, Inflow Depth = 0.65" for 100-Year event
Inflow = 2.64 cfs @ 12.45 hrs, Volume= 0.588 af
Primary = 2.64 cfs @ 12.45 hrs, Volume= 0.588 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Appendix C: Standard 3 Computations and Supporting Documentation

- Preliminary Test Pit Data
- Soil Evaluation in accordance with Volume 3, Chapter 1 of the Handbook
- 72-hour drawdown analysis

Preliminary Test Pit Data

Memorandum

To: FILE

Date: July 21, 2021

Project #: 15225.02

From: Kenneth S. Staffier, PE
Soil Evaluator #2322

Re: Preliminary Test Pits
Proposed Solar Array
0 Route 25
Wareham, Massachusetts

Preliminary Test Pits

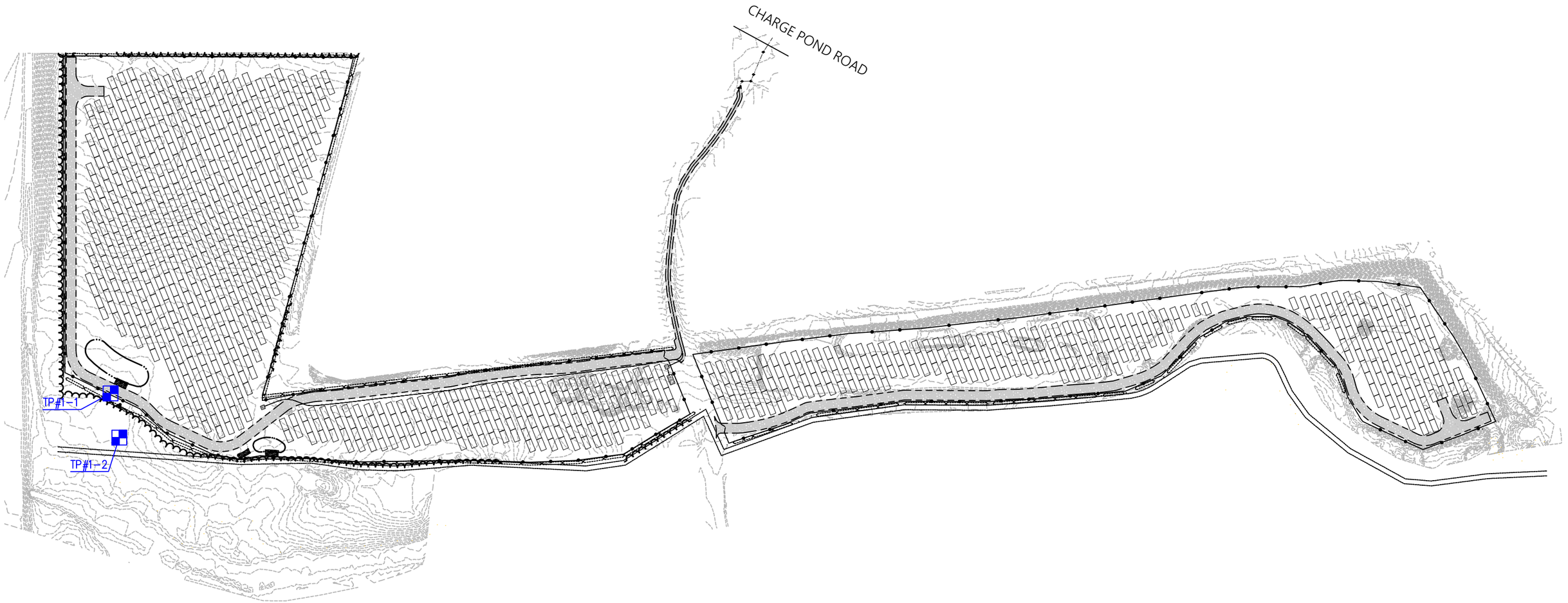
On April 15, 2021 VHB completed 2 hand-dug test pits at 0 Route 20 in Wareham, MA to determine the depth to estimated seasonal and general soil characteristics within the location of proposed stormwater management practices (SMPs). Two test pits were excavated to a depth ranging from 55" – 59". The soil profile was generally consistent with an A1 horizon (forest mat) ranging from 4" – 5" thick; an A2 Horizon (Loamy Sand) ranging from 5" – 11" thick, a B horizon (Loamy Sand) ranging from 11" – 15" thick; and a C horizon (Fine Sand – Loamy Sand) ranging from 31" – 32" thick. Groundwater was encountered at depths ranging from 44" – 50".

