Attachment 2

Preliminary Engineering 275/345 KV GIS Substation Plan Set and Preferred Grid Interconnection Route Option G1 – Fire Tower Access Road to Oak Street

NEW ENGLAND WIND 2 CONNECTOR
275/345 KV GIS SUBSTATION

INDEX OF SHEETS

LOCUS MAP
N.T.S.

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A	2022-09-14	ISSUED FOR CLIENT REVIEW	IFCR	DRM	JDT	KEF

CONTRACTOR:
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400 Crown Colony Drive Suite 200
Quincy, MA U.S.A. 02169-0982

CLIENT:
125 High Street
Boston, MA 02110

PROJECT: NEW ENGLAND WIND 2 CONNECTOR

TITLE: 275/345 KV GIS SUBSTATION COVER SHEET

DOC ID: CWW-OSP-STC-DW-0003

SHEET	DWG. NO.	SCALE	FORMAT/SIZE	REV:
1 OF 10	SHEET - 1	AS SHOWN	ANSI D	E

SEDIMENTATION AND EROSION CONTROL NOTES

IT IS THE INTENT OF THE CONTRACT PLANS AND DETAILS TO CONTROL EROSION AND SEDIMENTATION IN ALL PORTIONS OF THE SITE. THE CONTRACTOR IS TO IMPLEMENT THE EROSION AND SEDIMENTATION CONTROLS INDICATED ON THE PLANS, IN ACCORDANCE WITH THE FOLLOWING NOTES, BUT IS ALERTED TO THE FACT THAT ADDITIONAL MEASURES MAY BE REQUIRED TO COMPLY WITH THIS INTENT, AS FIELD CONDITIONS MAY WARRANT. SHOULD SUCH MEASURES BE DETERMINED TO BE REQUIRED OR ORDERED BY THE ENGINEER, THEY ARE TO BE IMPLEMENTED IMMEDIATELY. IN ADDITION, THE CONTRACTOR SHALL PREPARE AND SUBMIT FOR ENGINEER'S REVIEW A STORMWATER POLLUTION PREVENTION PLAN (SWPPP) AND FILE A NOTICE OF INTENT WITH THE U.S. EPA AS REQUIRED UNDER THE NPDES CONSTRUCTION GENERAL PERMIT PROGRAM.

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING EROSION CONTROL MEASURES IN ORDER TO PREVENT THE OFF-SITE TRACKING OF EARTH, SEDIMENT, AND DEBRIS; AND FOR GENERALLY CONTROLLING THE EROSION AND SEDIMENT TRANSPORT DURING THE CONSTRUCTION PROCESS. SITE SPECIFIC CONDITIONS MAY REQUIRE MODIFICATIONS IN THE FIELD, BUT THE CONTRACTOR MUST ENSURE THAT THAT MEASURES IMPLEMENTED IN THE FIELD MEET THE MINIMUM REQUIREMENTS OF THESE PLANS.
2. ALL WORK SHALL BE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS, THE PROVISIONS OF ALL APPLICABLE PERMITS AND APPROVALS ISSUED BY LOCAL, STATE & FEDERAL REGULATION FOR ACTIVITIES INVOLVING WETLANDS, WATERCOURSES AND/OR EROSION CONTROLS. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE MASSACHUSETTS EROSION AND SEDIMENT CONTROL GUIDELINES FOR URBAN AND SUBURBAN AREAS, MAY 2003.
3. THE CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION OF SILT FENCES. EARTH DIKES, TEMPORARY SETTLING BASINS, CHECK DAMS AND TEMPORARY SEDIMENT BASINS. SUCH PRACTICES DIVERT FLOWS FROM EXPOSED SOILS, LIMIT RUNOFF AND THE DISCHARGE OF POLLUTANTS FROM EXPOSED AREAS OF THE SITE TO THE DEGREE ATTAINABLE. TEMPORARY EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO THE COMMENCEMENT OF ANY SITE WORK, SHALL BE MAINTAINED DURING CONSTRUCTION, AND SHALL REMAIN IN PLACE UNTIL ALL SITE WORK IS COMPLETED AND GROUND COVER IS ESTABLISHED (AT LEAST 75% UNIFORM COVERAGE BY NEW SEEDLINGS).
4. IN GENERAL, WORK REQUIRING EROSION CONTROL INCLUDES EXCAVATIONS, FILLS, RETAINING WALLS, DRAINAGE, ROUGH AND FINISH GRADING, AND STOCKPILING OF EARTH.
5. AREAS SUBJECT TO EROSION SHALL BE MINIMIZED IN TERMS OF TIME AND AREA. DO NOT DISTURB VEGETATION AND TOPSOIL BEYOND THE PROPOSED LIMIT OF SILT FENCE ACTIVITIES.
6. EROSION CONTROL MEASURE SHALL BE INCORPORATED IN THE SEQUENCE OF CONSTRUCTION TO PREVENT SEDIMENT LADEN WATER FROM LEAVING THE SITE.
7. EARTHWORK ACTIVITY SHALL BE PERFORMED IN A MANNER SUCH THAT RUNOFF IS DIRECTED TO TEMPORARY DRAINAGE SWALES AND SEDIMENTATION BASINS. IN NO CASE SHALL RUNOFF FROM ROADWAYS OR OTHER AREAS, UPGRADIENT FROM EMBANKMENTS, BE ALLOWED TO RUN DOWN ANY CUT OR FILL SLOPE, WITHOUT THE APPROVAL OF THE ENGINEER.
8. THE CONTRACTOR SHALL, AT ALL TIMES, HAVE A STOCKPILE OF HAY BALES, SILT FENCE, CRUSHED STONE, AND CATCH BASIN FILTER BAGS ADEQUATE TO REINFORCE/REPLACE EROSION AND SEDIMENT CONTROLS AS NEEDED.
9. ALL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE MAINTAINED IN EFFECTIVE CONDITION THROUGHOUT THE CONSTRUCTION PERIOD SO THAT ALL AREAS ARE STABILIZED TO PREVENT THE MOVEMENT OF SOIL, SILT, SEDIMENT AND DEBRIS INTO DRAINAGE SYSTEMS OR WATERWAYS ON AND NEAR CONSTRUCTION ACTIVITY. THE CONTRACTOR SHALL INSPECT THE EROSION CONTROLS DAILY AND CLEAN ACCUMULATED MATERIALS FROM BEHIND THEM, AS NECESSARY. ALL EROSION AND SEDIMENTATION CONTROL MEASURES FOUND TO BE IN NEED OF REPAIR OR REPLACEMENT SHALL BE IMMEDIATELY CORRECTED, SO AS TO MAINTAIN THE INTEGRITY OF THE EROSION AND SEDIMENTATION CONTROL SYSTEM.
10. IN ORDER TO MINIMIZE EROSION AND SEDIMENT RUNOFF FROM THE SITE, THE CONTRACTOR SHOULD MAINTAIN EXISTING VEGETATION WHERE POSSIBLE AND STABILIZE THE DISTURBED PORTIONS OF THE SITE AS QUICKLY AS POSSIBLE. THE CONTRACTOR SHALL PHASE CONSTRUCTION TO MINIMIZE THE AREA OF DISTURBED EARTH OPEN TO THE ELEMENTS AT ANY GIVEN TIME. THIS SHALL BE ACHIEVED BY THE FOLLOWING METHODS OR OTHER BEST MANAGEMENT PRACTICES (BMP's):
    A. LOAMING AND SEEDING CUT SLOPES IMMEDIATELY UPON COMPLETION OF SUBGRADE PREPARATION, AND SECURING SUCH NEWLY ESTABLISHED SLOPES WITH EROSION CONTROL NETTING AND/OR MULCH.
    B. PLACING AND COMPACTING PAVEMENT GRAVEL BASE AND SUB-BASE IMMEDIATELY UPON COMPLETION OF SUBGRADE PREPARATION.
    C. LIMITING STRIPPING AND STOCKPILING OF LOAM TO AREAS SLATED FOR IMMEDIATE CONSTRUCTION AND STABILIZATION (I.E. PLACEMENT OF GRAVELS, LOAM AND SEED, EROSION CONTROL MATTING).
11. THE CONTRACTOR MUST ALSO ANTICIPATE INCREASED RUNOFF FROM STEEPER SLOPES AND DURING HIGH GROUNDWATER CONDITIONS. THIS MAY OCCUR DURING THE WET SEASON (TYPICALLY MARCH THROUGH APRIL) OR AFTER SIGNIFICANT PRECIPITATION EVENTS.
12. SEDIMENT REMOVED FROM CONTROL STRUCTURES SHALL BE DISPOSED OF LEGALLY OFF SITE. NO EQUIPMENT OR MATERIAL OF ANY KIND SHALL BE STOCKPILED OR DEPOSITED IN ANY REGULATED AREA, UNLESS SPECIFICALLY SHOWN ON THE CONTRACT PLANS OR AUTHORIZED BY PROJECT PERMITS/APPROVALS.
13. STOCKPILED SOIL SHALL BE SURROUNDED WITH SILTATION FENCES TO PREVENT AND CONTROL SILTATION AND EROSION. STOCKPILES THAT WILL REMAIN EXPOSED FOR MORE THAN 30 DAYS, SHALL BE STABILIZED WITH MULCH OR SEEDED FOR TEMPORARY VEGETATIVE COVER.
14. TEMPORARY STORAGE OF MATERIALS ON-SITE SHALL BE LOCATED GREATER THAN 100-FEET FROM WETLAND AREAS, AND AS APPROVED BY THE ENGINEER. THERE SHALL BE NO LONG-TERM STORAGE OF MATERIAL ON-SITE OR ON-ROUTE. MATERIAL NOT USED ON-SITE OR ON-ROUTE SHALL BE TRUCKED TO AN ACCEPTABLE OFF-SITE DISPOSAL LOCATION.
15. ALL DISTURBED SURFACES SHALL BE STABILIZED WITHIN 14 DAYS AFTER CONSTRUCTION IN ANY PORTION OF THE SITE THAT HAS BEEN COMPLETED OR WHERE CONSTRUCTION HAS TEMPORARILY CEASED.
16. ALL AREAS OF DISTURBANCE MUST HAVE TEMPORARY OR FINAL STABILIZATION WITH MULCH OR MULCH NETTING, OR SEEDED FOR TEMPORARY VEGETATIVE COVER, WITHIN 14 DAYS OF THE INITIAL DISTURBANCE. AFTER THIS TIME, ANY DISTURBANCE IN THE AREA MUST BE STABILIZED AT THE END OF EACH WORK DAY. THE FOLLOWING EXCEPTIONS APPLY:
    A. STABILIZATION IS NOT REQUIRED IF WORK IS TO CONTINUE IN THE AREA WITHIN THE NEXT 24 HOURS AND THERE IS NO PRECIPITATION FORECAST FOR THE NEXT 24 HOURS.
    B. STABILIZATION IS NOT REQUIRED IF THE WORK IS OCCURRING IN A SELF-CONTAINIED EXCAVATION WITH A DEPTH OF 2 FEET OR GREATER.
17. CULVERT/PIPE INLETS AND OUTFALLS SHALL BE STABILIZED WITH STONE FOR PIPE ENDS OR OTHER APPROVED PERMANENT EROSION CONTROL MEASURES, IMMEDIATELY FOLLOWING PIPE INSTALLATION.
18. THERE SHALL BE NO DIRECT DISCHARGE FROM ANY REQUIRED DEWATERING OPERATIONS INTO ANY WETLAND, WATERCOURSE, OR DRAINAGE SYSTEM AND THEN ONLY AS ALLOWED BY REGULATORY PERMITS. ANY DEWATERING DISCHARGE CONTAINING SETTLEABLE SOLIDS (SEDIMENTS) SHALL BE PASSED THROUGH A SEDIMENTATION CONTROL BASIN, FRACTIONATION TANK OR SIMILAR TREATMENT, APPROVED BY THE ENGINEER, TO REMOVE THESE SOLIDS. CONTRACTOR SHALL MAINTAIN SAID SEDIMENT CONTROL DEVICES THROUGHOUT THE ENTIRE DEWATERING OPERATION AND SHALL CEASE DEWATERING, IF DEFICIENCIES ARE NOTED, UNTIL THE DEFICIENCIES ARE CORRECTED.
19. THE CONTRACTOR SHALL INSPECT ALL PORTIONS OF THE SITE IN ANTICIPATION OF RAINFALL EVENTS TO DETERMINE IF SITE GRADING IS SUFFICIENT TO PREVENT EROSION OF SLOPES AND/OR THE TRANSPORTATION OF SEDIMENTS TO WETLANDS OR WATERCOURSES, WITHIN THE PROJECT LIMITS. SHOULD ADDITIONAL MEASURES BE REQUIRED, THEY ARE TO BE IMPLEMENTED IMMEDIATELY. IN NO CASE SHALL THE INSTALLATION OF ADDITIONAL MEASURES, NECESSARY TO PROTECT SLOPES WITHIN THE PROJECT LIMITS, BE DELAYED BEYOND THE COMMENCEMENT OF PRECIPITATION.
20. EROSION CONTROL MEASURES SHALL BE INSPECTED EVERY WEEK, DURING AND AFTER EVERY RAIN EVENT GREATER THAN 0.25 INCHES. ANY NECESSARY REPLACEMENT OF REPAIR SHALL BE PERFORMED PROMPTLY BY THE CONTRACTOR
21. ALL DISTURBED EARTH SLOPES SHALL BE STABILIZED WITH PERMANENT VEGETATIVE COVER AS SOON AS POSSIBLE. DISTURBED AREAS, THAT ARE NOT SUBJECT TO CONSTRUCTION TRAFFIC, SHALL RECEIVE A PERMANENT OR TEMPORARY VEGETATIVE COVER AS SOON AS FINAL CONTOURS ARE ESTABLISHED. IF THE SEASON PREVENTS THE ESTABLISHMENT OF A VEGETATIVE COVER, DISTURBED AREAS SHALL BE THOROUGHLY MULCHED. MULCHED AREAS SHALL BE SEEDED AS SOON AS WEATHER CONDITIONS ALLOW.
22. ALL SLOPES STEEPER THAN 2H:1V SHALL BE COVERED WITH MODIFIED ROCKFILL AND/OR AN APPROVED EROSION CONTROL MATTING.
23. CONTRACTOR SHALL REMOVE ALL SEDIMENTATION CONTROL SYSTEMS, REMOVE ALL ACCUMULATED SEDIMENTS, AND SEED THE DISTURBED AREAS, WHEN THE CONTROL SYSTEMS ARE NO LONGER REQUIRED. CONTRACTOR SHALL REQUEST AND RECEIVE PERMISSION FROM THE ENGINEER PRIOR TO REMOVING ANY CONTROL SYSTEM.
24. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL SILT AND DEBRIS RESULTING FROM CONSTRUCTION OPERATIONS FROM EACH DRAINAGE STRUCTURE UPON COMPLETION OF THE PROJECT.
25. OBJECTS AND/OR AREAS DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE RESTORED TO THEIR ORIGINAL CONDITION AND ELEVATION.
26. ALL DISTURBED AREAS NOT OCCUPIED BY PAVEMENT, CRUSHED GRAVEL, CRUESHED STONE OR RIPRAP SHALL BE COVERED WITH 4" (MIN.) OF LOAM AND SEED.
27. PERMANENT SEEDING SHALL OCCUR BETWEEN MARCH 1 AND JUNE 15, OR BETWEEN AUGUST 15 AND OCTOBER 15.