The test pit logs are outlined in Table 1 below:

Table 1 Test Pit Data

Test Pit	A_1 Horizon	A_2 Horizon	B Horizon	C Horizon	Depth to Estimated Seasonal High Groundwater[2]
1-1	0"-4" Forest Mat	4"-9" Loamy Sand	9"-24" Loamy Sand	24" -55" Fine Sand-Loamy Sand	44"
1-2	0"-5" Forest Mat	5"-16" Loamy Sand	16"-27" Loamy Sand	27"-59" Fine Sand – Sandy Loam	50"

1 All measurements from ground surface
2 ESGHW is based on observed redox and groundwater



0 200 400 Feet

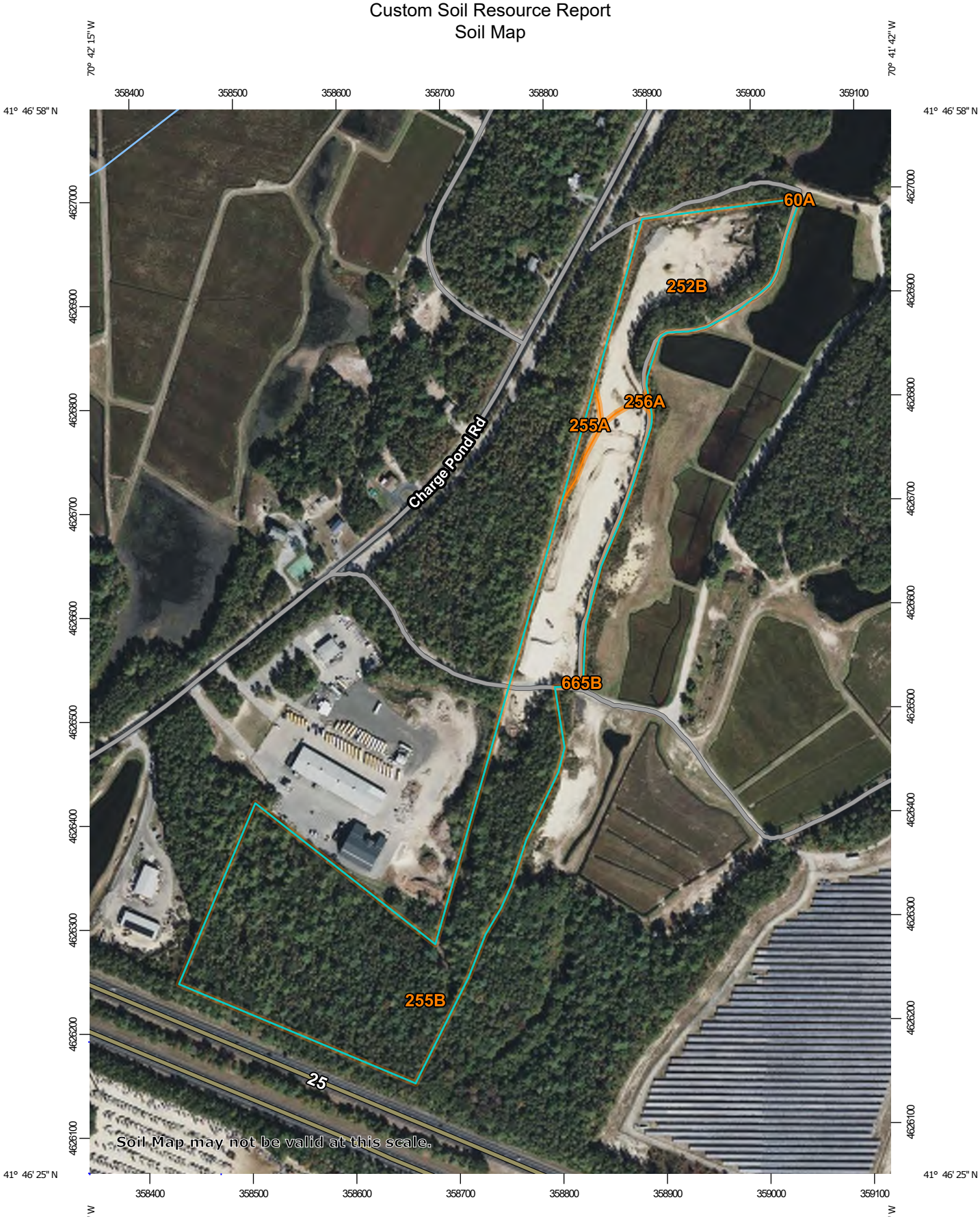
Test Pit Figure
0 Route 25
Wareham, MA

Figure 1

07/22/2021

Soil Evaluation and Analysis

Custom Soil Resource Report
Soil Map



Map Scale: 1:4,990 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Plymouth County, Massachusetts
Survey Area Data: Version 13, Jun 9, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 25, 2020—Oct 9, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
60A	Swansea coarse sand, 0 to 2 percent slopes	0.0	0.0%
252B	Carver coarse sand, 3 to 8 percent slopes	4.8	21.6%
255A	Windsor loamy sand, 0 to 3 percent slopes	0.3	1.2%
255B	Windsor loamy sand, 3 to 8 percent slopes	17.3	77.1%
256A	Deerfield loamy fine sand, 0 to 3 percent slopes	0.0	0.1%
665B	Udipsamments, 0 to 8 percent slopes	0.0	0.0%
Totals for Area of Interest		**22.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

Appendix D: Standard 4 Supporting Information

› Water Quality Volume Calculations

Water Quality Volume Calculations

Water Quality Volume Calculations

Project	Proposed Solar Array	**Project #**	15225.01
Calculated by	WGM	**Date**	9/19/2023
Checked by	SKE	**Date**	9/19/2023