GENERAL CONSTRUCTION NOTES

1. THE LOCATION OF ALL UNDERGROUND UTILITIES SHOWN ON THIS PLAN SET SHALL BE CONSIDERED APPROXIMATE. THEREFORE, PRIOR TO THE START OF ANY WORK ON THE SITE, THE CONTRACTOR SHALL NOTIFY ALL APPROPRIATE AGENCIES AND UTILITY COMPANIES, AND VERIFY THE ACTUAL LOCATION OF ALL UTILITIES SHOWN OR NOT SHOWN ON THIS PLAN. CONTACT DIG-SAFE AT 188-344-7233 (1-888-DIG-SAFE) AT LEAST 72 HOURS PRIOR TO THE START OF EXCAVATING.
2. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, AND PROCEDURES; AND FOR THE SAFETY PRECAUTIONS AND PROGRAMS REQUIRED FOR THE WORK UNDER THIS CONTRACT. THE CONTRACT DOCUMENTS DO NOT INCLUDE THE NECESSARY COMPONENTS FOR CONSTRUCTION SAFETY AND THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR PROVIDING ALL SAFETY BARRIERS, WARNING FLASHERS, STEEL PLATES FOR COVERING TRENCHES AND EXCAVATIONS, AS REQUIRED FOR THE PROTECTION OF WORKERS AND THE PUBLIC. COMPLY WITH OSHA REGULATIONS.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING ALL NECESSARY CONSTRUCTION PERMITS REQUIRED FOR THIS PROJECT.
4. PRIOR TO CONSTRUCTION, CONSTRUCTION FENCE OR OTHER SUITABLE FORM OF DEMARCATION SHALL BE INSTALLED AT THE LIMITS OF THE AREAS TO BE DISTURBED.
5. PRIOR TO CONSTRUCTION, THE CONTRACTOR SHALL DESIGNATE A STAGING AREA FOR STORAGE OF CONSTRUCTION EQUIPMENT AND MATERIALS, AND SUCH AREA SHALL BE PRE-APPROVED BY TOWN OR OWNERS ENGINEER.
6. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DEVELOP A CONSTRUCTION PHASING PLAN AND THAT EROSION CONTROL MEASURES ARE INSTALLED AND MAINTAINED. (SEE EROSION CONTROL NOTES.)
7. WORK WITHIN PUBLIC WAYS, INCLUDING THE DEEDED ACCESS ROAD, SHALL COMPLY WITH APPLICABLE MUNICIPAL AND STATE REQUIREMENTS.
8. PRIOR TO COMMENCING CONSTRUCTION, THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR MAKING ALL NECESSARY ARRANGEMENTS AND FOR PERFORMING ANY NECESSARY WORK INVOLVED IN CONNECTION WITH THE DISCONTINUANCE OR JURISDICTION OF THE UTILITY COMPANIES, SUCH AS ELECTRICITY, TELEPHONE, CABLE OR FIBER OPTIC, WATER, AND SEWER SYSTEMS, OR ANY SYSTEMS WHICH WILL BE IMPACTED BY THE WORK TO BE PERFORMED PER THE PLANS.
9. UNLESS OTHERWISE NOTED OR APPROVED BY THE ENGINEER, THE CONTRACTOR SHALL MAINTAIN ALL EXISTING UTILITIES.
10. THE CONTRACTOR SHALL EXERCISE EXTREME CARE WHEN EXCAVATING AND BACKFILLING IN THE VICINITY OF EXISTING UTILITIES, INCLUDING BUT NOT LIMITED TO SHORING AND THE USE OF HAND EXCAVATION WHERE APPROPRIATE.
11. ALL EXISTING PIPING AND STRUCTURES EXPOSED DURING EXCAVATION SHALL BE ADEQUATELY SUPPORTED, BRACED, OR OTHERWISE PROTECTED DURING CONSTRUCTION ACTIVITIES IN ACCORDANCE WITH THE REQUIREMENTS OF ALL GOVERNING CODES AND REGULATIONS.
12. WHERE AN EXISTING UTILITY IS FOUND TO CONFLICT WITH THE PROPOSED WORK, THE LOCATION, ELEVATION, AND SIZE OF THE UTILITY SHALL BE ACCURATELY DETERMINED WITHOUT DELAY BY THE CONTRACTOR AND THE INFORMATION FURNISHED TO THE ENGINEER FOR RESOLUTION OF THE CONFLICT.
13. NO CHANGES ARE TO BE MADE UNLESS AUTHORIZED BY THE DESIGN ENGINEER.
14. THE CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL SAFETY CODES, REGULATIONS, LEGAL REQUIREMENTS, AND PERMIT CONDITIONS.
15. CONSTRUCTION SEQUENCE SHALL BE COORDINATED TO MINIMIZE DISTURBANCE OF EXISTING CONDITIONS.
16. IF REQUIRED BY THE CONTRACTOR, OVERHEAD LINES SHALL BE RELOCATED BY THE UTILITY COMPANY AT THE CONTRACTOR'S EXPENSE.
17. THE CONTRACTOR SHALL TAKE ADEQUATE PRECAUTIONS TO PROTECT EXISTING RAILROAD TRACKS, ALL RETAINING WALLS, WALKS, STREETS, PAVEMENTS, HIGHWAY GUARDS, CURBING, EDGING, TREES, AND PLANTINGS ON OR OFF THE PREMISES OF THE WORK, AND SHALL REPAIR AND REPLACE OR OTHERWISE MAKE GOOD AT CONTRACTOR'S OWN EXPENSE ANY ITEMS DAMAGED AS A RESULT OF THE CONTRACTOR'S WORK.
18. THE CONTRACTOR SHALL REMOVE FROM THE PROJECT SITE ALL CONSTRUCTION DEBRIS, STUMPS, RUBBISH AND DEBRIS FOUND THEREON. STORAGE OF SUCH MATERIALS ON THE PROJECT SITE OR ROUTE WILL NOT BE PERMITTED. ALL MATERIALS TO BE REMOVED AND DISPOSED SHALL BE DISPOSED IN ACCORDANCE WITH ALL APPLICABLE CODES AND REGULATIONS. THE CONTRACTOR SHALL LEAVE THE PROJECT SITE IN SAFE, CLEAN AND LEVEL CONDITION.
19. ALL SURFACES DISTURBED BY THIS WORK SHALL BE RESTORED TO THEIR ORIGINAL CONDITION AS DETAILED OR AS SPECIFIED BY THE ENGINEER.
20. ALL MANHOLES AND, DRAINAGE STRUCTURES, OR VAULT STRUCTURES SHALL HAVE THEIR RIMS SET TO FINISHED GRADE REGARDLESS OF ANY ELEVATIONS OTHERWISE SHOWN, UNLESS OTHERWISE APPROVED BY THE ENGINEER.
21. ALL WORK SHALL COMPLY WITH THE PROJECT'S REGULATORY PERMITS AND AGREEMENTS.
22. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SPECIFYING HOW TO "REPAIR. REPLACE, PROTECT, AND MAINTAIN" ALL EXISTING ABOVE GROUND AND UNDERGROUND UTILITIES DURING CONSTRUCTION. THIS SHALL INCLUDE SHOP DRAWING SUBMITTALS TO THE PROJECT ENGINEER.
23. UTILITY TRENCHES THAT REQUIRE REPAIRS AND/OR REPLACEMENT OF EXPOSED UNDERGROUND UTILITIES MAY NOT BE BACKFILLED UNTIL THE COMPLETED UTILITY WORK HAS BEEN INSPECTED AND APPROVED BY THE APPROPRIATE UTILITY INSPECTOR.
24. THE CONTRACTOR IS RESPONSIBLE FOR DUST CONTROL. DUST CONTROL SHALL INCLUDE THE WATERING AND APPLICATION OF CALCIUM AS NECESSARY FOR ALL SURFACES AND SWEEPING AT THE INTERSECTION OF OAK STREET.
25. DURING CONSTRUCTION, TRENCHES ARE NOT TO BE LEFT IN A CONDITION THAT WOULD DIRECT RUNOFF AROUND TREATMENT AND DETENTION FACILITIES.
26. ALL SITE WORK SHOULD BE SECURED AT THE END OF THE WORK DAY TO REDUCE EROSION AND SEDIMENT PROBLEMS. THIS INCLUDES AS APPLICABLE, COVERING STOCKPILES OF SEDIMENT, INSTALLING TEMPORARILY VEGETATION OR BY USING GEOTEXTILES TO COVER DISTURBED AREAS WITH STEEPER SLOPES.
27. DEWATERING OPERATIONS SHALL COMPLY WITH THE REQUIREMENTS OF THE U.S. EPA NPDES PHASE 1 CONSTRUCTION ACTIVITY GENERAL PERMIT FOR CONSTRUCTION SITES THAT ARE GREATER THAN 1 ACRE.
28. EXCESS MATERIAL SHALL BE STOCKPILED AT A PROPER UPLAND LOCATION. STOCKPILES ARE TO BE CONSTRUCTED IN ACCORDANCE WITH GOOD ENGINEERING PRACTICE AND PERIODIC INSPECTIONS SHALL BE PREFORMED FOR SLOPE STABILITY. STOCKPILES ARE TO BE PROPERLY SECURED TO PREVENT EROSION AND SEDIMENT RUNOFF.
29. CLEARING AND GRUBBING - GRUB AND REMOVE STUMPS ROOTS TO A DEPTH OF 24 INCHES BELOW SITE SUBGRADE OR EXISTING GROUND, STRIP AVAILABLE TOPSOIL AND STOCKPILE FOR USE WITHIN THE PROJECT PERIMETER.
30. EXCAVATION - COMPLETELY REMOVE ANY PEAT OR OTHER ORGANIC MATERIALS AND REPLACE WITH APPROVED FILL MATERIALS AND COMPACT.
31. MATERIALS - FILL MATERIAL SHALL BE SUITABLE EXISTING MATERIAL OBTAINED FROM EXCAVATIONS OR BORROW FROM OFF SITE SOURCES, AND SHALL BE GRANULAR SOILS FREE FROM ROOTS, ORGANIC MATERIAL, RUBBISH, STONES OVER 6" IN DIAMETER AND FROZEN SOIL. FILLS SHALL NOT BE CONSTRUCTED WITH MATERIAL FROM ROCK EXCAVATION.
32. COMPACTION - PLACE FILL MATERIAL IN SUCCESSIVE HORIZONTAL LAYERS 8 TO 12 INCHES IN LOOSE DEPTH AND COMPACT WITH APPROVED EQUIPMENT TO AT LEAST 95% OF LABORATORY MAXIMUM DENSITY (ASTM D 1557 METHOD D). COMPLETELY COMPACT EACH LAYER BEFORE PLACING THE NEXT LAYER. DO NOT PLACE, SPREAD OR COMPACT FILL MATERIAL WHILE GROUND OR FILL MATERIAL IS FROZEN OR PARTIALLY THAWED AND DURING UNFAVORABLE WEATHER CONDITIONS. FILL MATERIAL WHICH HAS AN EXCESSIVE MOISTURE CONTENT SHALL NOT BE COMPACTED UNTIL THE MATERIAL HAS BEEN AERATED BY GRADING, HARROWING OR OTHER METHODS TO REMOVE EXCESS MOISTURE.

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TITLE: 275/345 KV GIS SUBSTATION GENERAL NOTES

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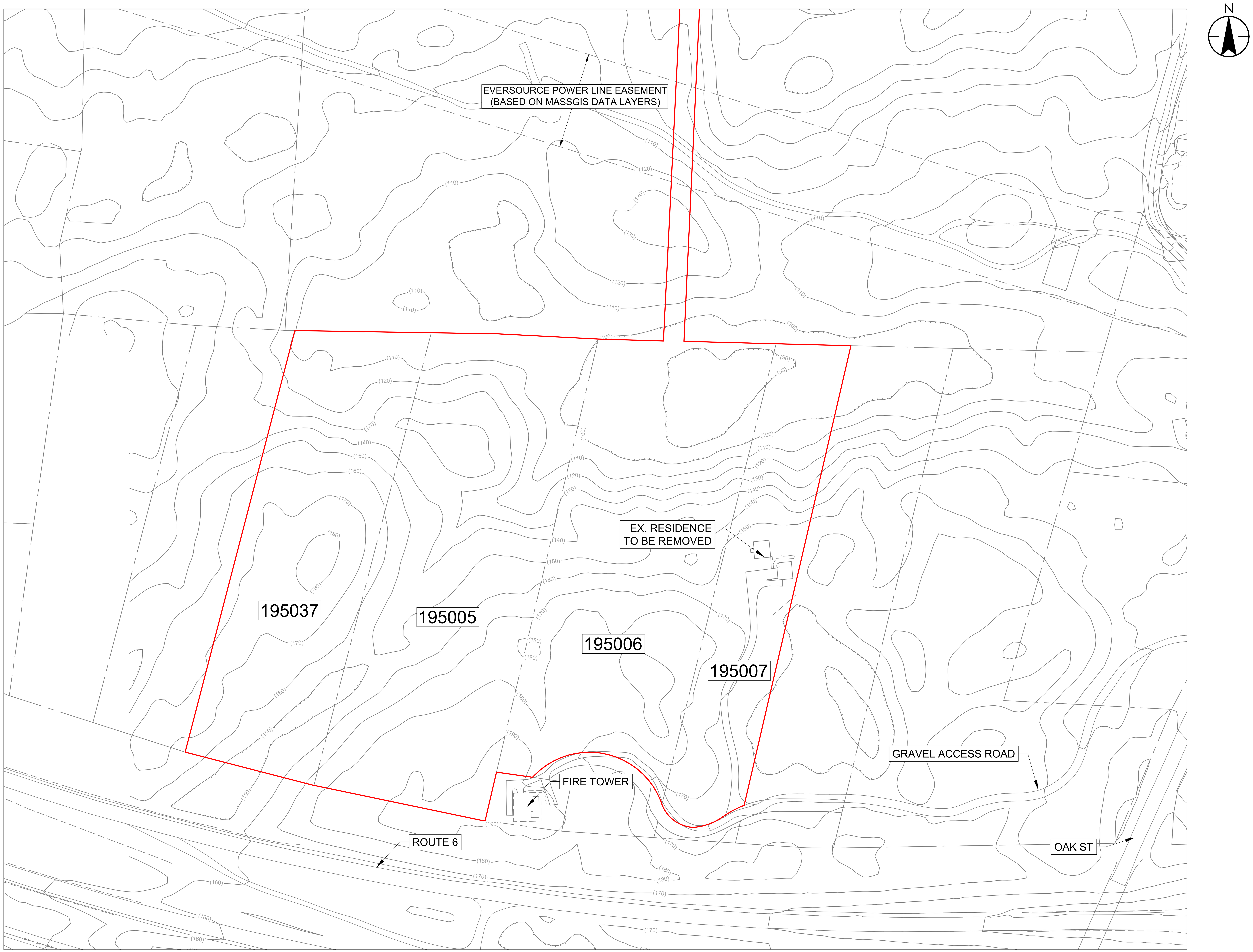
SHEET 2 OF 10	DWG. NO. SHEET – 2	SCALE AS SHOWN	FORMAT/SIZE ANSI D	REV: E



NOTES:

1. THE EXTENTS OF THE SITE ARE NOT WITHIN AN INTERIM WELLHEAD PROTECTION AREA (IWPA).
2. ACCORDING TO THE FLOOD RATE INSURANCE MAP FOR BARNSTABLE COUNTY MASSACHUSETTS PANEL 561 MAP NUMBER 25001C0561J WITH THE EFFECTIVE DATE OF JULY 16, 2014 THE ENTIRE SITE IS WITHIN FLOOD ZONE X (AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN).
3. PROPERTY LINES ARE FROM GIS DATA.
4. EXISTING TOPOGRAPHY IS TAKEN FROM 2016 USGS COASTAL NATIONAL ELEVATION DATABASE (CoNED) LIDAR DATA. TOPOGRAPHY TO BE CONFIRMED WITH A FIELD SURVEY.
5. ACCORDING TO MASSGIS THE SITE IS NOT WITHIN THE NATURAL HERITAGE AND ENDANGERED SPECIES PROGRAM (NHESP) PRIORITY HABITATS OF RARE WILDLIFE OR THE NHESP ESTIMATED HABITATS OF RARE WILDLIFE.
6. ACCORDING TO MASSGIS THERE ARE NO CERTIFIED VERNAL POOLS OR POTENTIAL VERNAL POOLS LOCATED ON THE PROJECT SITE.
7. ACCORDING TO MASSGIS THERE ARE NO WETLANDS LOCATED WITHIN THE SITE OR WITHIN 100FT OF THE AREA TO BE REDEVELOPED.
8. ACCORDING TO MASSGIS THE SITE IS NOT LOCATED WITHIN AN AREA OF CRITICAL ENVIRONMENTAL CONCERN.
9. SOILS IN THE SITE AREA (PER NATURAL RESOURCES CONSERVATION SERVICE) ARE 493D "PLYMOUTH-BARNSTABLE-NANTUCKET COMPLEX" AND 494C "PLYMOUTH-BARNSTABLE COMPLEX"; BOTH WITHIN HYDROLOGIC SOIL GROUP "A".
10. THE SITE COMPRISES THE FOLLOWING PROPERTIES FROM THE TOWN OF BARNSTABLE ASSESSORS MAP BOOK:

OWNER: MACGREGOR, J BRUCE TR
BOOK/PAGE 29232/0017
ASSESSORS MAP 195
PARCEL 037

OWNER: DIRICO, FRANK
BOOK/PAGE 10267/0043
ASSESSORS MAP 195
PARCEL 005

OWNER: DIRICO, FRANK
BOOK/PAGE 4216/0157
ASSESSORS MAP 195
PARCEL 006

OWNER: ALCOCK, ARTHUR JAMES & BASKIN, JE
BOOK/PAGE 24918/0127
ASSESSORS MAP 195
PARCEL 007

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SCALE IN FEET

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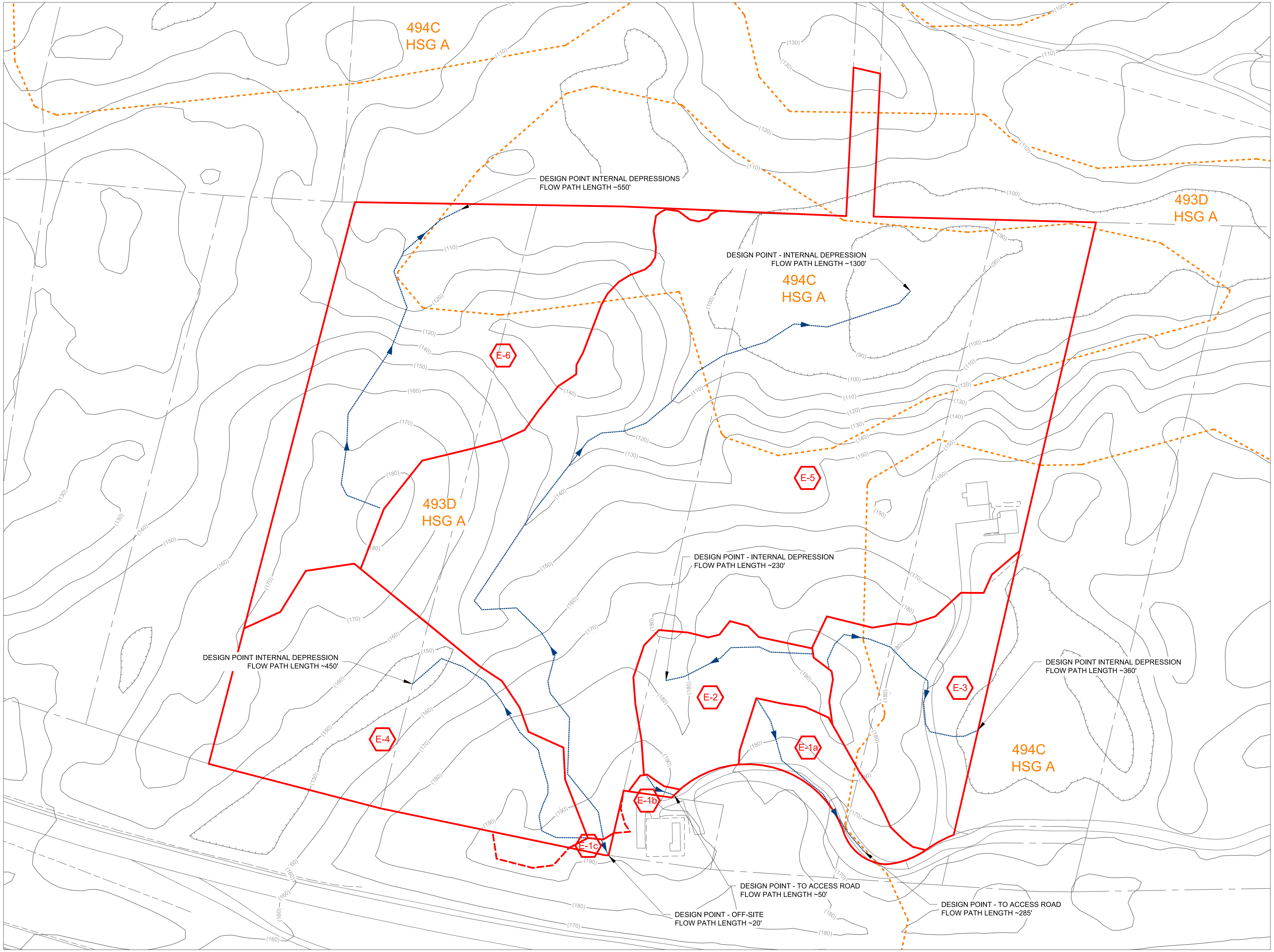
ORIGINAL SHEET - ANSI D



LEGEND

- WOODS/BRUSH
- TIME OF CONCENTRATION LINE
- SUBCATCHMENT AREAS WITHIN SITE
- OFF-SITE INFLOW INTO PROPOSED DRAINAGE SYSTEM
- NRCS SOIL BOUNDARY

0 75 150
SCALE IN FEET

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CONTRACTOR:
Stantec
Stantec Consulting Services Inc.
400 Crown Colony Drive Suite 200
Quincy, MA U.S.A. 02169-0982

CLIENT:
AVANGRID Offshore Wind
125 High Street
Boston, MA 02110

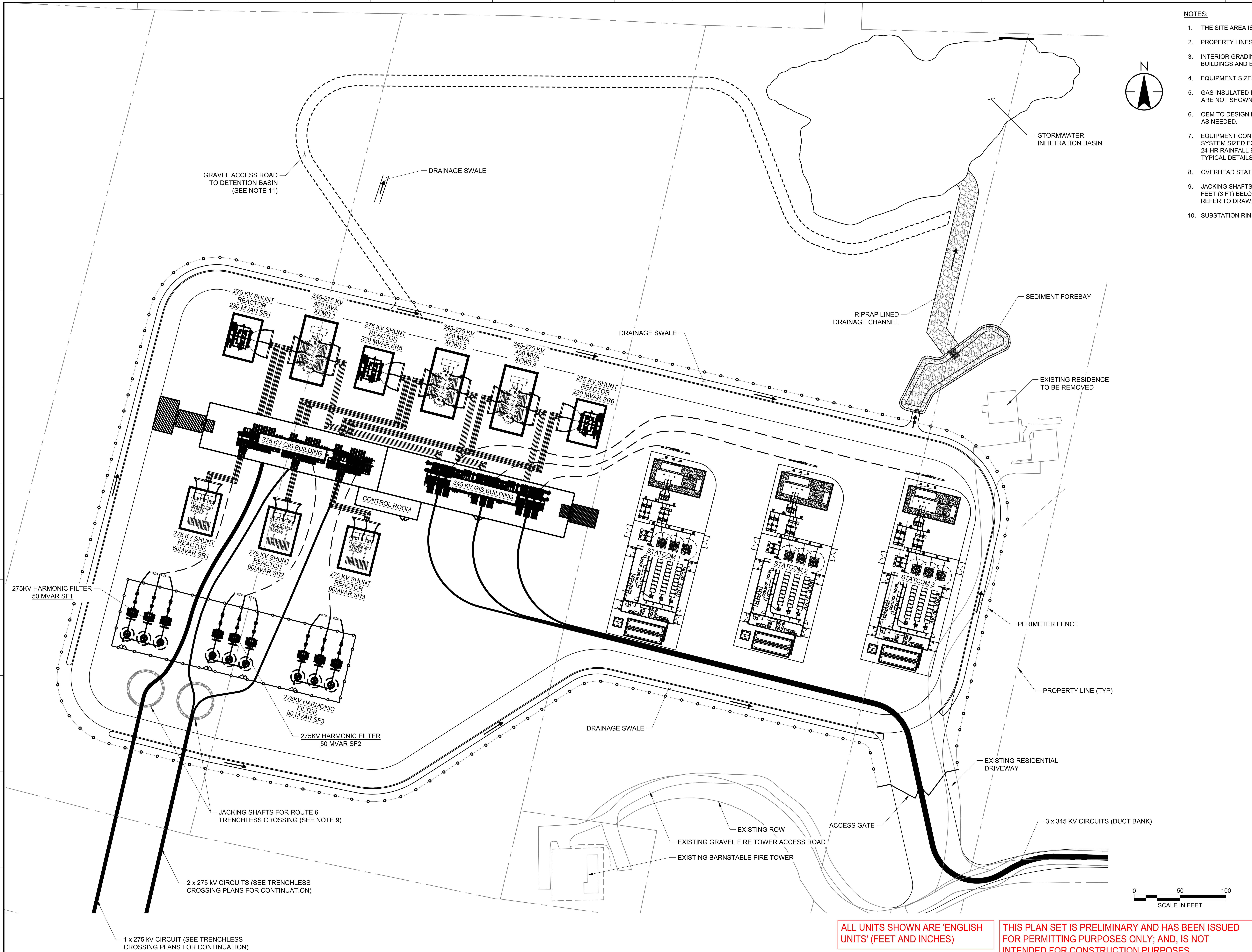
PROJECT
NEW ENGLAND WIND 2 CONNECTOR

TITLE:
275/345 KV GIS SUBSTATION
EXISTING SUBCATCHMENT AREAS

DOC ID: CWW-OSP-STC-DW-0003

SHEET 4 OF 10	DWG. NO. SHEET - 4	SCALE AS SHOWN	FORMAT/SIZE ANSI D	REV: E

ORIGINAL SHEET - ANSI D



NOTES:

1. THE SITE AREA IS APPROXIMATELY 23.9 ACRES.
2. PROPERTY LINES ARE FROM GIS DATA.
3. INTERIOR GRADING IS INDICATIVE ONLY AND MAY BE FURTHER OPTIMIZED AROUND BUILDINGS AND EQUIPMENT.
4. EQUIPMENT SIZES ARE PRELIMINARY AND SUBJECT TO CHANGE.
5. GAS INSULATED BUS (GIB) IS ONLY SHOWN FOR PRELIMINARY ROUTES, AIR BUSHINGS ARE NOT SHOWN FOR CLARITY.
6. OEM TO DESIGN BUILDING TO MAXIMUM 30' HEIGHT; ADD FOOTPRINT OR BASEMENT AS NEEDED.
7. EQUIPMENT CONTAINING DIELECTRIC FLUIDS SHALL BE FITTED WITH A CONTAINMENT SYSTEM SIZED FOR 110% OF THE DIELECTRIC FLUID VOLUME PLUS VOLUME FOR A 30" 24-HR RAINFALL EVENT. REFER TO SHEET 8, DETAILS 3 AND 5 FOR CRITERIA AND TYPICAL DETAILS.
8. OVERHEAD STATIC WIRES NOT SHOWN FOR CLARITY.
9. JACKING SHAFTS FOR ROUTE 6 TRENCHLESS CROSSING TO BE REMOVED TO THREE FEET (3 FT) BELOW FINISHED GRADE AND BACKFILLED FOLLOWING CONSTRUCTION. REFER TO DRAWING CWW-OSP-STC-DW-0006.
10. SUBSTATION RING ROAD TO BE CONSTRUCTED OF CRUSHED GRAVEL (UNPAVED).

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E	2022-02-10	UPDATED FOR STATE PERMITTING	IFI	MDC	JDT	KEF
D	2022-12-15	REVISED SITING - PARCELS 2-5	IFI	MDC	JDT	KEF
C	2022-10-26	ISSUED FOR STATE PERMITTING	IFI	MDC	JDT	KEF
B	2022-09-28	ISSUED FOR STATE PERMITTING	IFI	DRM	JDT	KEF
A	2022-09-14	ISSUED FOR CLIENT REVIEW	IFCR	DRM	JDT	KEF

CONTRACTOR:

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CLIENT:

AVANGRID Offshore Wind
125 High Street
Boston, MA 02110

PROJECT
NEW ENGLAND WIND 2 CONNECTOR

TITLE:
275/345 KV GIS SUBSTATION
PROPOSED EQUIPMENT LAYOUT

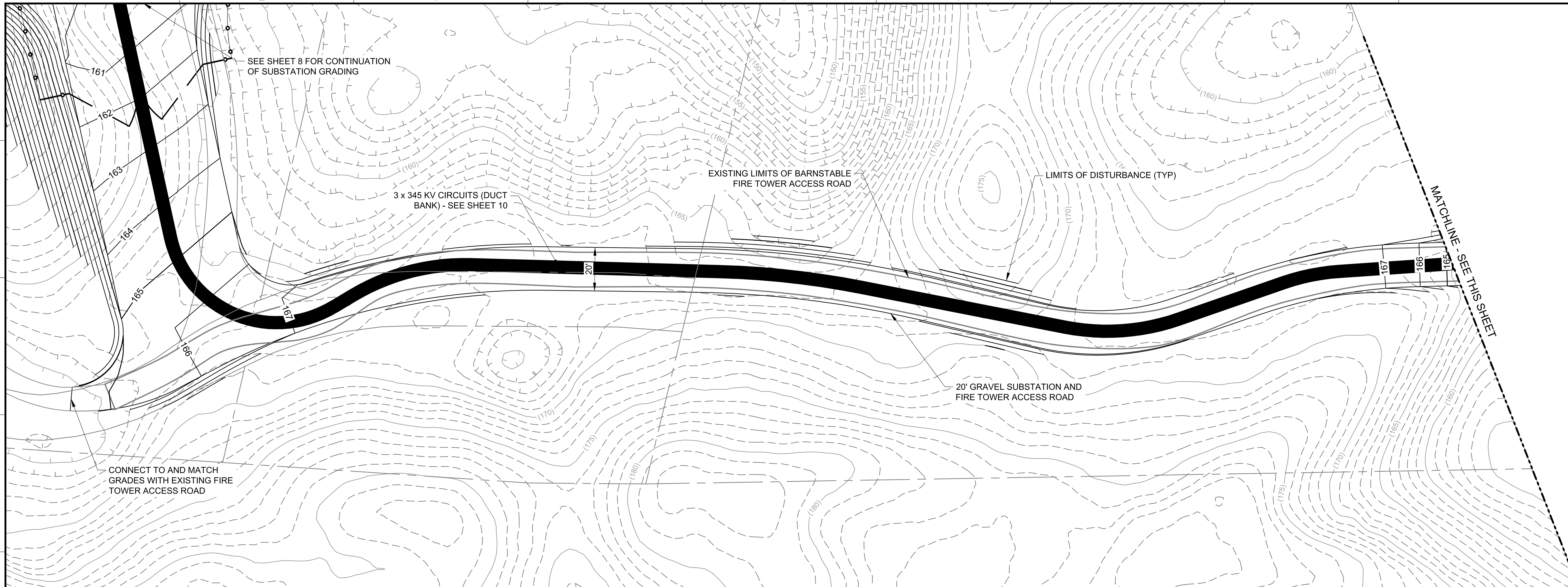
DOC ID:
CWW-OSP-STC-DW-0003

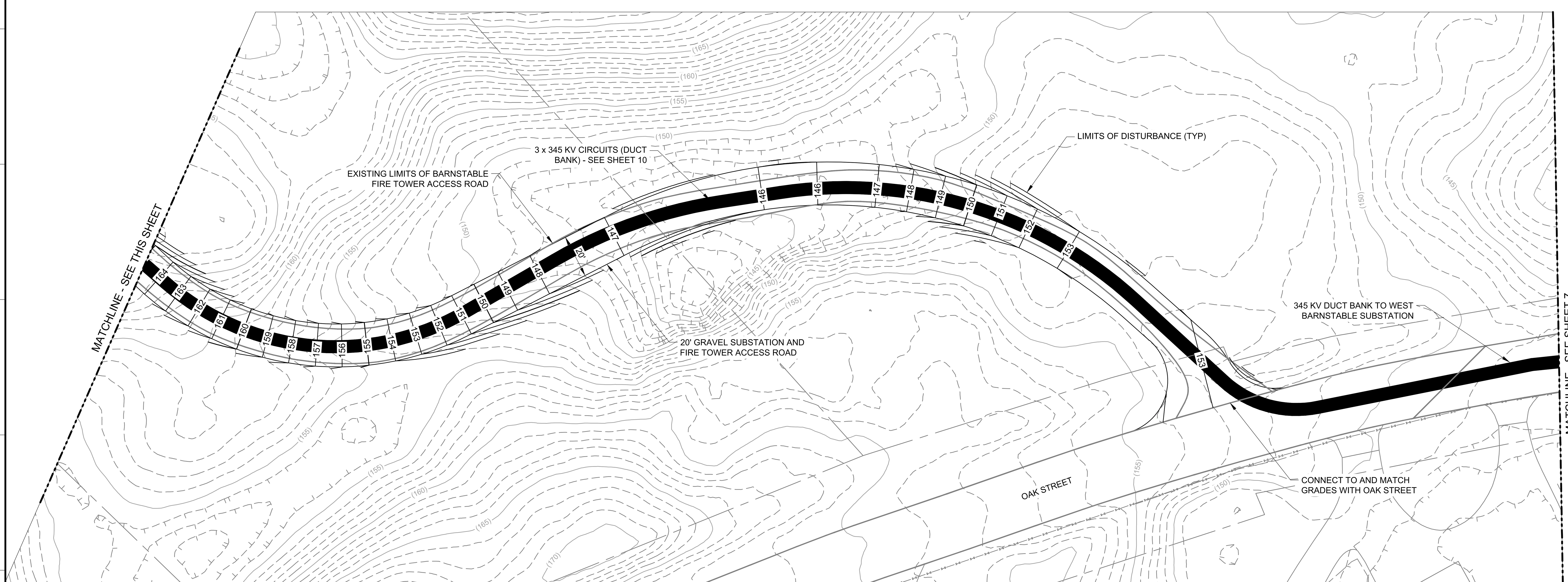
SHEET	DWG. NO.	SCALE	FORMAT/SIZE	REV:
5 OF 10	SHEET - 5	AS SHOWN	ANSI D	E

ORIGINAL SHEET - ANSI D

NOTES:

1. PROPERTY LINES ARE FROM GIS DATA.
2. GRADING IS INDICATIVE ONLY AND MAY BE FURTHER OPTIMIZED AROUND BUILDINGS AND EQUIPMENT.





0 30 60
SCALE IN FEET

REV.	DATE	REVISION DESCRIPTION	STATUS	DRAWN	CHKD	APPRVD
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A	2022-09-14	ISSUED FOR CLIENT REVIEW	IFCR	DRM	JDT	KEF

CONTRACTOR:
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CLIENT:
AVANGRID Offshore Wind
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Boston, MA 02110

PROJECT: NEW ENGLAND WIND 2 CONNECTOR

TITLE: 275/345 KV GIS SUBSTATION
345KV DUCT BANK - ACCESS ROAD

DOC ID: CWW-OSP-STC-DW-0003

SHEET 6 OF 10 | DWG. NO. SHEET - 6 | SCALE AS SHOWN | FORMAT/SIZE ANSI D | REV: E

ALL UNITS SHOWN ARE 'ENGLISH UNITS' (FEET AND INCHES)

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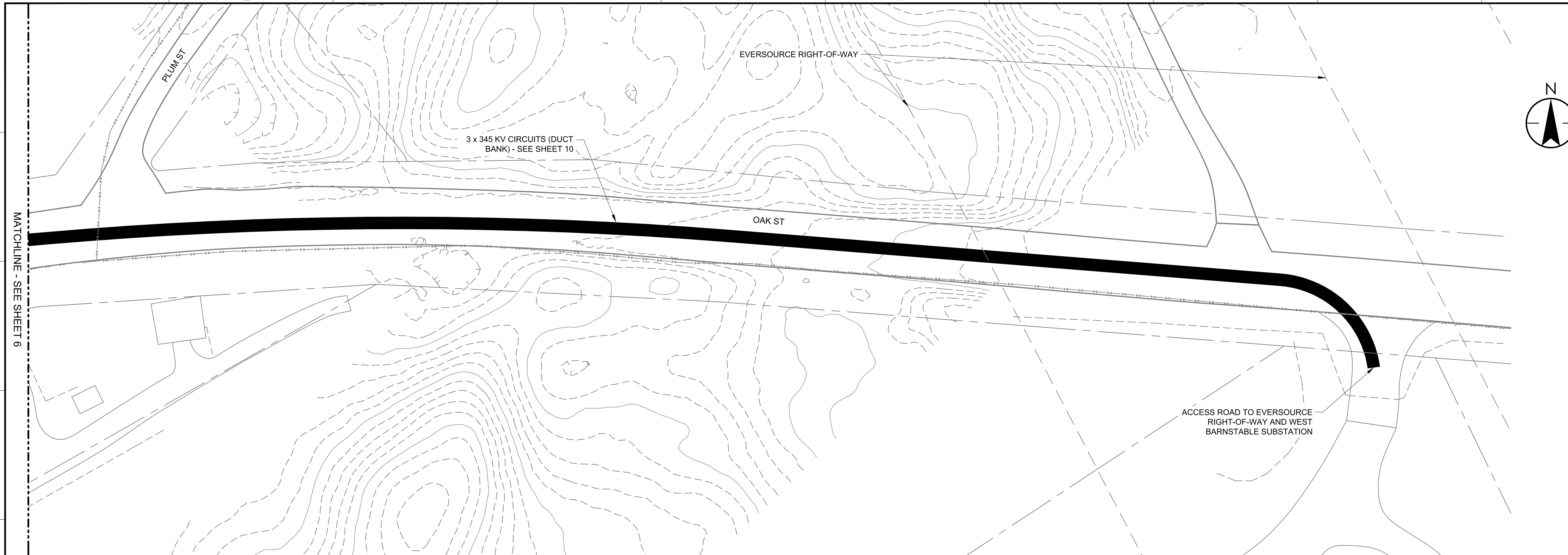
ORIGINAL SHEET - ANSI D



NOTES:

1. PROPERTY LINES ARE FROM GIS DATA.
2. GRADING IS INDICATIVE ONLY AND MAY BE FURTHER OPTIMIZED AROUND BUILDINGS AND EQUIPMENT.

0 30 60
SCALE IN FEET

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A	2022-09-14	ISSUED FOR CLIENT REVIEW	IFCR	DRM	JDT	KEF

CONTRACTOR:
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CLIENT:
AVANGRID | Offshore Wind
125 High Street
Boston, MA 02110

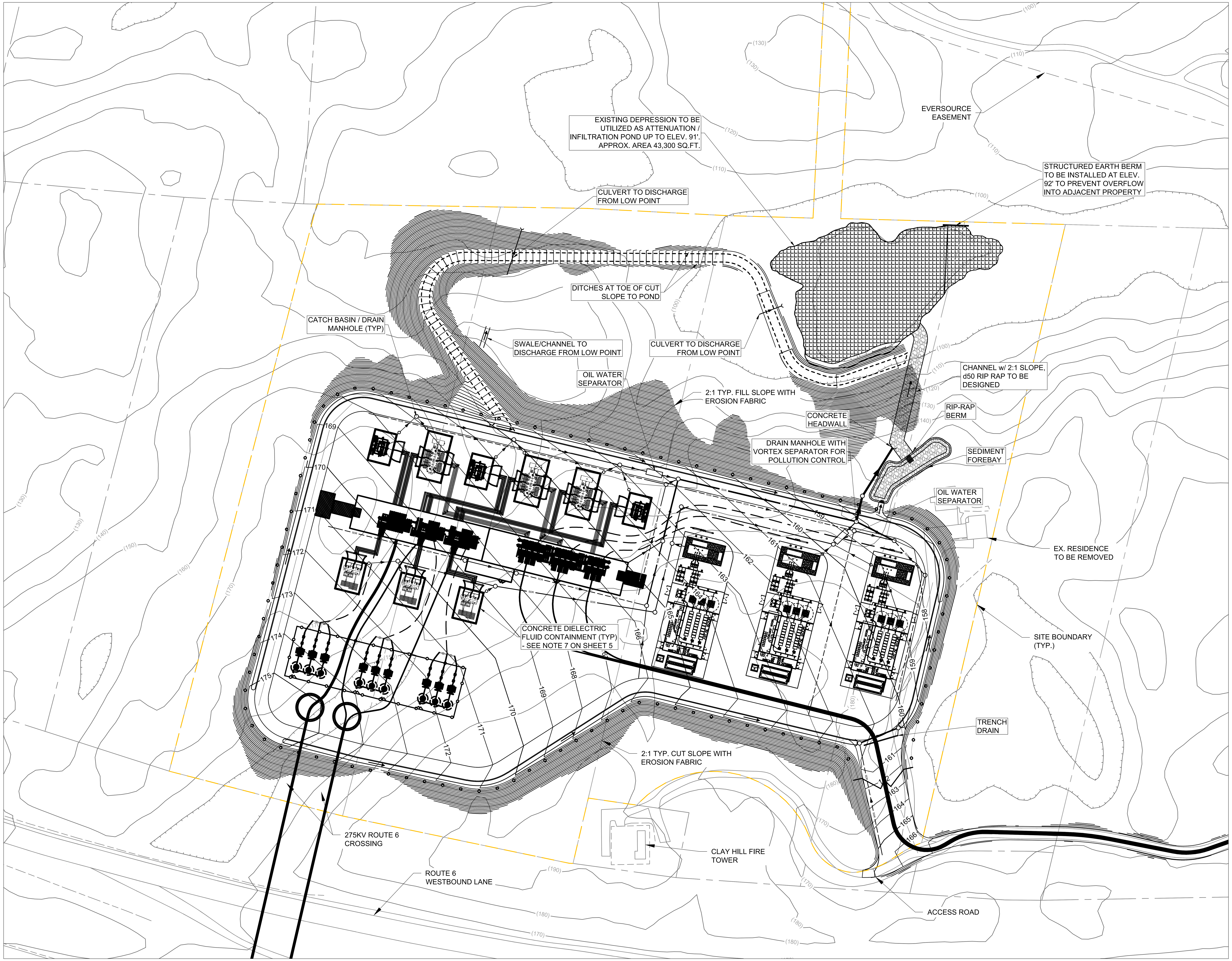
PROJECT: NEW ENGLAND WIND 2 CONNECTOR

TITLE: 275/345 KV GIS SUBSTATION
345KV DUCT BANK - OAK ST

DOC ID: CWW-OSP-STC-DW-0003

SHEET 7 OF 10	DWG. NO. SHEET - 7	SCALE AS SHOWN	FORMAT/SIZE ANSI D	REV: E

c:\pwworkdir\d0636514\clay hill substation layout
2023.02.10 6:10:28 PM
by: carroll, matthew
ORIGINAL SHEET - ANSI D