BASIN #1P

Runoff from subcatchment areas PR-2

Water Quality Storm Runoff Depth	(in)	**0.0**
Total Impervious Area	(ft^2)	**0**

BASIN WQV:

Required Volume:	**Runoff Depth to be Treated (in)**	**Required Volume (ft^3)**
	0.0	**0**

Provided Volume:	**Elevation**	**Area (ft^2)**	**Cumulative Volume (ft^3)**
	21.5	2,420	0
	22.0	2,850	1,318
	22.4	3,165	**2,521**

FREEBOARD CHECK:

100-YR Peak Elevation:	22.3
Maximum Basin Elevation:	22.4
Basin Freeboard:	**0.1**

BASIN #2P

Runoff from subcatchment areas PR-3

Water Quality Storm Runoff Depth	(in)	**0.0**
Total Impervious Area	(ft^2)	**0**

BASIN WQV:

Required Volume:	**Runoff Depth to be Treated (in)**	**Required Volume (ft^3)**
	0.0	**0**

Provided Volume:	**Elevation**	**Area (ft^2)**	**Cumulative Volume (ft^3)**
	22.0	354	0
	23.0	756	555
	24.0	922	1,276
	24.8	1,648	**2,803**

FREEBOARD CHECK:

100-YR Peak Elevation:	24.3
Maximum Basin Elevation:	24.8
Basin Freeboard:	**0.5**

** Per MassDEP Treatment Requirement*

Appendix E: Standard 8 Supporting Information

› List of Recommended Construction Period BMPs

List of Recommended Construction Period BMPs

Appendix H: Erosion and Sedimentation Control Measures

As part of the Notice of Intent process, an erosion and sedimentation control plan will be developed, and will include measures such as those described below.

Erosion and Sedimentation Control Measures

The Project will disturb approximately 19.3 acres of land and is therefore required to obtain coverage under the Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Construction General Permit. As required under this permit, a Stormwater Pollution Prevention Plan (SWPPP) will be developed and submitted before land disturbance begins.

The following erosion and sedimentation controls are for use during the earthwork and construction phases of the project. The following controls are provided as recommendations for the site contractor and do not constitute or replace the final Stormwater Pollution Prevention Plan that must be fully implemented by the Contractor and owner in Compliance with EPA NPDES regulations.

Straw Wattles

Straw wattles will be placed to trap sediment transported by runoff before it reaches the drainage system or leaves the construction site. Wattles will be set at least four inches into the existing ground to minimize undercutting by runoff.

Silt Fencing

In areas where high runoff velocities or high sediment loads are expected, straw bale barriers will be backed up with silt fencing. This semi-permeable barrier made of a synthetic porous fabric will provide additional protection. The silt fences and straw bale barrier will be replaced as determined by periodic field inspections.

Gravel and Construction Entrance/Exit

A temporary crushed-stone construction entrance/exit will be constructed. A cross slope will be placed in the entrance to direct runoff to a protected catch basin inlet or settling area. If deemed necessary after construction begins, a wash pad may be included to wash off vehicle wheels before leaving the project site.

Diversion Channels

Diversion channels will be used to collect runoff from construction areas and discharge to either sedimentation basins or protected catch basin inlets.

Temporary Sediment Basins

Temporary sediment basins will be designed either as excavations or bermed stormwater detention structures (depending on grading) that will retain runoff for a sufficient period of time to allow suspended soil particles to settle out prior to discharge. These temporary basins will be located based on construction needs as determined by the contractor and outlet devices will be designed to control velocity and sediment. Points of discharge from sediment basins will be stabilized to minimize erosion.

Vegetative Slope Stabilization

Stabilization of open soil surfaces will be implemented within 14 days after grading or construction activities have temporarily or permanently ceased, unless there is sufficient snow cover to prohibit implementation. Vegetative slope stabilization will be used to minimize erosion on slopes of 3:1 or flatter. Annual grasses, such as annual rye, will be used to ensure rapid germination and production of root mass. Permanent stabilization will be completed with the planting of perennial grasses or legumes. Establishment of temporary and permanent vegetative cover may be established by hydro-seeding or sodding. A suitable topsoil, good seedbed preparation, and adequate lime, fertilizer and water will be provided for effective establishment of these vegetative stabilization methods. Mulch will also be used after permanent seeding to protect soil from the impact of falling rain and to increase the capacity of the soil to absorb water.

Maintenance

- The contractor or subcontractor will be responsible for implementing each control shown on the Sedimentation and Erosion Control Plan. In accordance with EPA regulations, the contractor must sign a copy of a certification to verify that a plan has been prepared and that permit regulations are understood.
- The on-site contractor will inspect all sediment and erosion control structures periodically and after each rainfall event. Records of the inspections will be prepared and maintained on-site by the contractor.
- Silt shall be removed from behind barriers if greater than 6-inches deep or as needed.
- Damaged or deteriorated items will be repaired immediately after identification.
- The underside of straw bales should be kept in close contact with the earth and reset as necessary.

- Sediment that is collected in structures shall be disposed of properly and covered if stored on-site.

- Erosion control structures shall remain in place until all disturbed earth has been securely stabilized. After removal of structures, disturbed areas shall be regraded and stabilized as necessary.