N

NOTES:

1. PROPOSED GRADING IS PRELIMINARY AND MAY BE FURTHER OPTIMIZED AROUND BUILDINGS AND EQUIPMENT
2. PRELIMINARY PIPE ELEVATIONS HAVE BEEN ASSUMED FOR USE IN DRAINAGE CALCULATIONS, POTENTIAL CONFLICTS WILL BE FURTHER EVALUATED DURING DETAILED DESIGN
3. CLOSED DRAINAGE PIPES TO BE 12" DIAMETER OR GREATER, PERFORATED TRENCH DRAINS TO BE 8" DIAMETER

LEGEND:

- PROPOSED STORMWATER PIPE
- PROPOSED STORMWATER PIPE - PERFORATED
- FLOW DIRECTION
- DETENTION BASIN
- RIP RAP LINED FEATURES
- PROPOSED DRAINAGE STRUCTURE OR CLEANOUT. STRUCTURE TYPE TBC WHERE NOT SPECIFIED

0 75 150
SCALE IN FEET

REV.	DATE	REVISION DESCRIPTION	STATUS	DRAWN	CHKD	APPRVD
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CLIENT:
AVANGRID | Offshore Wind
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Boston, MA 02110

PROJECT
NEW ENGLAND WIND 2 CONNECTOR

TITLE:
275/345 KV GIS SUBSTATION PROPOSED GRADING AND DRAINAGE PLAN

DOC ID: CWW-OSP-STC-DW-0003

SHEET 8 OF 10 | DWG. NO. SHEET - 8 | SCALE AS SHOWN | FORMAT/SIZE ANSI D | REV: E

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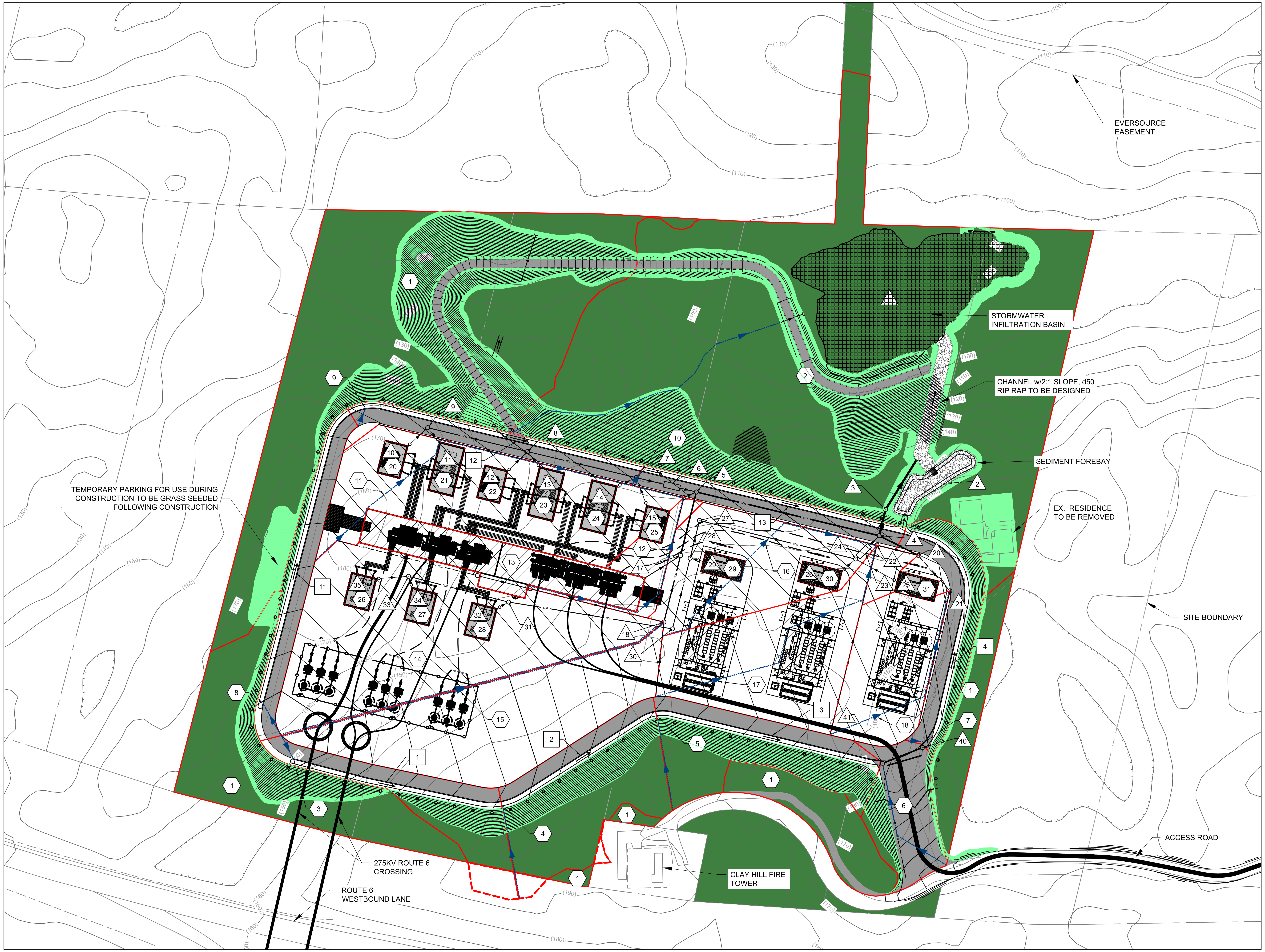
ORIGINAL SHEET - ANSI D



NOTES

1. CRUSHED ROCK SURFACE MATERIAL IS TO EXTEND 6' BEYOND THE SUBSTATION FENCE. THE FINISHED ROCK MATERIAL IS TO BE 6" THICK AND SHALL BE SELECTIVELY SCREENED AND WASHED TO PROVIDE A MINIMUM ELECTRICAL RESISTIVITY OF 3,000 OHM-METERS.

DISTURBED AREAS	AREA (AC)
TOTAL DISTURBED AREA	14.5
SUBSTATION AREA	9.9
DISTURBED AREA OUTSIDE FENCE	4.6
GRAVEL AREA INSIDE FENCE	1.6
GRAVEL AREA OUTSIDE FENCE	0.3
CRUSHED STONE AREA	5.5
TOTAL IMPERVIOUS AREA	2.8

0 75 150
SCALE IN FEET

LEGEND:
- BUILDING
- CONTAINMENT AREA
- GRAVEL ROADS
- WOODS
- CRUSHED ROCK AREA
- DETENTION BASIN
- GRADED EXTERNAL AREA - GRASS SEEDED
- STORMWATER FLOW DIRECTION
- TRIBUTARY BOUNDARY
- TIME OF CONCENTRATION LINE

NODES USED WITHIN HYDROCAD MODEL
- SUBCATCHMENT
- POND / STRUCTURE
- REACH

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Quincy, MA U.S.A. 02169-0982

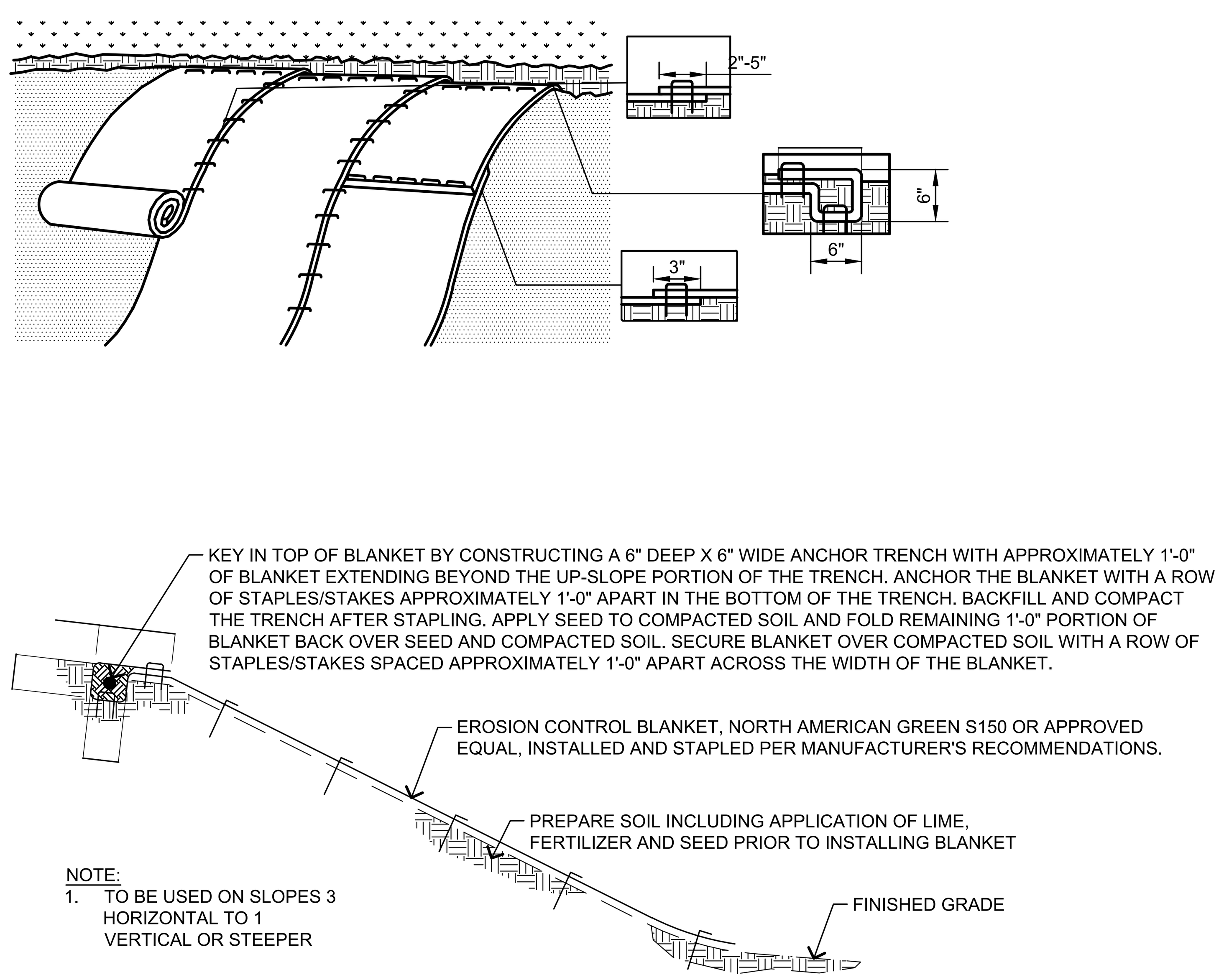
CLIENT:
AVANGRID Offshore Wind
125 High Street
Boston, MA 02110

PROJECT
NEW ENGLAND WIND 2 CONNECTOR

TITLE:
275/345 KV GIS SUBSTATION
PROPOSED SUBCATCHMENT AREAS

DOC ID: CWW-OSP-STC-DW-0003

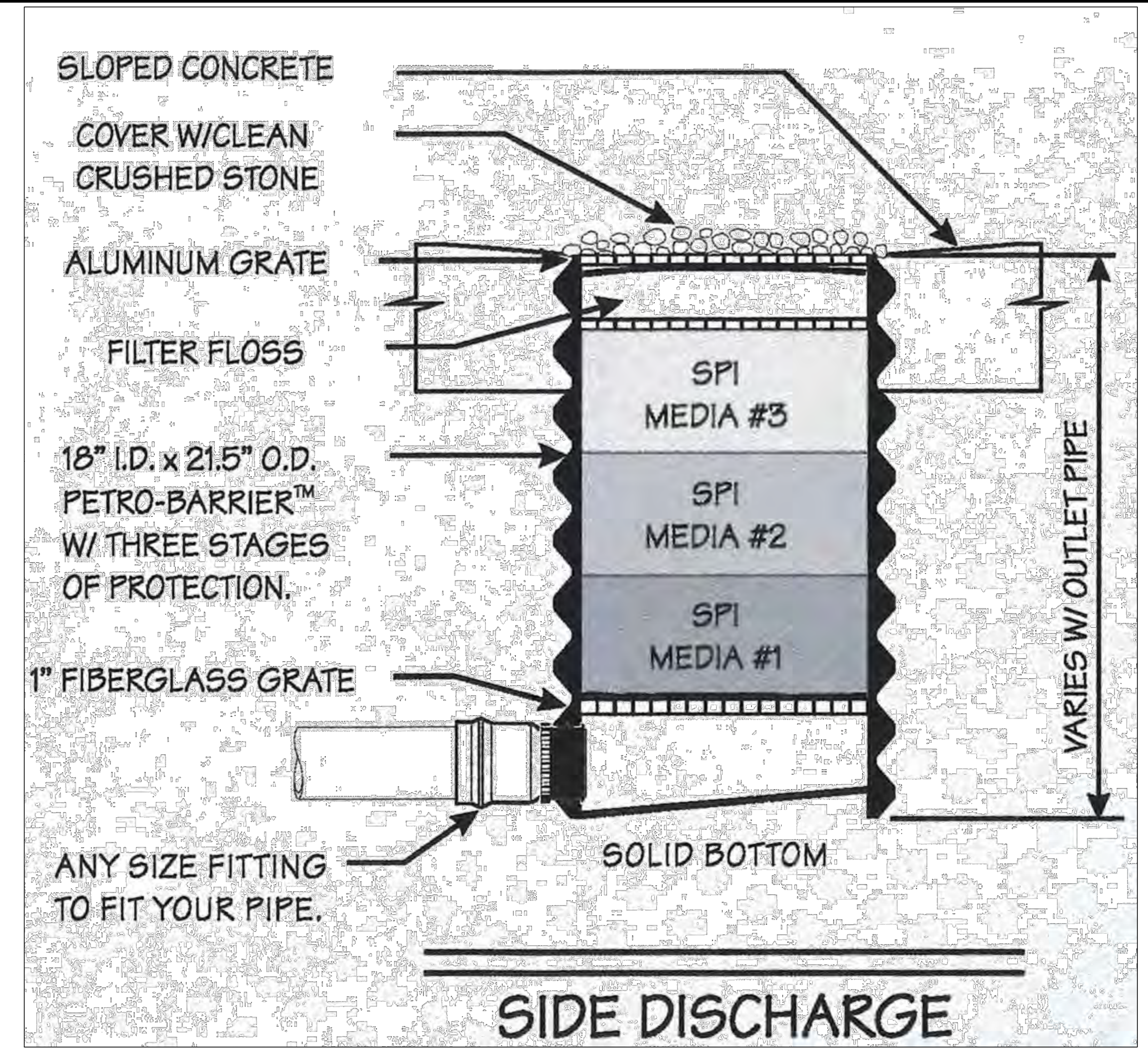
SHEET 9 OF 10	DWG. NO. SHEET - 9	SCALE AS SHOWN	FORMAT/SIZE ANSI D	REV: E



NOTE:
1. TO BE USED ON SLOPES 3 HORIZONTAL TO 1 VERTICAL OR STEEPER

1 EROSION CONTROL BLANKET

NOT TO SCALE

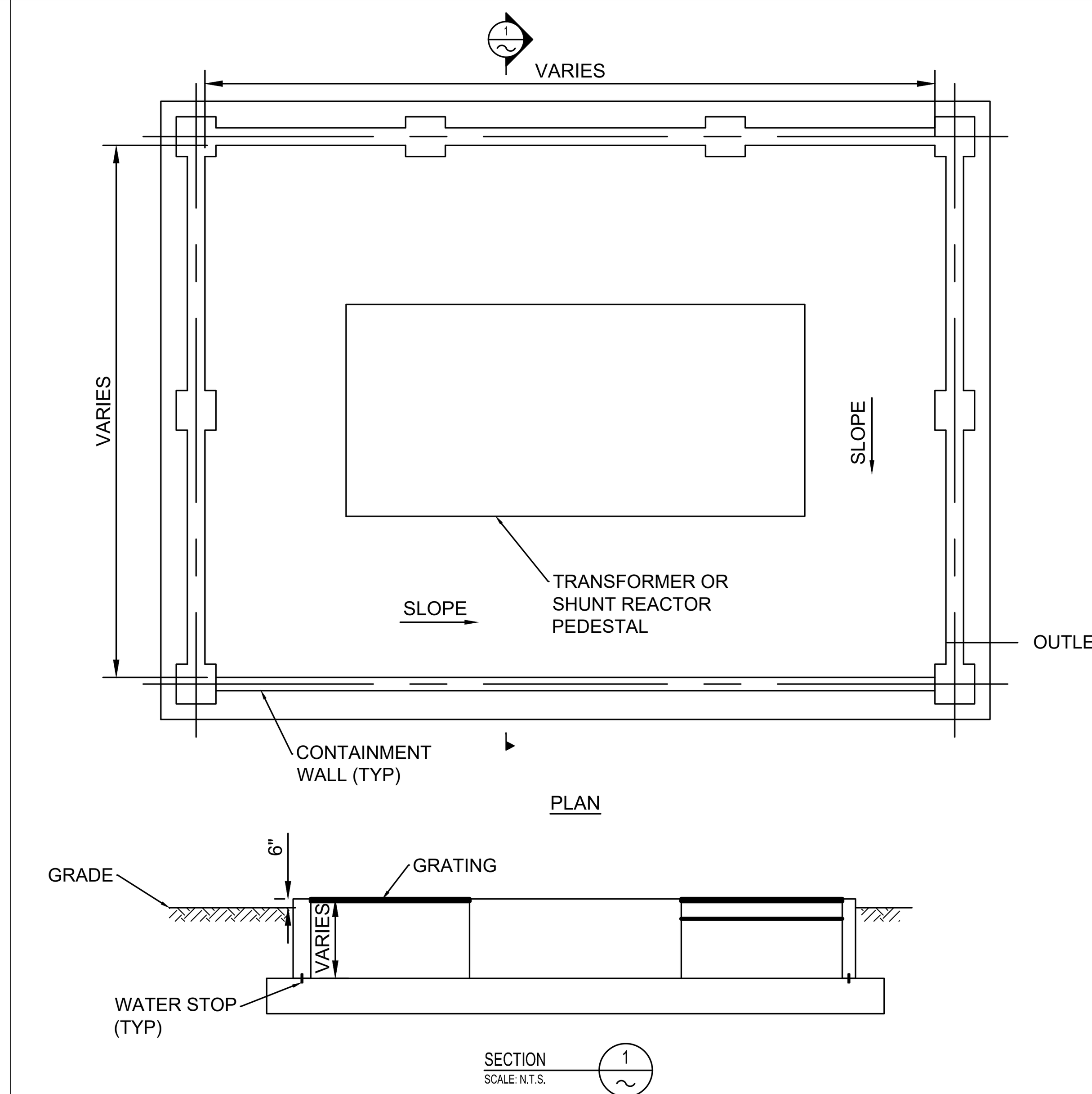


NOTES:

1. PETRO-BARRIER TO BE MANUFACTURED BY SOLIDIFICATION PRODUCTS INTERNATIONAL INC.
2. PETRO-BARRIERS TO BE LOCATED UNDERNEATH THE DRAINAGE OUTLET AT ALL CONTAINMENT AREAS. CONTAINMENT AREAS MUST BE SWEPT CLEAN BEFORE THE INSTALLATION OF THE PETRO-BARRIERS TO ENSURE THEY DO NOT BECOME CLOGGED DURING THE FIRST PRECIPITATION EVENT.
3. PETRO BARRIERS TO BE INSPECTED AFTER EACH RAIN EVENT OVER 1" IN DEPTH.