The sedimentation and erosion control plan is included in project plan set.

EMERGENCY NOTIFICATION PHONE NUMBERS

1. **SUPERVISOR/MANAGER - TBD**
   Name: _____ Beeper: _____
   Phone: _____ Home Phone: _____
   ALTERENATE
   Name: _____ Beeper: _____
   Phone: _____ Home Phone: _____

2. **FIRE DEPARTMENT**
   Emergency: **911**
   Business: (781) 270-1925
   POLICE DEPARTMENT
   Emergency: **911**
   Business: _____

3. **CLEANUP CONTRACTOR - TBD**
   Address: _____
   Phone: _____

4. **MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION**
   Emergency: _____
   Northeast Region – Woburn Office: _____

5. **NATIONAL RESPONSE CENTER**
   Phone: (800) 424-8802

   ALTERNATE: U.S. ENVIRONMENTAL PROTECTION AGENCY
   Emergency: (617) 223-7265
   Business: (617) 860-4300

6. **CONSERVATION COMMISSION**
   Contact: (508) 291-3100 x 6505

   BOARD OF HEALTH
   Contact: (508) 291-3100 x 3197

7. **FACILITY MANAGER - TBD**
   Name: _____
   Phone: _____

Appendix F: Standard 9 Supporting Information

› Operations & Maintenance Plan

Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation

0 Route 25
Wareham, MA

PREPARED FOR

Wareham PV I, LLC
330 Congress Street, 6th Floor
Boston, MA 02210
617.377.4301

PREPARED BY

101 Walnut Street
PO Box 9151
Watertown, MA 02471
617.924.1770

August 2021

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Project Information

Site

Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation
0 Roue 25
Wareham, MA

Developer

Wareham PV I, LLC
330 Congress Street, 6th Floor
Boston, MA 02210
617.377.4301

Site Supervisor - TBD

Site Manager Name
Site Manager Address
Site Manager City, State Zip
Site Manager Phone Number

Site Contact - TBD

Name: _____

Telephone: _____

Cell phone: _____

Email: _____

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Section A: Source Control

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A Source Control

A comprehensive source control program will be implemented at the Project Site, which includes the following components:

- Outlet control structure cleaning
    - Refer to Section D of this manual
- Clearing litter from the access drives, and perimeter landscape areas
    - Refer to Section D & E of this manual
- Spill Prevention training
    - Refer to Section B of this manual

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Section B: Spill Prevention

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B Spill Prevention

Spill prevention equipment and training will be provided by Longroad Energy.

B.1 Initial Notification

In the event of a spill the facility and/or construction manager or supervisor will be notified immediately.

Facility Manager (name):	TBD
Facility Manager (phone):	TBD
Construction Manager (name) :	
Construction Manager (phone):	

The supervisor will first contact the Fire Department and then notify the Police Department, the Public Health Commission and the Conservation Commission. The Fire Department is ultimately responsible for matters of public health and safety and should be notified immediately.

B.2 Further Notification

Based on the assessment from the Fire Chief, additional notification to a cleanup contractor may be made. The Massachusetts Department of Environmental Protection (DEP) and the EPA may be notified depending upon the nature and severity of the spill. The Fire Chief will be responsible for determining the level of cleanup and notification required. The attached list of emergency phone numbers shall be posted in the main construction/facility office and readily accessible to all employees. A hazardous waste spill report shall be completed as necessary using the attached form.

Emergency Notification Phone Numbers

1. FACILITY MANAGER - TBD

Name: _____ Phone: _____

Beeper/Cell: _____

Home Phone: _____

Alternate Contact: _____ Phone: _____

Beeper/Cell: _____

Home Phone: _____

2. FIRE & POLICE DEPARTMENT Emergency: 911

3. CLEANUP CONTRACTOR

Address: _____ Phone: _____

4. MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP) Emergency: (888) 304-1133

5. NATIONAL RESPONSE CENTER Phone: (800) 424-8802

Alternate: U.S. Environmental Protection Agency Business: (888) 372-7341

6. WAREHAM HEALTH DEPARTMENT Phone: (508) 291-3100 x 3197

WAREHAM CONSERVATION COMMISSION: Phone: (508) 291-3100 x 6505

Hazardous Waste & Oil Spill Report

Date: _____ **Time:** _____ **AM / PM**

Exact location (Transformer #): _____

Type of equipment: _____ **Make:** _____ **Size:** _____

S / N: _____ **Weather Conditions:** _____

On or near water? ☐ Yes ☐ No **If yes, name of body of water:** _____

Type of chemical / oil spilled: _____

Amount of chemical / oil spilled: _____

Cause of spill: _____

Measures taken to contain or clean up spill: _____

Amount of chemical / oil recovered: _____ **Method:** _____

Material collected as a result of cleanup:

_____ drums containing _____

_____ drums containing _____

_____ drums containing _____

Location and method of debris disposal: _____

Name and address of any person, firm, or corporation suffering charges: _____

Procedures, method, and precautions instituted to prevent a similar occurrence from recurring: _____

Spill reported by General Office by: _____ **Time:** _____ **AM / PM**

Spill reported to DEP / National Response Center by: _____

DEP Date: _____ **Time:** _____ **AM / PM** **Inspector:** _____

NRC Date: _____ **Time:** _____ **AM / PM** **Inspector:** _____

Additional comments: _____

B.3 Assessment – Initial Containment

The supervisor or manager will assess the incident and initiate containment control measures with the appropriate spill containment equipment included in the spill kit kept on-site. A list of recommended spill equipment to be kept on site is included on the following page.