2 CONTAINMENT AREA PETRO-BARRIER (TYP.)

NOT TO SCALE

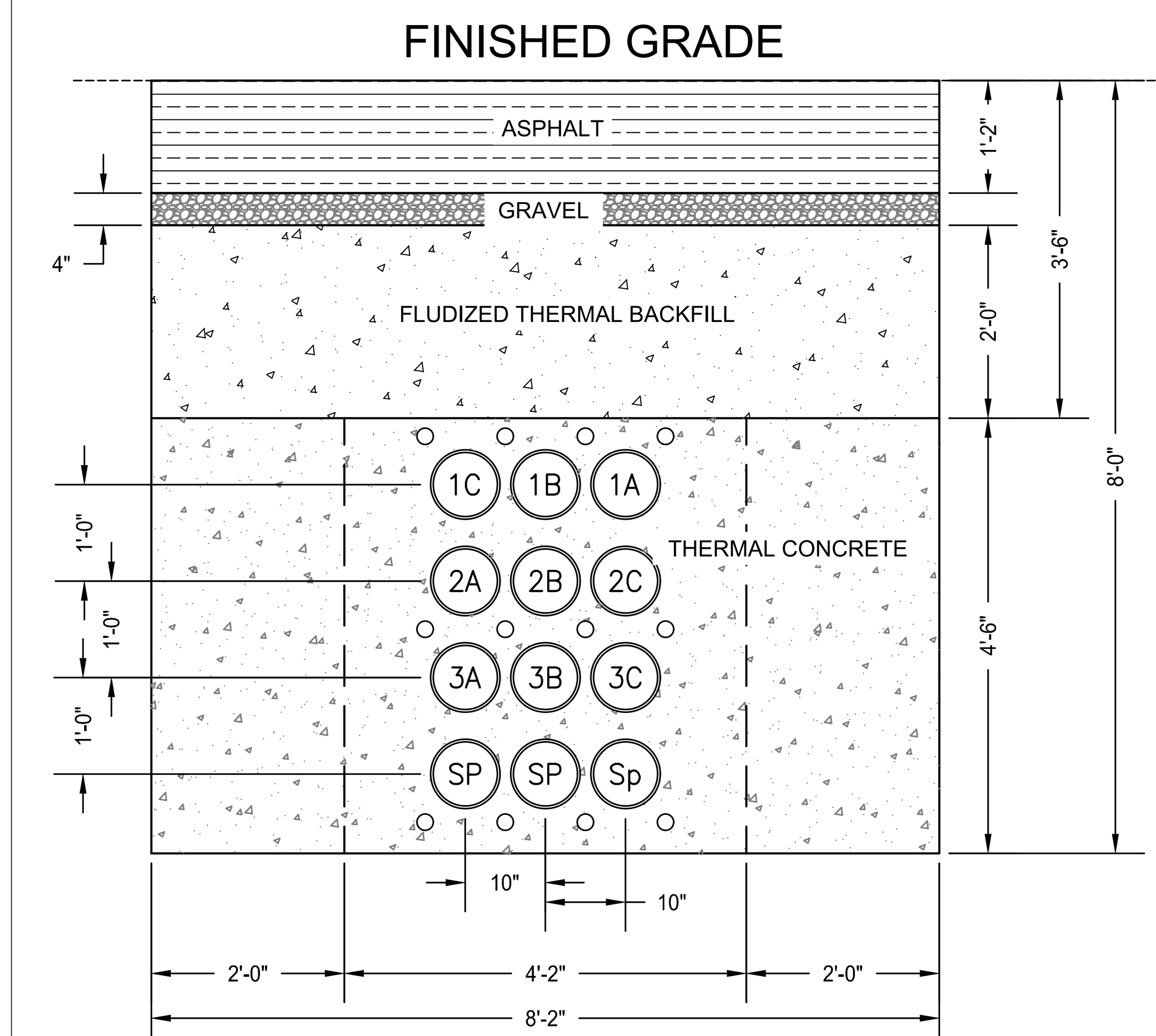


NOTES:

1. SEE DETAIL 5 FOR CONTAINMENT SIZING CRITERIA

3 TYPICAL ELECTRICAL EQUIPMENT CONTAINMENT

NOT TO SCALE



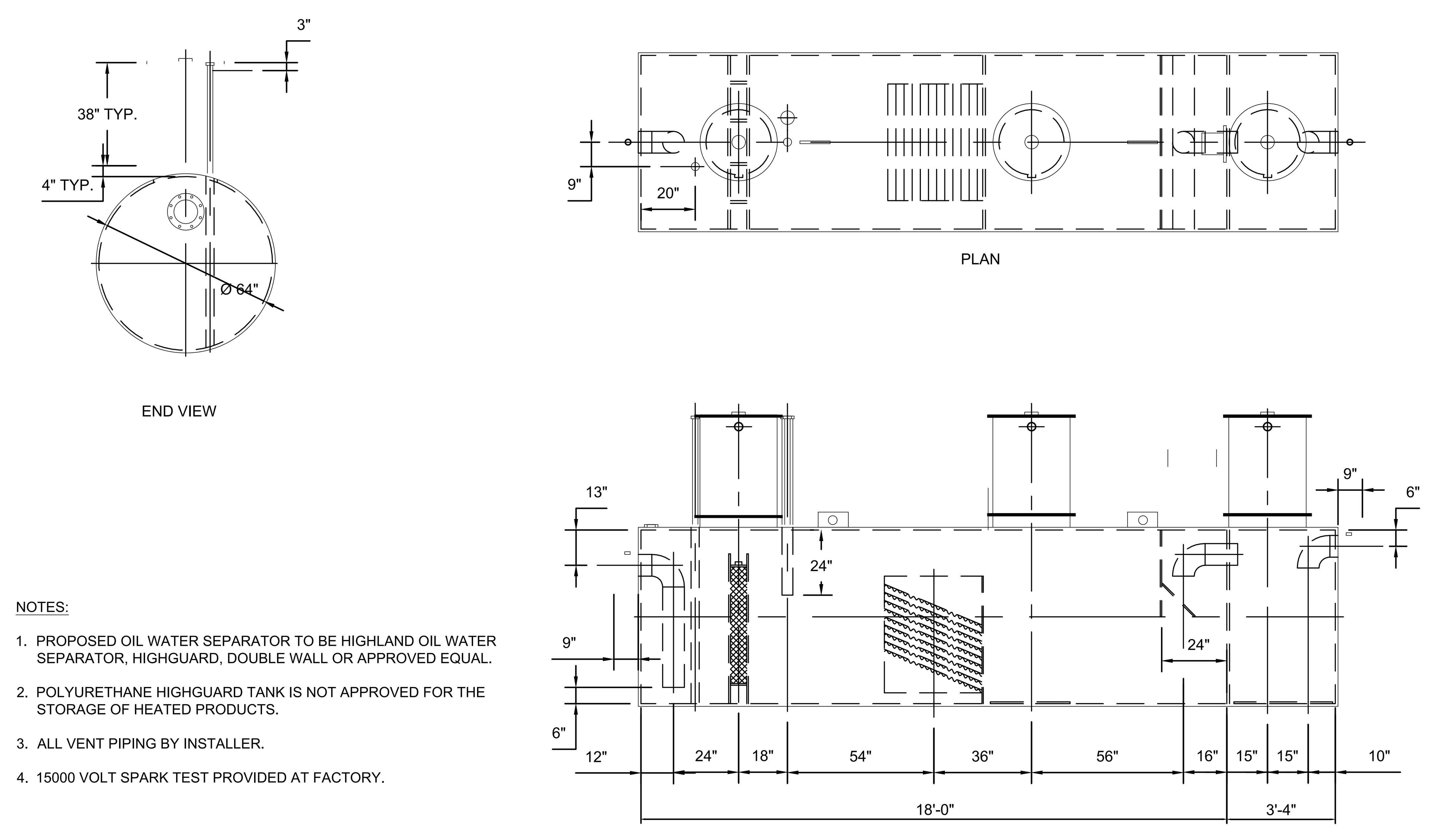
PROPOSED 275 kV DUCT BANK, 3.5' DEPTH TO TOP OF DUCT BANK
8" CONDUITS, 5000kcmil CABLES

NOTES:

1. DETAIL ONLY APPLIES AT DEPTH 3.5FT

4 345KV DUCT BANK SECTION

NOT TO SCALE

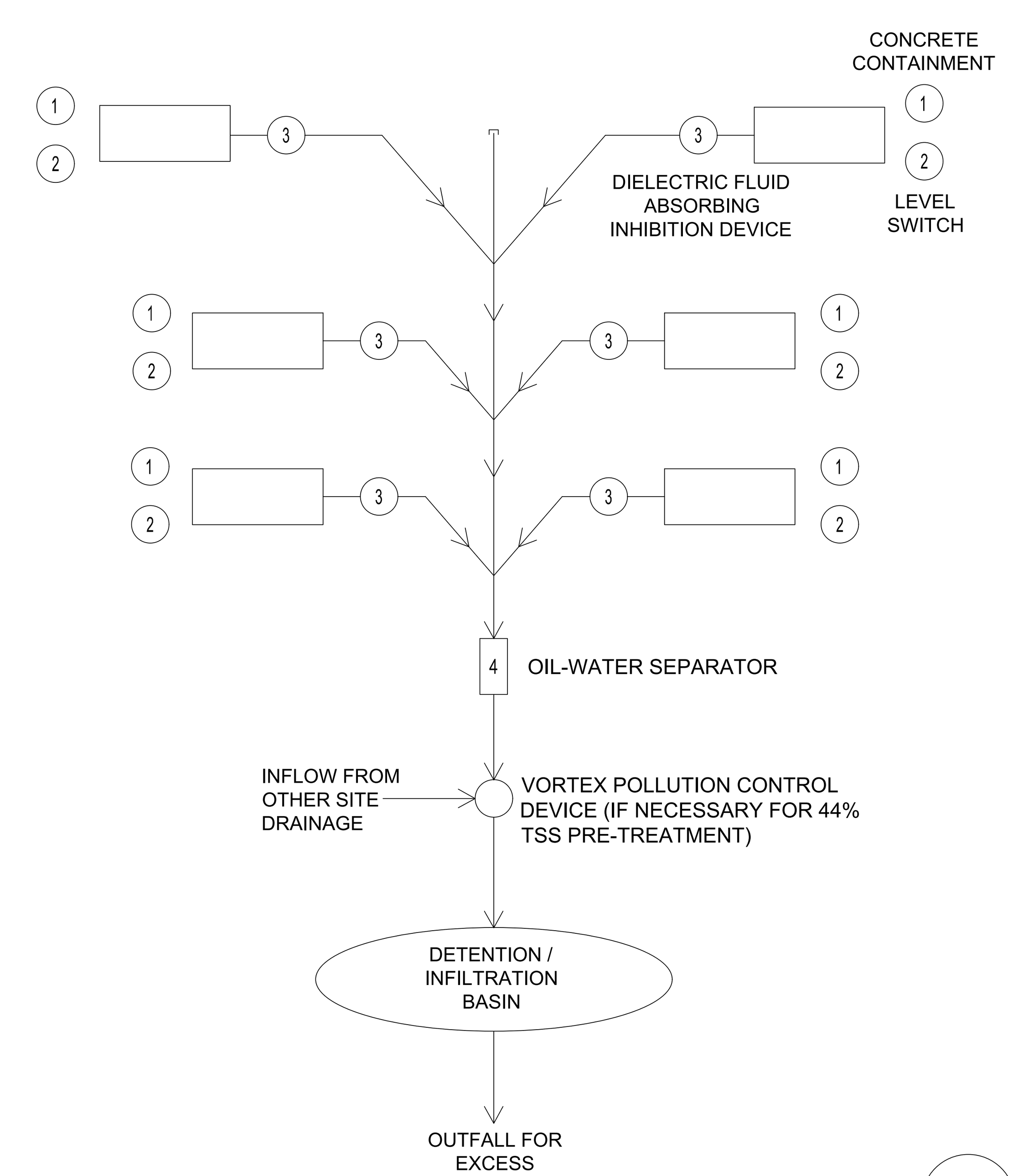


NOTES:

1. PROPOSED OIL WATER SEPARATOR TO BE HIGHLAND OIL WATER SEPARATOR, HIGHGUARD, DOUBLE WALL OR APPROVED EQUAL.
2. POLYURETHANE HIGHGUARD TANK IS NOT APPROVED FOR THE STORAGE OF HEATED PRODUCTS.
3. ALL VENT PIPING BY INSTALLER.
4. 15000 VOLT SPARK TEST PROVIDED AT FACTORY.

4 OIL WATER SEPARATOR

NOT TO SCALE



NOTES:

1. NOT ALL CONTAINMENT AREAS ARE DEPICTED - THERE ARE 12 IN TOTAL FOR THE CLAY HILL SUBSTATION SITE.
2. SOME SUBSTATION EQUIPMENT (TRANSFORMERS AND OIL FILLED REACTORS) WILL CONTAIN DIELECTRIC FLUID (A TYPE OF OIL). SUCH EQUIPMENT WILL BE PLACED WITHIN SECONDARY CONTAINMENT STRUCTURES SIZED TO CONTAIN 110% OF THE DIELECTRIC FLUID VOLUME WITHIN THE EQUIPMENT, PLUS PROVIDE AN ADDITIONAL 30-INCHES OF EQUIVALENT STORAGE VOLUME TO MEET THE PROBABLE MAXIMUM PRECIPITATION (PMP) RAINFALL EVENT AS DEFINED BY THE TOWN OF BARNSTABLE.
3. ALL OTHER SUBSTATION EQUIPMENT CONTAINING DIELECTRIC FLUID (E.G. CAPACITORS) WILL BE PLACED WITHIN SECONDARY CONTAINMENT STRUCTURES SIZED TO CONTAIN 110% OF THE DIELECTRIC FLUID VOLUME WITHIN THE EQUIPMENT PLUS AN ADDITIONAL 8.2 INCHES OF EQUIVALENT STORAGE FOR THE 50-YEAR 24-HOUR RAINFALL EVENT. THIS DESIGN STORM EVENT AND PRECIPITATION DEPTH WAS PROVIDED AS PART OF OUTPUT FROM THE RESILIENT MASSACHUSETTS ACTION TEAM (RMAT) CLIMATE RESILIENCE DESIGN STANDARDS TOOL.
4. EACH SUMP (ITEM 2) SHALL HAVE A LEVEL SWITCH TO INDICATE HIGH LEVEL IN SUMP REPRESENTING DIELECTRIC FLUID SPILL OR BLOCKED DIELECTRIC FLUID INHIBITION DEVICE (ITEM 3).
5. ITEM 3 REPRESENTS DIELECTRIC FLUID ABSORBING INHIBITION DEVICE. CONSISTS OF DIELECTRIC FLUID ABSORBENT RESIN THAT SWELLS AND BLOCKS DIELECTRIC FLUID WHILE ALLOWING WATER TO PASS. SEE PETRO-BARRIER DETAIL ON SHEET 8.
6. ITEM 4 IS FINAL OIL-WATER SEPARATOR TO REMOVE DIELECTRIC FLUID SHEEN IF ANY.

5 SUBSTATION CONTAINMENT AREA DRAINAGE SCHEMATIC

NOT TO SCALE

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CLIENT:
AVANGRID Offshore Wind
125 High Street
Boston, MA 02110

PROJECT
NEW ENGLAND WIND 2 CONNECTOR

TITLE:
275/345 KV GIS SUBSTATION
TYPICAL DETAIL SHEET

DOC ID:
CWW-OSP-STC-DW-0003

SHEET	DWG. NO.	SCALE	FORMAT/SIZE	REV:
10 OF 10	SHEET - 10	AS SHOWN	ANSI D	E

ORIGINAL SHEET - ANSI D

Attachment 3

Substation Stormwater Management Report

Stormwater Management Report

Project:

275/345KV Substation for New England Wind 2 Connector Project
Land at Clay Hill, Barnstable, MA 02050
Parcels 195037 and 195005 - 195007

Applicant/Developer:

Avangrid Offshore Wind, LLC
125 High Street
Boston, MA 02110

Submitted to MEPA Office
100 Cambridge Street
Suite 900
Boston, MA 02114

Prepared by:

Stantec Consulting Services, Inc.
300 Crown Colony Drive, Suite 110
Quincy, MA 02169
www.stantec.com
(508) 591-4304

Project No. 198804104

February 10, 2023

Stantec

TABLE OF CONTENTS

APPENDED DRAWING SHEETS

1.0 STORMWATER MANAGEMENT DESIGN AND COMPLIANCE

1.1 Project Background and Description

The proposed project site is comprised of four adjacent properties in Barnstable, Massachusetts. Property areas, from west to east, are 5.3 acres, 7.2 acres, 7.5 acres and 3.9 acres. All 4 properties are currently entirely forested, with the exception of a small 'panhandle' spur in the north of the center property that is partially occupied by a clear-cut electrical easement. The proposed substation will occupy a portion of the areas of the properties, primarily in the south and center. An existing access road, leading from Oak Street to the fire tower at Clay Hill, passes the southern boundary of the three easternmost properties and will be connected to the proposed substation.

The project site is bounded by Town of Barnstable Conservation Commission land to the north, which the electrical easement passes through. The eastern and western boundaries of the site are land owned by the Town of Barnstable Conservation Commission. US Route 6 bounds the westernmost two properties to the south, while the fire tower and access road at Clay Hill is situated between Route 6 and the easternmost three properties.

There are no wetlands within 100-feet of the substation site, as it is located in the mid-Cape area, on the side slope of a glacial moraine with well-drained granular soils. There are also no perennial streams located within 200-feet of the Site. According to the Town of Barnstable Comprehensive Wastewater Management Plan dated November 2020, groundwater elevations at the site are 35-40ft, giving depths to groundwater across the site ranging from approximately 160ft in the south to 60ft in the north.