Fire / Police Department: 911

Wareham Health Department (508) 291-3100 x 3197

Wareham Conservation Commission: (508) 291-3100 x 6505

Emergency Response Equipment

The following equipment and materials shall be maintained at all times and stored in a secure area for long-term emergency response need.

Supplies	Quantity	Recommended Suppliers
› Sorbent Pillows/"Pigs"	2	http://www.newpig.com Item # KIT276 — mobile container with two pigs
› Sorbent Boom/Sock	25 feet	http://www.forestry-suppliers.com
› Sorbent Pads	50	
› Lite-Dri® Absorbent	5 pounds	
› Shovel	1	Item # 33934 — Shovel (or equivalent)
› Pry Bar	1	Item # 43210 — Manhole cover pick (or equivalent)
› Goggles	1 pair	Item # 23334 — Goggles (or equivalent)
› Gloves – Heavy	1 pair	Item # 90926 — Gloves (or equivalent)

Section C: Snow Management

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C Snow Management

- Access roads on site will be plowed and snow will be pushed to the shoulder of the gravel road. Snow will be managed to prevent blockage of stormwater drainage swales and stormwater management features. Snow combined with sand and debris may block a storm drainage system, diminishing the infiltration capacity of the system and causing localized flooding.
- Sand and debris deposited on vegetated or paved areas shall be cleared from the site and properly disposed of at the end of the snow season, no later than May 15.
- Snow shall not be dumped into any waterbody, pond, or wetland resource area.

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Section D: Maintenance of Stormwater Management Systems

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D Maintenance of Stormwater Management Systems

D.1 Structural Stormwater Management Devices

D.1.1 Basin Outlet Control Structures

The proper removal of sediments and associated pollutants and trash occurs only when catch basin inlets and sumps are cleaned out regularly. The more frequent the cleaning, the less likely sediments will be re-suspended and subsequently discharged. In addition, frequent cleaning also results in more volume available for future deposition and enhances the overall performance. As noted in the pavement Operation and Maintenance (O&M) section, more frequent sweeping of paved surfaces will result in less accumulation in catch basins, less cleaning of subsurface structures, and less disposal costs.

There are two (2) outlet control structures on site. Disposal of all sediments must be in accordance with applicable local, state, and federal guidelines. A map of the outlet control structure locations is included in Section E.5 Maintenance Checklists and Device Location Maps.

Inspections and Cleaning

- All outlet control structures shall be inspected at least four times per year and cleaned a minimum of at least once per year.
- Sediment (if more than six inches deep) and/or floatable pollutants shall be pumped from the basin and disposed of at an approved offsite facility in accordance with all applicable regulations.
- Any structural damage or other indication of malfunction will be reported to the site manager and repaired as necessary
- During colder periods, the grates must be kept free of snow and ice.
- During warmer periods, the grates must be kept free of leaves, litter, sand, and debris.

D.1.2 Stormwater Outfalls

The stormwater drainage system at Proposed Solar Array has two (2) outfall locations where treated stormwater is discharged to surface wetlands.

- Inspect outfall locations monthly for the first three months after construction to ensure proper functioning and correct any areas that have settled or experienced washouts.
- Inspect outfalls annually after initial three month period.
- Annual inspections should be supplemented after large storms, when washouts may occur.
- Maintain vegetation around outfalls to prevent blockages at the outfall.
- Maintain rip rap pad below each outfall and replace any washouts.
- Remove and dispose of any trash or debris at the outfall.

D.2 Vegetated Stormwater Management Devices

D.2.1 Surface Infiltration Basins

There are two (2) surface infiltration ponds on site. The infiltration ponds are completely vegetated basins that are designed to detain, clean and infiltrate roadway runoff. The maintenance of the infiltration basins may affect the functioning of stormwater management practices. This includes the condition of the side slope vegetation and the sediment deposits in the bottom of the ponds.

Initial Post-construction Inspection

- Infiltration basins should be inspected after every major storm for the first few months to ensure proper stabilization and function.

Long-term Maintenance

- The grass on the sideslopes and in the buffer areas should be mowed, and grass clippings, organic matter, and accumulated trash and debris removed, at least twice during the growing season.
- Eroded or barren spots should be reseeded immediately after inspection to prevent additional erosion and accumulation of sediment.
- Deep tilling can be used to break up a clogged surface area.
- Sediment should be removed from the basin as necessary. Removal procedures should not take place until the floor of the basin is thoroughly dry.

Inspections and Cleaning

- Infiltration basins should be inspected at least twice a year to ensure proper stabilization and function.

- Light equipment, which will not compact the underlying soil, should be used to remove the top layer.

D.2.2 Vegetated Areas Maintenance

Although not a structural component of the drainage system, the maintenance of vegetated areas may affect the functioning of the stormwater management system. This includes the health/density of vegetative cover and activities such as the application and disposal of lawn and garden care products, disposal of leaves and yard trimmings and proper aeration of soils.

- Inspect planted areas on a semi-annual basis and remove any litter.
- Maintain planted areas adjacent to pavement to prevent soil washout.
- Immediately clean any soil deposited on pavement.
- Re-seed bare areas; install appropriate erosion control measures when native soil is exposed or erosion channels are forming.
- Plant alternative mixture of grass species in the event of unsuccessful establishment.
- The grass vegetation should be cut to a height between three and four inches.
- Pesticide/Herbicide Usage – No pesticides are to be used unless a single spot treatment is required for a specific control application.
- Fertilizer usage should be avoided. If deemed necessary, slow release fertilizer should be used. Fertilizer may be used to begin the establishment of vegetation in bare or damaged areas, but should not be applied on a regular basis unless necessary.
- Annual application of compost amendments and aeration are recommended.

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Section E: Operations and Maintenance Plan Summary

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E Operations and Maintenance Plan Summary

This Operation and Maintenance Plan has been prepared in accordance with the Stormwater Management Policy developed by the DEP. It specifies operational practices and drainage system maintenance requirements for the Solar Array located at 0 Route 25 in Wareham, Massachusetts. Requirements should be adjusted by the site manager as necessary to ensure successful functioning of system components.

E.1 Routine Maintenance Checklists

Routine required maintenance is described in Sections A – D. The following checklists are to be used by the property manager to implement and document the required maintenance and inspection tasks.

E.2 Reporting and Documentation

The site supervisor shall be responsible for ensuring that the scheduled tasks as described in this plan are appropriately completed and recorded in the Maintenance Log. Accurate records of all inspections, routine maintenance and repairs shall be documented and these records shall be available for inspection by members of the Wareham Conservation Commission, or their designated agent, upon request.

The Maintenance Log shall:

- Document the completion of required maintenance tasks.
- Identify the person responsible for the completion of tasks.
- Identify any outstanding problems, malfunctions or inconsistencies identified during the course of routine maintenance.
- Document specific repairs or replacements.

E.3 Construction Practices Maintenance/ Evaluation Checklist

Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation Wareham, MA

Best Management Practice	Inspection Frequency	Date Inspected	Inspector Initials	Minimum Maintenance and Key Items to Check	Cleaning or Repair Needed ☐Yes/No (List Items)	Date of Cleaning or Repair	Performed by:
Straw Wattles/ Silt Fencing	Weekly and after any rainfall			Sediment build up, broken bales or stakes			
Gravel Construction Entrance	Weekly and after any rainfall			Filled voids, runoff/sediments into street			
Diversion Channels	Weekly and after any rainfall			Maintained, moved as necessary to correct locations, Check for erosion or breakout			
Temporary Sedimentation Basins	Weekly and after any rainfall			Cracking, erosion, breakout, sediment buildup, contaminants			

Stormwater Control Manager (TBD): _____

E.4 Long-term Maintenance/Evaluation Checklist

Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation Wareham, MA

Best Management Practice	Minimum Maintenance and Key Items to Check	Inspection Frequency	Date Inspected	Inspector Initials	Cleaning Frequency	Cleaning or Repair Needed ☐Yes/No	Date of Cleaning or Repair	Performed by:
Outfall Structures	Remove debris and excess vegetation, replace any dislodged riprap	1X per year			1X per year			
Infiltration Basins	Remove sediment 1X per year or if >6 inches	1X per year			1X per year			

Stormwater Control Manager: _____

E.5 Maintenance Checklists and Device Location Maps

These checklists are provided for the maintenance crew to photocopy and use when conducting inspections and cleaning activities to the stormwater management systems.

Outlet Control Structures – Inspect 4 times per year, clean when sediment depth >6 inches or at least once per year.

OCS	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
101				/ /	
201				/ /	

Outfalls – Inspect 4 times per year, replace any dislodged rip-rap, remove excess vegetation, remove any debris.

Outfall	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
102				/ /	
103				/ /	

Infiltration/Detention Basins – Inspect once per year, remove sediment if more than 6 inches has accumulated in sediment forebay or sediment collection row.

Basin	Inspected (Y/N)	Sediment Depth (inches)	Cleaning needed (Y/N)	Date Cleaned	Comments (Trash, Oil, Pet waste, Lawn Debris, Damage)
IB 1				/ /	
IB 2				/ /	
				/ /	

General Vegetation Survey

Memorandum

To: David Kane
Longroad Energy
30 Danforth St., Ste. 210
Portland, ME 04101

Date: July 16, 2021

Project #: 15225.01

From: Christopher Wagner, PWS

Re: General Vegetation Survey
Wareham PV I Solar Development
0 Route 25, Wareham, MA

On Monday June 28, 2021, a VHB Senior Environmental Scientist assessed the vegetation on the approximately 22-acre parcel at 0 Route 25 off of Charge Pond Road in Wareham, MA (the Site). The assessment was done to support a Site Alteration Special Permit for an approximately 3.5 MW (AC) ground-mounted solar photovoltaic array (the Project). One of the requirements for the Special Permit is that the applicant provide a "survey of existing vegetation conducted by an individual qualified through appropriate academic credentials and field experience." According to the requirements for the Special Permit, the survey should note the following:

1. Major upland vegetation located on site, including trees, shrub layer, ground cover and herbaceous vegetation;
2. Size and height of trees, noting specimen trees and/or forest communities; and
3. Location of any rare and endangered species as mapped by NHESP.