The approach to stormwater management for this project is to balance the needs of the project while preserving the integrity of groundwater and minimizing impacts to the adjacent lands. To the extent feasible, environmentally sensitive design and low impact development (LID) measures will be incorporated into the planning and design of this project. The proposed stormwater management system incorporates Best Management Practices (BMPs), as described in the Department of Environmental Protection Stormwater Management Policy Handbook, and as recommended in the Town of Barnstable's site plan criteria. These BMPs will primarily function to minimize potential adverse water quality impacts to groundwater and to downgradient receptors. The BMPs proposed will also maintain or reduce peak stormwater discharge rates released off-site, ensuring no erosive conditions will be generated; and storage/infiltration basins are proposed to ensure that post-development runoff volumes will not exceed pre-development runoff volumes. To ensure the highest level of groundwater protection, it is proposed to provide surplus containment beneath certain substation equipment containing large quantities of dielectric fluids.

1.2 Project Scope of Work

The proposed project involves the following scope of work:

- Construction of retaining walls and associated grading such that grades within the substation, excluding access roads and ramps, are limited to no greater than 2% to facilitate operations and maintenance. A key objective of the proposed site grading will be to balance earth cuts and fills to minimize movement of soils to and from the site.
- Construction of an approx. 20' wide gravel road around the perimeter of the substation to allow for access to all proposed electrical equipment. The south-eastern corner of this perimeter road will include a connection to the Clay Hill fire tower access road to the south the site, which then connects to Oak St further east. The remaining areas within the substation yard will be surfaced with crushed stone.
- A perimeter fence will be installed around the perimeter of the substation and at both entrances/exits.
- Construction of all electrical equipment and buildings as shown on the plan. Some of the equipment may feature barrier walls to help mitigate sound impacts.
- Construction of containment structures for equipment that will contain dielectric fluids (6 Transformers, 2 Station Service Transformers and 6 Shunt Reactors). Such equipment will be placed within containment structures sized to contain 110% of the dielectric fluid volume of the equipment contained, plus an additional 30-inches of vertical storage to account for rainfall during the Probable Maximum Precipitation event. Twelve (12) containment structures are shown on the proposed plans.
- A closed drainage system for conveying clean stormwater from containment areas to the infiltration basin through a final oil/water separator structure.
- A stormwater management system is provided, as further described in this report, to manage stormwater runoff from the new building, paved access ways, and crushed stone surface of the electrical equipment yard.
- A 12' wide gravel access route is to be built, connecting the substation site to stormwater management features elsewhere within the property for maintenance access purposes.

As the substation design and Site Plan are refined in the future, the project Stormwater Management Plan described in this report will be adjusted accordingly, to reflect any hydraulic or hydrologic changes or BMP changes that might result from Site Plan revision.

1.3 Analysis Overview

A stormwater drainage analysis for this project has been prepared and is presented in the sections which follow. This analysis evaluates the capacity of the proposed drainage systems, and documents compliance with the Stormwater Management Standards of the Massachusetts Department of Environmental Protection (DEP) and the Town of Barnstable's Site Plan Criteria.

The drainage analysis includes calculated estimates of the runoff volume and peak storm flow rates for each individual drainage area at the Site. HydroCAD, a software program, developed by Applied Microcomputer Systems, was utilized in the preparation of the stormwater runoff model. HydroCAD is based on the Soil Conservation Service (SCS) "Technical Release 20 – Urban Hydrology for Small Watersheds" and is a generally accepted industry standard methodology.

The Resilient Massachusetts Action Team (RMAT) Climate resilience Design Standards and Guidelines were used to determine the appropriate design rainfall event and corresponding precipitation depth. Epsilon Associates, Inc., working on behalf of Avangrid Offshore Wind, worked through the RMAT Climate Resilience Design Standards Tool to determine these design inputs. Based on factors including the criticality and design life of the proposed development, the tool output showed that the development should utilize 'Tier 3' calculation methodologies and a return period of 50 years. The tool output also included the design 50-year 24-hr precipitation depth of 8.2", calculated using tier 3 methodologies, removing the need to perform this calculation separately. Utilizing tools within HydroCAD software, an SCS Type III storm distribution curve was then used with the 24-hr storm depth to estimate peak intensities at a sub-hourly level. Rainfall depths that were utilized for design are noted below (2-year, 10-year and 100-year rain event data is the 'Extreme Precipitation Estimates' from the Northeast Regional Climate Center):

24-Hour Storm Event	Rainfall (inches)
2-year	3.3
10-year	4.8
50-year (RMAT)	8.2
100-year	8.4

Time of concentration (T_c) values and runoff curve numbers (CN) were developed for each of the calculated drainage areas based upon prevalent topographic patterns, ground cover conditions, and SCS Hydrologic Soil Group classifications. A minimum T_c of 5 minutes was used for sub-catchments with tributary areas having a calculated T_c of less than 5 minutes.

In addition to urban cover, onsite soils are comprised of two categories: Barnstable-Plymouth-Nantucket complex, rolling, very bouldery (Hydrological Soil Group A); and Plymouth-Barnstable complex, hilly, very bouldery (Hydrological Soil Group A) according to the online Web Soil Survey of the USADA Natural Resources Conservation Service (NRCS). No test pits have been excavated on Site, but soils will be thoroughly tested as part of final design and permitting. Based on the NRCS soils data, a Rawls rate of 2.41

in/hr was assumed as the site soils infiltration rate. This infiltration rate will be updated accordingly once on-site soil evaluations have taken place.

1.4 Existing Conditions

The total area of all four properties is 23.9 acres, of which 9.91 acres make up the area of the proposed substation. As described in Section 1.1, the existing site is currently entirely forested, with the exception of a small 'panhandle' spur in the north of the easternmost property that is partially occupied by a clear-cut electrical easement.

An Existing Conditions Tributary Area Plan is attached (Section 3). SCS Method[1] CN and time of concentration values were calculated to determine the peak runoff rates and volumes for each existing sub-catchment area.

The highest elevation at the Site is approximately 195' above mean sea level (msl) in the south of the site, while the lowest elevation is approximately 83' in the north-center of the site. Generally, much of the site topography slopes from the south to the low point in the north, although smaller sub-catchments are present along the boundaries of the site.

1.5 Proposed Conditions

In the post-development condition, all drainage from the proposed substation will be directed toward the localized depression in the north-eastern corner of the site, with a berm to be added to this area in order to prevent overflow of excess stormwater into the adjacent property to the east.

Inflow to the infiltration systems has been separated into sub-catchments. The catchment locations and composition of areas (i.e., roof, crushed rock surface, gravel roads, grass, woods, etc.) are shown on the Proposed Subcatchment Areas plan (Sheet 7). Post-development stormwater will substantially infiltrate on-site because the substation yard surface will be predominantly permeable (e.g. proposed crushed stone yard), with well-drained soils underneath as described in Section 1.4. However, during extreme rainfall events, rainfall and runoff from impermeable surfaces on the site may briefly exceed the infiltration capacity of the underlying soil beneath the crushed stone surfacing and will instead flow into the site drainage system.

As the site is currently forested, the impermeable area of the site will increase by approximately 3.1 acres. With the exception of the gravel maintenance access route, all excess runoff will be infiltrated or attenuated within the localized depression such that there will be no additional discharge from during the analyzed 24-hour rainfall events. Any substation equipment that contains dielectric fluids will be located within appropriately sized spill containment areas. Some of the proposed substation occupies areas of the site that previously discharged runoff off-site during extreme rainfall events, which means that a portion of this runoff will now be managed on-site.

The proposed stormwater management system incorporates Low Impact Development (LID) strategies, which are designed to capture, treat, and recharge stormwater runoff. These measures provide a treatment train to improve the quality of stormwater runoff,

[1] Soil Conservation Service hydrologic method TR-55 was used to develop the Curve Number (CN) and Time of Concentration (Tc) values used for hydrologic analysis of pre-and post-development stormwater runoff values.

reduce the quantity of stormwater runoff, and provide infiltration and recharge to groundwater. These are considered Best Management Practices (BMPs) by the Massachusetts Department of Environmental Protection. A Summary of the LID measures to be incorporated is provided below:

- Perforated under-drains will be installed throughout the site, which will collect stormwater that has percolated through the crushed rock surfaces and direct it towards the attenuation and infiltration structures. Stormwater that percolates through the crushed rock will receive a degree of filtration that removes some suspended solid pollutants.
- A hydrodynamic vortex separator device will be installed to treat all runoff from the perforated under-drains. See Section 1.5.1 for additional information.
- Some stormwater will instead flow overland into a grassed swale around the perimeter of the site, which also provides opportunity for settlement and filtration of pollutants. Outflows from the swale will then flow into a sediment forebay for additional treatment.
- Both the vortex separator device and the sediment forebay will then flow through a rip-rap lined channel down a steep slope the infiltration basin.
- The infiltration basin also collects and infiltrates runoff from undeveloped areas of the property.
- A berm/dam structure will be installed within the existing localized depression area, at the edge of the proposed infiltration basin, such that no outflow from the proposed substation will leave the site during storms up to and including the 50-year 24-hr design rainfall event.

A more detailed description of the proposed stormwater BMP features follows:

1.5.1 Structural Best Management Practices (BMPs)

As outlined previously, the detention basin will receive pretreated stormwater runoff from the aforementioned conveyance and treatment BMPs. Stormwater will be pretreated to remove at least 44% of total suspended solids (TSS) before being released into the infiltration basin in accordance with the Massachusetts Stormwater Policy as applicable to areas with a rapid infiltration rate.

Infiltration Chambers and Vortex Separator Device

A hydrodynamic vortex separator device, such as the 'Downstream Defender' by Hydro International, is proposed upstream of the infiltration basin to achieve the required TSS removal for stormwater collected by perforated drains in the interior of the substation. This product has not been certified in Massachusetts, but testing from the New Jersey Department of Environmental Protection demonstrated that it achieves TSS removal of 50% when designed, operated and maintained appropriately[2]. The device

[2] https://www.hydro-int.com/sites/default/files/njdep_certification_letter_njcat_report.pdf

sizing/configuration will be confirmed with the manufacturer during the detailed design phase such that it performs optimally during the 1" design storm.

Swale and Sediment Forebay

Vegetated swales will be installed around the perimeter of the site and will collect stormwater runoff from adjacent areas and the gravel access road (this excludes the maintenance access route for the stormwater features, which will not be utilized with sufficient frequency to require pollutant mitigation measures). These swales will then discharge to a sediment forebay featuring a downstream check dam. Based on the HydroCAD model, flow within the swales is less than 2" deep, with velocities lower than 1 ft/s and total travel times in excess of 9 minutes during the 1" water quality design storm event. Therefore, based on the Massachusetts Stormwater Handbook for grassed channels, the swale should be suitable to provide effective pretreatment of TSS (50%), which will be combined with additional treatment by the sediment forebay downstream.

Dielectric Fluid Containment Areas, Inhibition Device, and Oil/Water Separator

Multiple oil absorbing inhibition devices will be employed for multiple layers of defense against dielectric fluid release from the dielectric fluid containment structures. Each electrical component containment will be piped to a common drain header. Immediately downstream of each individual sump will be an oil absorbing inhibition device located in a well below the frost line. The oil absorbing inhibition device consists of oil absorbing resin that swells and blocks flow when the dielectric fluid is found but allows rainwater to drain through. The header that collects the rainwater leads to an oil water separator (to remove any sheen), followed by another inhibition device for an added factor of safety.

Inhibition devices are commonly used. Brand names include Imbiber, C.I. Agent, HFF valve or equals. Final selection of an individual manufacturer has not been made at this time. These devices are manufactured in various forms including a filter like assembly, and in line piping assembly. Functionally they perform similarly. Final selection will be based on durability, capacity, ease of maintenance, and proven history of performance.

An additional tank oil/water separator system is proposed downstream of the above devices to help capture residual contaminants. These systems work on a hydrological difference between the inlet and outlet to allow for the dielectric fluid to rise in a pre-fabricated chamber. This allows the dielectric fluid to become trapped on the surface before being removed during normal maintenance operations. These systems also utilize screens and coalescers to capture the dielectric fluids and other sinking debris in the water.

1.6 Comments on Nitrogen Control Issues

Following redevelopment, the site will not contribute nitrogen (N) through wastewater. Only portable restrooms are to be used during construction and operation of the substation. Also, the substation site will comply with the Massachusetts Stormwater Policy and employ low impact development strategies to minimize stormwater runoff, and treat any runoff generated from paved areas (main access road and parking) prior to recharge to the ground. The maintenance access road will be not be utilized frequently and is therefore not a substantial source of nitrogen. The Nitrogen loading model presented in the Cape Cod Commission Nitrogen Loading Technical Bulletin 91-001, has been used to evaluate potential N loading from the substation site. A calculation based on this document is appended in Section 6, which shows that the projected N loading will be 0.35 ppm - less than the 1 ppm standard set by the Cape Cod Commission.

1.7 Analysis Summary

Detailed HydroCAD calculations of the stormwater drainage conditions for the design storm events are submitted in Section 2. As noted in the summary table below, the post-development total discharge volumes and peak runoff rates from the internal depression area remain 0 cfs, even during the most severe modelled design storm (1 in 100 year).

Design Point: North-eastern Internal Depression

Table 1. Summary Table

		Peak Runoff Rate (cfs)	Total Runoff Volume (af)
100-year Storm Event:	Existing Conditions	0	0
	Proposed Conditions	0	0

* See discussion below. cfs = cubic feet per second; af = acre feet

Overall, the proposed stormwater management design will meet or exceed the Massachusetts Stormwater Policy recommendations for this project; and the project will comply with the MassDEP Stormwater Standards. A summary of project status with respect to each Standard is as follows:

Standard 1 - No New Untreated Discharges. This Standard will be met; and no new stormwater conveyances would discharge untreated stormwater directly to the waters of the Commonwealth.

Standard 2 - Peak Rate Attenuation. This Standard will be met. Post-development peak discharge runoff rates will not exceed the pre-development rates.

Standard 3 – Recharge. This Standard will be met; and the recharge volume required by the Policy for this project will be met or exceeded.

Standard 4 - Water Quality. This Standard will be met; and the project will meet the required water quality standards. The proposed design will remove at least 44% of TSS prior to discharge to an infiltration structure as required per Stormwater Policy.

Standard 5 - Land Uses with Higher Potential Pollutant Loads. This Standard does not apply to this project. However, as noted, surplus containment areas will be provided for any substation equipment that contains dielectric fluid.

Standard 6 – Critical Areas. The site does not lie within Zones I or II or within the Interim Wellhead Protection area of a public water supply, and there are no stormwater discharges near or to any other critical area.

Standard 7 - Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable. The project is not defined as a redevelopment in the Massachusetts Stormwater Management Standards so all Standards must be met.

Standard 8 - Construction Period Pollution Prevention and Erosion and Sedimentation Control. An Erosion & Sedimentation control plan will be prepared for the prevention of erosion, sedimentation, and off-site transport of suspended solids; and a draft of this plan is included in Section Five of this Stormwater Report.

Standard 9 - Operation and Maintenance Plan. A Long-Term Operation and Maintenance Plan will be prepared as part of final design.

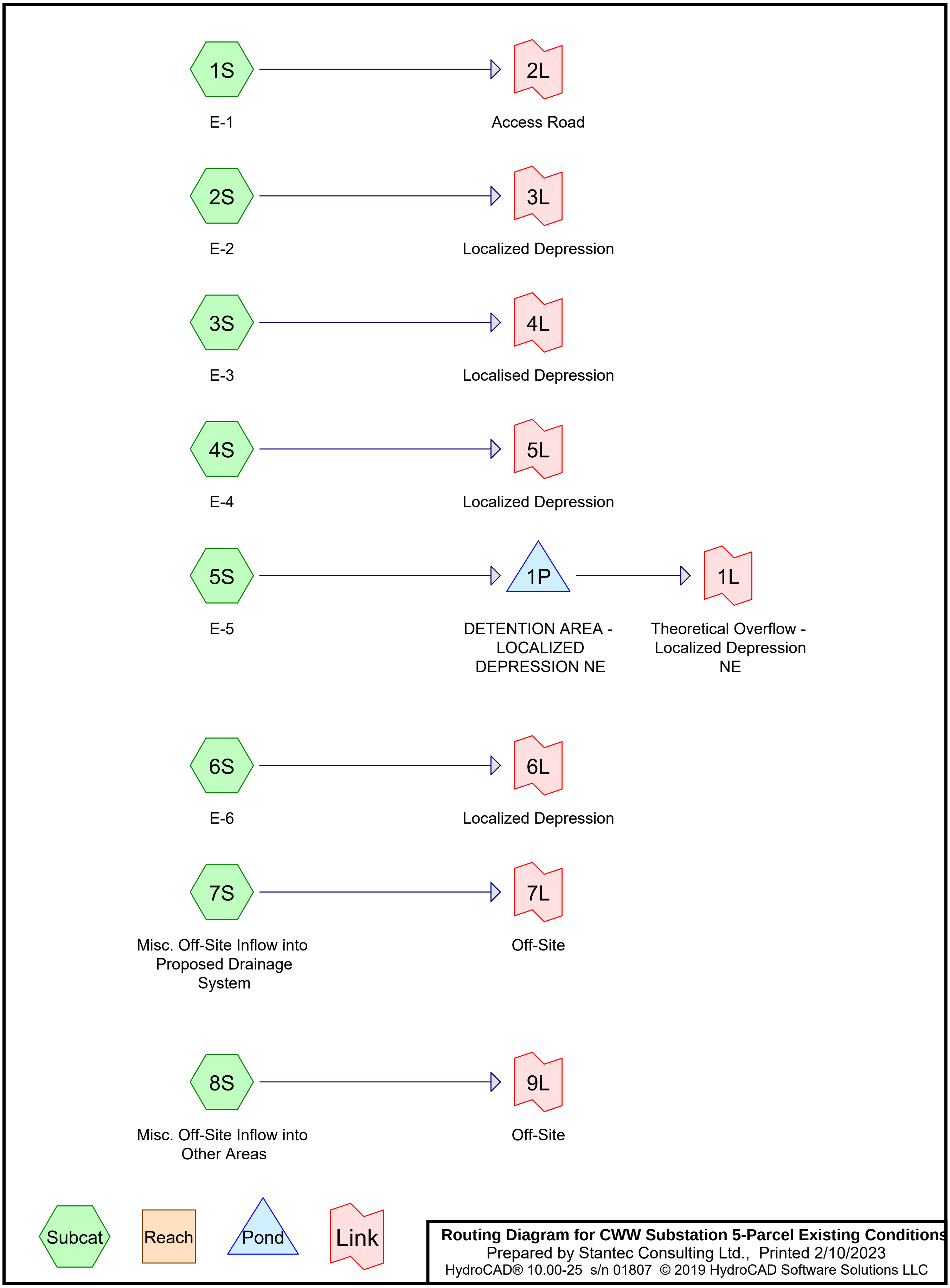
Standard 10 - Prohibition of Illicit Discharges. Per Standard No. 10 of the MassDEP Stormwater Management Standards, there shall be no illicit discharges to the stormwater management system. The Property Manager will be responsible for implementing the Operation and Maintenance Plan for the Site's stormwater management system; and for overseeing activities at the facility to prevent illicit discharges to the drainage system. It is strictly prohibited to discharge any products or substances onto the ground surface or into any drainage structures, such as catch basin inlets, manholes, or drainage outlets that would be a detriment to the environment.