Much of the Site consists of a narrow strip of land approximately 2,400 feet long and 200 feet wide, with a small section at the north end of the property approximately 400 feet wide, situated between Charge Pond Road and a series of cranberry bogs to the east. Much of this strip of land has been altered through excavation and consists of bare sandy areas with no existing tree cover. South of this area, the Site widens out to a section approximately 825 feet by 550 feet consisting mainly of undeveloped coniferous woodland. This portion of the Site is dominated by a pine forest with a dense shrub understory and areas of herbaceous cover. The approximate species composition of the area is as follows:

Trees: pitch pine (*Pinus rigida*) 60%, white pine (*Pinus strobus*) 20%, northern red oak (*Quercus rubra*) 10%, others 10% (others include red maple (*Acer rubrum*), black cherry (*Prunus serotina*), and scarlet oak (*Quercus coccinea*)).

Shrubs: highbush blueberry (*Vaccinium corymbosum*) 90%, pitch pine and white pine 5%, green brier (*Smilax rotundifolia*) and white oak (*Quercus alba*) 5%.

Herbaceous: bracken fern (*Pteridium aquilinum*) 90%, others 10% (others include bristly dewberry (*Rubus hispidus*), rabbit's foot clover (*Trifolium arvense*), white clover (*Trifolium repens*), bird's-foot trefoil (*Lotus corniculatus*), and spotted St. John's-wort (*Hypericum punctatum*).

Most trees in the area are approximately 30-40 feet tall and typically 8-12" diameter at breast height (dbh). A few of the largest specimens in the area are approximately 50-60 feet tall and 26-30" dbh.

The remainder of the site is largely unvegetated as noted previously. A thin strip of single pitch pine trees lines the eastern boundary of the Site, and a small area in the northeast corner of the Site is wooded, containing a similar

101 Walnut Street
PO Box 9151
Watertown, MA 02472-4026
P 617.924.1770

species composition to the forest in the south of the Site although younger and less well-developed. A small isolated wetland is present in the northeast corner of the Site.

No portion of the Site is within a mapped Estimated or Priority Habitat as determined by the Massachusetts Natural Heritage and Endangered Species Program (NHESP).

Please see the attached photo log for representative photos of the areas discussed in this memo.

vhb Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: Longroad Energy | **Site Location:** 0 Route 25, Wareham, MA | **Project No**: 15225.01

Photo No.: 1 | **Date:** 6/28/21

Location: Southern portion of Site

Description:

Forested area in the southern portion of the Site. Mainly pine canopy with dense shrub layer.

vhb Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: Longroad Energy | **Site Location:** 0 Route 25, Wareham, MA | **Project No**: 15225.01

Photo No.: 2 | **Date:** 6/28/21

Location: Southern portion of Site

Description:

Most trees are between 8-12" dbh, with some larger specimens scattered throughout the area.

vhb Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: Longroad Energy | **Site Location:** 0 Route 25, Wareham, MA | **Project No**: 15225.01

Photo No.: 3 | **Date:** 3/17/21

Location: Central portion of Site

Description:

Mainly unvegetated area within most of the central portion of the Site.

vhb Engineers | Scientists | Planners | Designers

Photographic Log

Client Name: Longroad Energy | **Site Location:** 0 Route 25, Wareham, MA | **Project No**: 15225.01

Photo No.: 4 | **Date:** 4/15/21

Location: Northern portion of Site

Description:

Small isolated wetland in northern portion of Site.

Tree Survey Memorandum

Memorandum

To: Wareham PV I, LLC
330 Congress Street
6th Floor
Boston, MA 02210

Date: October 6, 2023

Project #: 15225.01

From: VHB

Re: Proposed Large-Scale Ground-Mounted Solar Photovoltaic Installation - Tree Survey