Section 2

Analysis for 2-, 10-, 50- and 100-year Storms

Existing Conditions HydroCAD Analysis

Proposed Conditions HydroCAD Analysis


1S
2L
E-1
Access Road
2S
3L
E-2
Localized Depression
3S
4L
E-3
Localised Depression
4S
5L
E-4
Localized Depression
5S
1P
1L
E-5
DETENTION AREA - LOCALIZED DEPRESSION NE
Theoretical Overflow - Localized Depression NE
6S
6L
E-6
Localized Depression
7S
7L
Misc. Off-Site Inflow into Proposed Drainage System
Off-Site
8S
9L
Misc. Off-Site Inflow into Other Areas
Off-Site
Subcat
Reach
Pond
Link
Routing Diagram for CWW Substation 5-Parcel Existing Conditions
Prepared by Stantec Consulting Ltd., Printed 2/10/2023
HydroCAD® 10.00-25 s/n 01807 © 2019 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
2,020	96	Gravel surface, HSG A (1S)
1,039,500	30	Woods, Good, HSG A (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S)
1,041,520	**30**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
1,041,520	HSG A	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S
0	HSG B	
0	HSG C	
0	HSG D	
0	Other	
1,041,520		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subcatchment Numbers
2,020	0	0	0	0	2,020	Gravel surface	1S
1,039,500	0	0	0	0	1,039,500	Woods, Good	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S
1,041,520	**0**	**0**	**0**	**0**	**1,041,520**	**TOTAL AREA**	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: E-1 Runoff Area=27,000 sf 0.00% Impervious Runoff Depth>0.80"
Flow Length=285' Tc=10.9 min CN=35 Runoff=0.29 cfs 1,811 cf

Subcatchment 2S: E-2 Runoff Area=45,304 sf 0.00% Impervious Runoff Depth>0.42"
Flow Length=230' Tc=12.3 min CN=30 Runoff=0.16 cfs 1,574 cf

Subcatchment 3S: E-3 Runoff Area=68,819 sf 0.00% Impervious Runoff Depth>0.42"
Flow Length=356' Tc=13.6 min CN=30 Runoff=0.24 cfs 2,389 cf

Subcatchment 4S: E-4 Runoff Area=134,903 sf 0.00% Impervious Runoff Depth>0.42"
Flow Length=450' Tc=15.1 min CN=30 Runoff=0.47 cfs 4,675 cf

Subcatchment 5S: E-5 Runoff Area=547,239 sf 0.00% Impervious Runoff Depth>0.41"
Flow Length=1,300' Tc=30.9 min CN=30 Runoff=1.48 cfs 18,669 cf

Subcatchment 6S: E-6 Runoff Area=182,095 sf 0.00% Impervious Runoff Depth>0.42"
Flow Length=552' Tc=14.7 min CN=30 Runoff=0.63 cfs 6,313 cf

Subcatchment 7S: Misc. Off-Site Inflow into Runoff Area=4,170 sf 0.00% Impervious Runoff Depth>0.42"
Tc=5.0 min CN=30 Runoff=0.02 cfs 146 cf

Subcatchment 8S: Misc. Off-Site Inflow into Runoff Area=31,990 sf 0.00% Impervious Runoff Depth>0.42"
Tc=5.0 min CN=30 Runoff=0.13 cfs 1,119 cf

Pond 1P: DETENTION AREA - LOCALIZED Peak Elev=85.67' Storage=9,732 cf Inflow=1.48 cfs 18,669 cf
Discarded=0.39 cfs 9,126 cf Primary=0.00 cfs 0 cf Outflow=0.39 cfs 9,126 cf

Link 1L: Theoretical Overflow - Localized Depression NE Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 2L: Access Road Inflow=0.29 cfs 1,811 cf
Primary=0.29 cfs 1,811 cf

Link 3L: Localized Depression Inflow=0.16 cfs 1,574 cf
Primary=0.16 cfs 1,574 cf

Link 4L: Localised Depression Inflow=0.24 cfs 2,389 cf
Primary=0.24 cfs 2,389 cf

Link 5L: Localized Depression Inflow=0.47 cfs 4,675 cf
Primary=0.47 cfs 4,675 cf

Link 6L: Localized Depression Inflow=0.63 cfs 6,313 cf
Primary=0.63 cfs 6,313 cf

Link 7L: Off-Site Inflow=0.02 cfs 146 cf
Primary=0.02 cfs 146 cf

Link 9L: Off-Site

Inflow=0.13 cfs 1,119 cf
Primary=0.13 cfs 1,119 cf

Total Runoff Area = 1,041,520 sf Runoff Volume = 36,697 cf Average Runoff Depth = 0.42"
100.00% Pervious = 1,041,520 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1S: E-1

Runoff = 0.29 cfs @ 12.29 hrs, Volume= 1,811 cf, Depth> 0.80"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
24,980	30	Woods, Good, HSG A
2,020	96	Gravel surface, HSG A
27,000	35	Weighted Average
27,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.2000	0.17		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
6.1	235	0.0650	0.64		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
10.9	285	Total			

Summary for Subcatchment 2S: E-2

Runoff = 0.16 cfs @ 12.48 hrs, Volume= 1,574 cf, Depth> 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
45,304	30	Woods, Good, HSG A
45,304		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0700	0.11		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
4.9	180	0.0600	0.61		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
12.3	230	Total			

Summary for Subcatchment 3S: E-3

Runoff = 0.24 cfs @ 12.50 hrs, Volume= 2,389 cf, Depth> 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
68,819	30	Woods, Good, HSG A
68,819		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.29"
7.2	306	0.0800	0.71		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
13.6	356	Total			

Summary for Subcatchment 4S: E-4

Runoff = 0.47 cfs @ 12.52 hrs, Volume= 4,675 cf, Depth> 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
134,903	30	Woods, Good, HSG A
134,903		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
6.7	400	0.1600	1.00		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
15.1	450	Total			

Summary for Subcatchment 5S: E-5

Runoff = 1.48 cfs @ 12.77 hrs, Volume= 18,669 cf, Depth> 0.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
547,239	30	Woods, Good, HSG A
547,239		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	50	0.0600	0.11		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
23.1	1,250	0.1300	0.90		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
30.9	1,300	Total			

Summary for Subcatchment 6S: E-6

Runoff = 0.63 cfs @ 12.52 hrs, Volume= 6,313 cf, Depth> 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
182,095	30	Woods, Good, HSG A
182,095		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1300	0.14		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
8.9	502	0.1400	0.94		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
14.7	552	Total			

Summary for Subcatchment 7S: Misc. Off-Site Inflow into Proposed Drainage System

Runoff = 0.02 cfs @ 12.37 hrs, Volume= 146 cf, Depth> 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
4,170	30	Woods, Good, HSG A
4,170		100.00% Pervious Area

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

Summary for Subcatchment 8S: Misc. Off-Site Inflow into Other Areas

Runoff = 0.13 cfs @ 12.37 hrs, Volume= 1,119 cf, Depth> 0.42"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
31,990	30	Woods, Good, HSG A
31,990		100.00% Pervious Area

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

Summary for Pond 1P: DETENTION AREA - LOCALIZED DEPRESSION NE

Inflow Area = 547,239 sf, 0.00% Impervious, Inflow Depth > 0.41" for NRCC 100YR 24H event
Inflow = 1.48 cfs @ 12.77 hrs, Volume= 18,669 cf
Outflow = 0.39 cfs @ 18.32 hrs, Volume= 9,126 cf, Atten= 73%, Lag= 332.9 min
Discarded = 0.39 cfs @ 18.32 hrs, Volume= 9,126 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 85.67' @ 18.32 hrs Surf.Area= 7,058 sf Storage= 9,732 cf

Plug-Flow detention time= 189.7 min calculated for 9,096 cf (49% of inflow)
Center-of-Mass det. time= 82.8 min (1,000.5 - 917.6)

Volume	Invert	Avail.Storage	Storage Description
#1	83.00'	122,209 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
83.00	827	0	0
84.00	2,756	1,792	1,792
85.00	5,016	3,886	5,678
86.00	8,057	6,537	12,214
87.00	12,347	10,202	22,416
88.00	17,968	15,158	37,574
89.00	24,950	21,459	59,033
90.00	31,470	28,210	87,243
91.00	38,463	34,967	122,209

Device	Routing	Invert	Outlet Devices
#1	Discarded	83.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	91.90'	**50.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.39 cfs @ 18.32 hrs HW=85.67' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.39 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=83.00' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 1L: Theoretical Overflow - Localized Depression NE

Inflow Area = 547,239 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 100YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 2L: Access Road

Inflow Area = 27,000 sf, 0.00% Impervious, Inflow Depth > 0.80" for NRCC 100YR 24H event
Inflow = 0.29 cfs @ 12.29 hrs, Volume= 1,811 cf
Primary = 0.29 cfs @ 12.29 hrs, Volume= 1,811 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 3L: Localized Depression

Inflow Area = 45,304 sf, 0.00% Impervious, Inflow Depth > 0.42" for NRCC 100YR 24H event
Inflow = 0.16 cfs @ 12.48 hrs, Volume= 1,574 cf
Primary = 0.16 cfs @ 12.48 hrs, Volume= 1,574 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 4L: Localised Depression

Inflow Area = 68,819 sf, 0.00% Impervious, Inflow Depth > 0.42" for NRCC 100YR 24H event
Inflow = 0.24 cfs @ 12.50 hrs, Volume= 2,389 cf
Primary = 0.24 cfs @ 12.50 hrs, Volume= 2,389 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 5L: Localized Depression

Inflow Area = 134,903 sf, 0.00% Impervious, Inflow Depth > 0.42" for NRCC 100YR 24H event
Inflow = 0.47 cfs @ 12.52 hrs, Volume= 4,675 cf
Primary = 0.47 cfs @ 12.52 hrs, Volume= 4,675 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 6L: Localized Depression

Inflow Area = 182,095 sf, 0.00% Impervious, Inflow Depth > 0.42" for NRCC 100YR 24H event
Inflow = 0.63 cfs @ 12.52 hrs, Volume= 6,313 cf
Primary = 0.63 cfs @ 12.52 hrs, Volume= 6,313 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 7L: Off-Site

Inflow Area = 4,170 sf, 0.00% Impervious, Inflow Depth > 0.42" for NRCC 100YR 24H event
Inflow = 0.02 cfs @ 12.37 hrs, Volume= 146 cf
Primary = 0.02 cfs @ 12.37 hrs, Volume= 146 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 9L: Off-Site

Inflow Area =	31,990 sf,	0.00% Impervious,	Inflow Depth > 0.42"	for NRCC 100YR 24H event
Inflow =	0.13 cfs @	12.37 hrs, Volume=	1,119 cf	
Primary =	0.13 cfs @	12.37 hrs, Volume=	1,119 cf,	Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: E-1 Runoff Area=27,000 sf 0.00% Impervious Runoff Depth>0.04"
Flow Length=285' Tc=10.9 min CN=35 Runoff=0.00 cfs 93 cf

Subcatchment 2S: E-2 Runoff Area=45,304 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=230' Tc=12.3 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 3S: E-3 Runoff Area=68,819 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=356' Tc=13.6 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 4S: E-4 Runoff Area=134,903 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=450' Tc=15.1 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 5S: E-5 Runoff Area=547,239 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=1,300' Tc=30.9 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 6S: E-6 Runoff Area=182,095 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=552' Tc=14.7 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 7S: Misc. Off-Site Inflow into Runoff Area=4,170 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 8S: Misc. Off-Site Inflow into Runoff Area=31,990 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=30 Runoff=0.00 cfs 0 cf

Pond 1P: DETENTION AREA - LOCALIZED Peak Elev=83.00' Storage=0 cf Inflow=0.00 cfs 0 cf
Discarded=0.00 cfs 0 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf

Link 1L: Theoretical Overflow - Localized Depression NE Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 2L: Access Road Inflow=0.00 cfs 93 cf
Primary=0.00 cfs 93 cf

Link 3L: Localized Depression Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 4L: Localised Depression Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 5L: Localized Depression Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 6L: Localized Depression Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 7L: Off-Site Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 9L: Off-Site

Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 1,041,520 sf Runoff Volume = 93 cf Average Runoff Depth = 0.00"
100.00% Pervious = 1,041,520 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1S: E-1

Runoff = 0.00 cfs @ 15.48 hrs, Volume= 93 cf, Depth> 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
24,980	30	Woods, Good, HSG A
2,020	96	Gravel surface, HSG A
27,000	35	Weighted Average
27,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.2000	0.17		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
6.1	235	0.0650	0.64		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
10.9	285	Total			

Summary for Subcatchment 2S: E-2

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
45,304	30	Woods, Good, HSG A
45,304		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0700	0.11		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
4.9	180	0.0600	0.61		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
12.3	230	Total			

Summary for Subcatchment 3S: E-3

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
68,819	30	Woods, Good, HSG A
68,819		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.29"
7.2	306	0.0800	0.71		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
13.6	356	Total			

Summary for Subcatchment 4S: E-4

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
134,903	30	Woods, Good, HSG A
134,903		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
6.7	400	0.1600	1.00		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
15.1	450	Total			

Summary for Subcatchment 5S: E-5

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
547,239	30	Woods, Good, HSG A
547,239		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	50	0.0600	0.11		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
23.1	1,250	0.1300	0.90		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
30.9	1,300	Total			

Summary for Subcatchment 6S: E-6

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
182,095	30	Woods, Good, HSG A
182,095		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1300	0.14		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
8.9	502	0.1400	0.94		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
14.7	552	Total			

Summary for Subcatchment 7S: Misc. Off-Site Inflow into Proposed Drainage System

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
4,170	30	Woods, Good, HSG A
4,170		100.00% Pervious Area

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

Summary for Subcatchment 8S: Misc. Off-Site Inflow into Other Areas

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
31,990	30	Woods, Good, HSG A
31,990		100.00% Pervious Area

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

Summary for Pond 1P: DETENTION AREA - LOCALIZED DEPRESSION NE

Inflow Area = 547,239 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 10YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 83.00' @ 5.00 hrs Surf.Area= 827 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	83.00'	122,209 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
83.00	827	0	0
84.00	2,756	1,792	1,792
85.00	5,016	3,886	5,678
86.00	8,057	6,537	12,214
87.00	12,347	10,202	22,416
88.00	17,968	15,158	37,574
89.00	24,950	21,459	59,033
90.00	31,470	28,210	87,243
91.00	38,463	34,967	122,209

Device	Routing	Invert	Outlet Devices
#1	Discarded	83.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	91.90'	**50.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.00 cfs @ 5.00 hrs HW=83.00' (Free Discharge)
↑—**1=Exfiltration** (Passes 0.00 cfs of 0.05 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=83.00' (Free Discharge)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 1L: Theoretical Overflow - Localized Depression NE

Inflow Area = 547,239 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 10YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 2L: Access Road

Inflow Area = 27,000 sf, 0.00% Impervious, Inflow Depth > 0.04" for NRCC 10YR 24H event
Inflow = 0.00 cfs @ 15.48 hrs, Volume= 93 cf
Primary = 0.00 cfs @ 15.48 hrs, Volume= 93 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 3L: Localized Depression

Inflow Area = 45,304 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 10YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 4L: Localised Depression

Inflow Area = 68,819 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 10YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 5L: Localized Depression

Inflow Area = 134,903 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 10YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 6L: Localized Depression

Inflow Area = 182,095 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 10YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 7L: Off-Site

Inflow Area = 4,170 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 10YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 9L: Off-Site

Inflow Area = 31,990 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 10YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: E-1 Runoff Area=27,000 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=285' Tc=10.9 min CN=35 Runoff=0.00 cfs 0 cf

Subcatchment 2S: E-2 Runoff Area=45,304 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=230' Tc=12.3 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 3S: E-3 Runoff Area=68,819 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=356' Tc=13.6 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 4S: E-4 Runoff Area=134,903 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=450' Tc=15.1 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 5S: E-5 Runoff Area=547,239 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=1,300' Tc=30.9 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 6S: E-6 Runoff Area=182,095 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=552' Tc=14.7 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 7S: Misc. Off-Site Inflow into Runoff Area=4,170 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=30 Runoff=0.00 cfs 0 cf

Subcatchment 8S: Misc. Off-Site Inflow into Runoff Area=31,990 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=30 Runoff=0.00 cfs 0 cf

Pond 1P: DETENTION AREA - LOCALIZED Peak Elev=83.00' Storage=0 cf Inflow=0.00 cfs 0 cf
Discarded=0.00 cfs 0 cf Primary=0.00 cfs 0 cf Outflow=0.00 cfs 0 cf

Link 1L: Theoretical Overflow - Localized Depression NE Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 2L: Access Road Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 3L: Localized Depression Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 4L: Localised Depression Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 5L: Localized Depression Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 6L: Localized Depression Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 7L: Off-Site Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 9L: Off-Site

Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 1,041,520 sf Runoff Volume = 0 cf Average Runoff Depth = 0.00"
100.00% Pervious = 1,041,520 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1S: E-1

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
24,980	30	Woods, Good, HSG A
2,020	96	Gravel surface, HSG A
27,000	35	Weighted Average
27,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.2000	0.17		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
6.1	235	0.0650	0.64		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
10.9	285	Total			

Summary for Subcatchment 2S: E-2

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
45,304	30	Woods, Good, HSG A
45,304		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0700	0.11		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
4.9	180	0.0600	0.61		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
12.3	230	Total			

Summary for Subcatchment 3S: E-3

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
68,819	30	Woods, Good, HSG A
68,819		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.29"
7.2	306	0.0800	0.71		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
13.6	356	Total			

Summary for Subcatchment 4S: E-4

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
134,903	30	Woods, Good, HSG A
134,903		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
6.7	400	0.1600	1.00		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
15.1	450	Total			

Summary for Subcatchment 5S: E-5

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
547,239	30	Woods, Good, HSG A
547,239		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	50	0.0600	0.11		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
23.1	1,250	0.1300	0.90		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
30.9	1,300	Total			

Summary for Subcatchment 6S: E-6

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
182,095	30	Woods, Good, HSG A
182,095		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1300	0.14		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
8.9	502	0.1400	0.94		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
14.7	552	Total			

Summary for Subcatchment 7S: Misc. Off-Site Inflow into Proposed Drainage System

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
4,170	30	Woods, Good, HSG A
4,170		100.00% Pervious Area

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

Summary for Subcatchment 8S: Misc. Off-Site Inflow into Other Areas

Runoff = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
31,990	30	Woods, Good, HSG A
31,990		100.00% Pervious Area

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

Summary for Pond 1P: DETENTION AREA - LOCALIZED DEPRESSION NE

Inflow Area = 547,239 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 2YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min
Discarded = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 83.00' @ 5.00 hrs Surf.Area= 827 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	83.00'	122,209 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
83.00	827	0	0
84.00	2,756	1,792	1,792
85.00	5,016	3,886	5,678
86.00	8,057	6,537	12,214
87.00	12,347	10,202	22,416
88.00	17,968	15,158	37,574
89.00	24,950	21,459	59,033
90.00	31,470	28,210	87,243
91.00	38,463	34,967	122,209

Device	Routing	Invert	Outlet Devices
#1	Discarded	83.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	91.90'	**50.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.00 cfs @ 5.00 hrs HW=83.00' (Free Discharge)
└─**1=Exfiltration** (Passes 0.00 cfs of 0.05 cfs potential flow)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=83.00' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 1L: Theoretical Overflow - Localized Depression NE

Inflow Area = 547,239 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 2YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 2L: Access Road

Inflow Area = 27,000 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 2YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 3L: Localized Depression

Inflow Area = 45,304 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 2YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 4L: Localised Depression

Inflow Area = 68,819 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 2YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 5L: Localized Depression