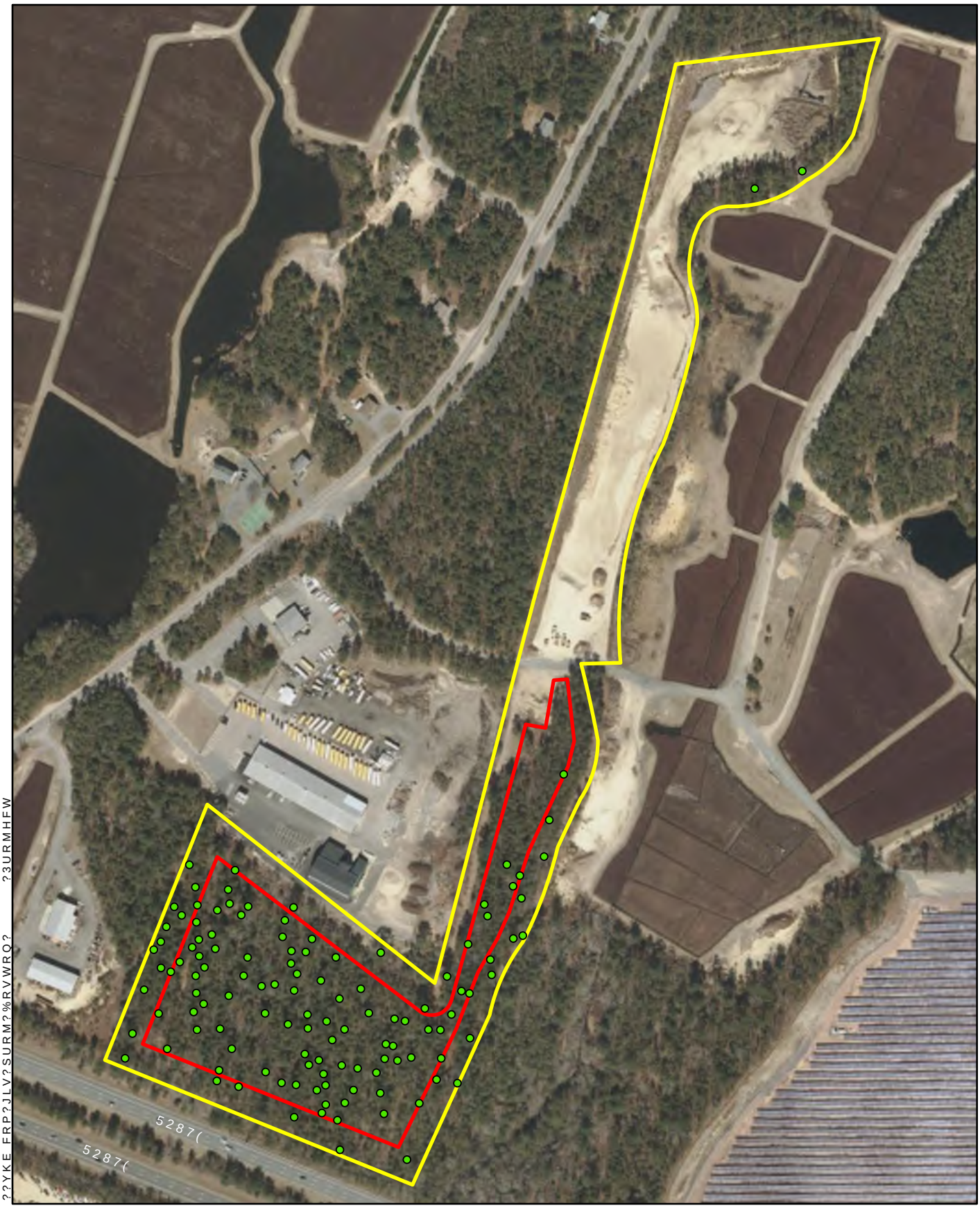
Tree Survey

This memorandum describes VHB's findings from a tree survey conducted on September 29, 2023 using the methodology described below for the approximately 22-acre parcel located along Charge Pond Road and Route 25 in Wareham, Massachusetts (the Project Site). Longroad Energy has filed an application with the Wareham Planning Board to construct a solar array on the Project Site, which would require clearing approximately eight acres of forested area. In its Site Plan Review checklist, the Town of Wareham includes a line item requiring that all trees greater than 18 inches diameter at breast height (DBH, a measurement taken approximately 4.5 feet above the ground surface) on a given property be accounted for on the site plans. At its public hearing on September 18, 2023, the Planning Board asked for this information to be added to the application. This report identifies the trees on the Project Site that meet this criterion. Refer to **Figure 1 – Tree Survey Data** for locations of such trees.

Methodology

The tree survey was conducted using a methodology approved by Director of Planning and Community Development Ken Buckland via email dated September 19, 2023. Trees with a DBH of 18 inches or greater were identified using high-resolution aerial imagery from March 2023 in conjunction with past field survey data. In 2022, VHB environmental scientists conducted a separate field survey of all trees (of any size) present within an approximately 5,000 square foot area at the edge the Project Site. Trees were measured in the field and GPS data was collected to identify the precise locations of all trees in the surveyed area, including trees with a DBH of 18 inches or greater. For the 2023 survey, the 2022 data was overlain with the aerial imagery from March 2023 to use as a point of reference for a desktop review of the forested areas on the Project Site. Trees with a similar canopy size to known trees 18 inches DBH or greater were then visually identified within the Project Site.

The resulting survey yielded a total of 123 trees with a DBH of 18 inches or greater on the Project Site. These trees are primarily located within the southern extent of the Project Site. From prior field visits, the approximate composition of trees on the Project Site is as follows: pitch pine (*Pinus rigida*) 60%, white pine (*Pinus strobus*) 20%, northern red oak (*Quercus rubra*) 10%, others 10% (others include red maple (*Acer rubrum*), black cherry (*Prunus serotina*), and scarlet oak (*Quercus coccinea*)). **Figure 1** summarizes the results of this survey.



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Construction Schedule

WAREHAM SOLAR-CONST. SCHEDULE