Inflow Area = 134,903 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 2YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 6L: Localized Depression

Inflow Area = 182,095 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 2YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 7L: Off-Site

Inflow Area = 4,170 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 2YR 24H event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 9L: Off-Site

Inflow Area =	31,990 sf,	0.00% Impervious,	Inflow Depth = 0.00"	for NRCC 2YR 24H event		
Inflow =	0.00 cfs @	5.00 hrs,	Volume=	0 cf		
Primary =	0.00 cfs @	5.00 hrs,	Volume=	0 cf,	Atten= 0%,	Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1S: E-1 Runoff Area=27,000 sf 0.00% Impervious Runoff Depth>0.75"
Flow Length=285' Tc=10.9 min CN=35 Runoff=0.26 cfs 1,681 cf

Subcatchment 2S: E-2 Runoff Area=45,304 sf 0.00% Impervious Runoff Depth>0.38"
Flow Length=230' Tc=12.3 min CN=30 Runoff=0.14 cfs 1,425 cf

Subcatchment 3S: E-3 Runoff Area=68,819 sf 0.00% Impervious Runoff Depth>0.38"
Flow Length=356' Tc=13.6 min CN=30 Runoff=0.21 cfs 2,162 cf

Subcatchment 4S: E-4 Runoff Area=134,903 sf 0.00% Impervious Runoff Depth>0.38"
Flow Length=450' Tc=15.1 min CN=30 Runoff=0.39 cfs 4,233 cf

Subcatchment 5S: E-5 Runoff Area=547,239 sf 0.00% Impervious Runoff Depth>0.37"
Flow Length=1,300' Tc=30.9 min CN=30 Runoff=1.25 cfs 16,893 cf

Subcatchment 6S: E-6 Runoff Area=182,095 sf 0.00% Impervious Runoff Depth>0.38"
Flow Length=552' Tc=14.7 min CN=30 Runoff=0.53 cfs 5,716 cf

Subcatchment 7S: Misc. Off-Site Inflow into Runoff Area=4,170 sf 0.00% Impervious Runoff Depth>0.38"
Tc=5.0 min CN=30 Runoff=0.01 cfs 132 cf

Subcatchment 8S: Misc. Off-Site Inflow into Runoff Area=31,990 sf 0.00% Impervious Runoff Depth>0.38"
Tc=5.0 min CN=30 Runoff=0.11 cfs 1,014 cf

Pond 1P: DETENTION AREA - LOCALIZED Peak Elev=85.51' Storage=8,631 cf Inflow=1.25 cfs 16,893 cf
Discarded=0.37 cfs 8,425 cf Primary=0.00 cfs 0 cf Outflow=0.37 cfs 8,425 cf

Link 1L: Theoretical Overflow - Localized Depression NE Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 2L: Access Road Inflow=0.26 cfs 1,681 cf
Primary=0.26 cfs 1,681 cf

Link 3L: Localized Depression Inflow=0.14 cfs 1,425 cf
Primary=0.14 cfs 1,425 cf

Link 4L: Localised Depression Inflow=0.21 cfs 2,162 cf
Primary=0.21 cfs 2,162 cf

Link 5L: Localized Depression Inflow=0.39 cfs 4,233 cf
Primary=0.39 cfs 4,233 cf

Link 6L: Localized Depression Inflow=0.53 cfs 5,716 cf
Primary=0.53 cfs 5,716 cf

Link 7L: Off-Site Inflow=0.01 cfs 132 cf
Primary=0.01 cfs 132 cf

Link 9L: Off-Site

Inflow=0.11 cfs 1,014 cf
Primary=0.11 cfs 1,014 cf

Total Runoff Area = 1,041,520 sf Runoff Volume = 33,256 cf Average Runoff Depth = 0.38"
100.00% Pervious = 1,041,520 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 1S: E-1

Runoff = 0.26 cfs @ 12.33 hrs, Volume= 1,681 cf, Depth> 0.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
24,980	30	Woods, Good, HSG A
2,020	96	Gravel surface, HSG A
27,000	35	Weighted Average
27,000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.8	50	0.2000	0.17		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
6.1	235	0.0650	0.64		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
10.9	285	Total			

Summary for Subcatchment 2S: E-2

Runoff = 0.14 cfs @ 12.50 hrs, Volume= 1,425 cf, Depth> 0.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
45,304	30	Woods, Good, HSG A
45,304		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.4	50	0.0700	0.11		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
4.9	180	0.0600	0.61		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
12.3	230	Total			

Summary for Subcatchment 3S: E-3

Runoff = 0.21 cfs @ 12.52 hrs, Volume= 2,162 cf, Depth> 0.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
68,819	30	Woods, Good, HSG A
68,819		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.4	50	0.1000	0.13		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.29"
7.2	306	0.0800	0.71		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
13.6	356	Total			

Summary for Subcatchment 4S: E-4

Runoff = 0.39 cfs @ 12.54 hrs, Volume= 4,233 cf, Depth> 0.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
134,903	30	Woods, Good, HSG A
134,903		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.4	50	0.0500	0.10		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
6.7	400	0.1600	1.00		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
15.1	450	Total			

Summary for Subcatchment 5S: E-5

Runoff = 1.25 cfs @ 12.80 hrs, Volume= 16,893 cf, Depth> 0.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
547,239	30	Woods, Good, HSG A
547,239		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	50	0.0600	0.11		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
23.1	1,250	0.1300	0.90		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
30.9	1,300	Total			

Summary for Subcatchment 6S: E-6

Runoff = 0.53 cfs @ 12.53 hrs, Volume= 5,716 cf, Depth> 0.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
182,095	30	Woods, Good, HSG A
182,095		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	50	0.1300	0.14		**Sheet Flow, SHEET** Woods: Light underbrush n= 0.400 P2= 3.29"
8.9	502	0.1400	0.94		**Shallow Concentrated Flow, SHALLOW CONC** Forest w/Heavy Litter Kv= 2.5 fps
14.7	552	Total			

Summary for Subcatchment 7S: Misc. Off-Site Inflow into Proposed Drainage System

Runoff = 0.01 cfs @ 12.38 hrs, Volume= 132 cf, Depth> 0.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
4,170	30	Woods, Good, HSG A
4,170		100.00% Pervious Area

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

Summary for Subcatchment 8S: Misc. Off-Site Inflow into Other Areas

Runoff = 0.11 cfs @ 12.38 hrs, Volume= 1,014 cf, Depth> 0.38"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
31,990	30	Woods, Good, HSG A
31,990		100.00% Pervious Area

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

Summary for Pond 1P: DETENTION AREA - LOCALIZED DEPRESSION NE

Inflow Area = 547,239 sf, 0.00% Impervious, Inflow Depth > 0.37" for RMAT 50-YR 24H TIER 3 event
Inflow = 1.25 cfs @ 12.80 hrs, Volume= 16,893 cf
Outflow = 0.37 cfs @ 18.34 hrs, Volume= 8,425 cf, Atten= 71%, Lag= 332.5 min
Discarded = 0.37 cfs @ 18.34 hrs, Volume= 8,425 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 85.51' @ 18.34 hrs Surf.Area= 6,567 sf Storage= 8,631 cf

Plug-Flow detention time= 185.0 min calculated for 8,397 cf (50% of inflow)
Center-of-Mass det. time= 79.8 min (1,001.6 - 921.8)

Volume	Invert	Avail.Storage	Storage Description
#1	83.00'	122,209 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
83.00	827	0	0
84.00	2,756	1,792	1,792
85.00	5,016	3,886	5,678
86.00	8,057	6,537	12,214
87.00	12,347	10,202	22,416
88.00	17,968	15,158	37,574
89.00	24,950	21,459	59,033
90.00	31,470	28,210	87,243
91.00	38,463	34,967	122,209

Device	Routing	Invert	Outlet Devices
#1	Discarded	83.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	91.90'	**50.0' long x 1.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 Coef. (English) 2.69 2.72 2.75 2.85 2.98 3.08 3.20 3.28 3.31 3.30 3.31 3.32

Discarded OutFlow Max=0.37 cfs @ 18.34 hrs HW=85.51' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.37 cfs)

Primary OutFlow Max=0.00 cfs @ 5.00 hrs HW=83.00' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Link 1L: Theoretical Overflow - Localized Depression NE

Inflow Area = 547,239 sf, 0.00% Impervious, Inflow Depth = 0.00" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.00 cfs @ 5.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 5.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 2L: Access Road

Inflow Area = 27,000 sf, 0.00% Impervious, Inflow Depth > 0.75" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.26 cfs @ 12.33 hrs, Volume= 1,681 cf
Primary = 0.26 cfs @ 12.33 hrs, Volume= 1,681 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 3L: Localized Depression

Inflow Area = 45,304 sf, 0.00% Impervious, Inflow Depth > 0.38" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.14 cfs @ 12.50 hrs, Volume= 1,425 cf
Primary = 0.14 cfs @ 12.50 hrs, Volume= 1,425 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 4L: Localised Depression

Inflow Area = 68,819 sf, 0.00% Impervious, Inflow Depth > 0.38" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.21 cfs @ 12.52 hrs, Volume= 2,162 cf
Primary = 0.21 cfs @ 12.52 hrs, Volume= 2,162 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 5L: Localized Depression

Inflow Area = 134,903 sf, 0.00% Impervious, Inflow Depth > 0.38" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.39 cfs @ 12.54 hrs, Volume= 4,233 cf
Primary = 0.39 cfs @ 12.54 hrs, Volume= 4,233 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 6L: Localized Depression

Inflow Area = 182,095 sf, 0.00% Impervious, Inflow Depth > 0.38" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.53 cfs @ 12.53 hrs, Volume= 5,716 cf
Primary = 0.53 cfs @ 12.53 hrs, Volume= 5,716 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 7L: Off-Site

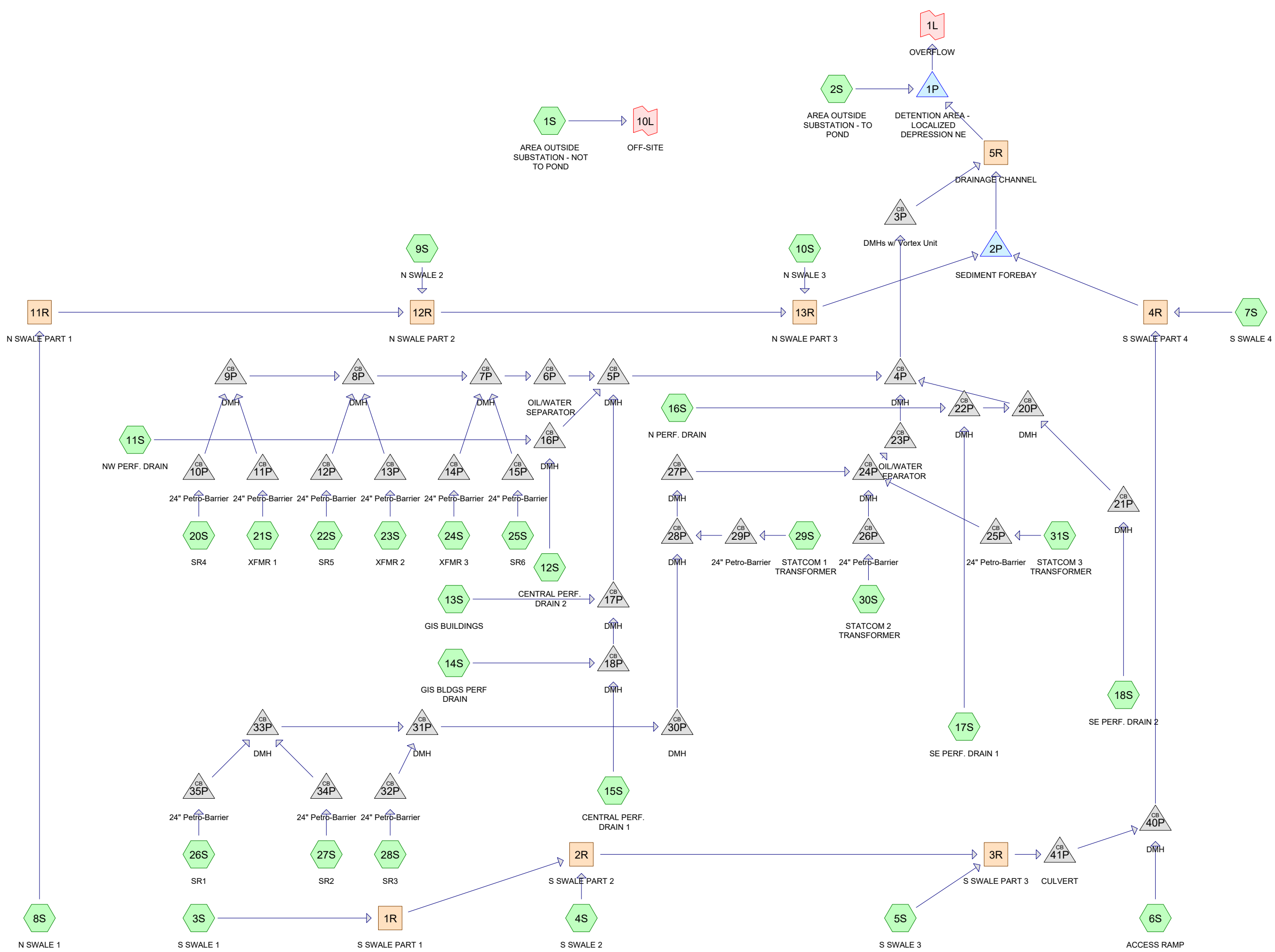
Inflow Area = 4,170 sf, 0.00% Impervious, Inflow Depth > 0.38" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.01 cfs @ 12.38 hrs, Volume= 132 cf
Primary = 0.01 cfs @ 12.38 hrs, Volume= 132 cf, Atten= 0%, Lag= 0.0 min

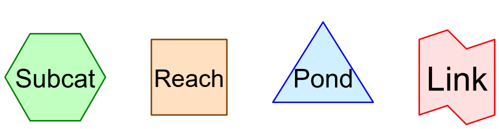
Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link 9L: Off-Site

Inflow Area = 31,990 sf, 0.00% Impervious, Inflow Depth > 0.38" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.11 cfs @ 12.38 hrs, Volume= 1,014 cf
Primary = 0.11 cfs @ 12.38 hrs, Volume= 1,014 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs





Routing Diagram for CWW Substation 5-Parcel Proposed Conditions

Prepared by Stantec Consulting Ltd., Printed 2/10/2023

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
23,427	98	Concrete Containment (20S, 21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 29S, 30S, 31S)
302,189	63	Crushed Stone Surface, HSG A (3S, 4S, 5S, 7S, 8S, 9S, 10S, 11S, 12S, 14S, 15S, 16S, 17S, 18S)
76,573	96	Gravel surface, HSG A (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S)
183,022	30	Meadow, non-grazed, HSG A (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S)
34,667	98	Roofs, HSG A (13S, 16S, 17S, 18S)
421,642	30	Woods, Good, HSG A (1S, 2S, 3S, 4S, 5S, 6S)
1,041,520	**48**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
1,018,093	HSG A	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S, 11S, 12S, 13S, 14S, 15S, 16S, 17S, 18S
0	HSG B	
0	HSG C	
0	HSG D	
23,427	Other	20S, 21S, 22S, 23S, 24S, 25S, 26S, 27S, 28S, 29S, 30S, 31S
1,041,520		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Subca Numb
0	0	0	0	23,427	23,427	Concrete Containment	
302,189	0	0	0	0	302,189	Crushed Stone Surface	
76,573	0	0	0	0	76,573	Gravel surface	
183,022	0	0	0	0	183,022	Meadow, non-grazed	
34,667	0	0	0	0	34,667	Roofs	
421,642	0	0	0	0	421,642	Woods, Good	
1,018,093	**0**	**0**	**0**	**23,427**	**1,041,520**	**TOTAL AREA**	

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: AREA OUTSIDE Runoff Area=258,650 sf 0.00% Impervious Runoff Depth=0.67"
Tc=5.0 min CN=32 Runoff=1.69 cfs 14,486 cf

Subcatchment 2S: AREA OUTSIDE Runoff Area=285,632 sf 0.00% Impervious Runoff Depth=0.59"
Flow Length=491' Tc=12.3 min CN=31 Runoff=1.37 cfs 14,027 cf

Subcatchment 3S: S SWALE 1 Runoff Area=21,901 sf 0.00% Impervious Runoff Depth=3.16"
Flow Length=378' Slope=0.0200 '/' Tc=6.2 min CN=56 Runoff=1.80 cfs 5,769 cf

Subcatchment 4S: S SWALE 2 Runoff Area=37,407 sf 0.00% Impervious Runoff Depth=1.52"
Tc=5.0 min CN=41 Runoff=1.22 cfs 4,744 cf

Subcatchment 5S: S SWALE 3 Runoff Area=28,531 sf 0.00% Impervious Runoff Depth=2.26"
Flow Length=644' Slope=0.0200 '/' Tc=9.3 min CN=48 Runoff=1.40 cfs 5,385 cf

Subcatchment 6S: ACCESS RAMP Runoff Area=17,331 sf 0.00% Impervious Runoff Depth=5.74"
Tc=5.0 min CN=78 Runoff=2.74 cfs 8,295 cf

Subcatchment 7S: S SWALE 4 Runoff Area=20,291 sf 0.00% Impervious Runoff Depth=3.97"
Flow Length=644' Slope=0.0200 '/' Tc=9.3 min CN=63 Runoff=1.93 cfs 6,712 cf

Subcatchment 8S: N SWALE 1 Runoff Area=15,778 sf 0.00% Impervious Runoff Depth=5.98"
Flow Length=378' Slope=0.0200 '/' Tc=6.2 min CN=80 Runoff=2.48 cfs 7,865 cf

Subcatchment 9S: N SWALE 2 Runoff Area=14,101 sf 0.00% Impervious Runoff Depth=6.34"
Flow Length=378' Slope=0.0200 '/' Tc=6.2 min CN=83 Runoff=2.32 cfs 7,451 cf

Subcatchment 10S: N SWALE 3 Runoff Area=12,739 sf 0.00% Impervious Runoff Depth=6.34"
Flow Length=378' Slope=0.0200 '/' Tc=6.2 min CN=83 Runoff=2.10 cfs 6,731 cf

Subcatchment 11S: NW PERF. DRAIN Runoff Area=45,853 sf 0.00% Impervious Runoff Depth=3.97"
Flow Length=660' Slope=0.0200 '/' Tc=6.0 min CN=63 Runoff=4.88 cfs 15,169 cf

Subcatchment 12S: CENTRAL PERF. DRAIN Runoff Area=6,658 sf 0.00% Impervious Runoff Depth=3.97"
Tc=5.0 min CN=63 Runoff=0.73 cfs 2,203 cf

Subcatchment 13S: GIS BUILDINGS Runoff Area=21,900 sf 100.00% Impervious Runoff Depth=8.14"
Tc=5.0 min CN=98 Runoff=4.29 cfs 14,855 cf

Subcatchment 14S: GIS BLDGS PERF Runoff Area=74,801 sf 0.00% Impervious Runoff Depth=3.97"
Flow Length=570' Slope=0.0200 '/' Tc=8.4 min CN=63 Runoff=7.32 cfs 24,745 cf

Subcatchment 15S: CENTRAL PERF. DRAIN Runoff Area=54,087 sf 0.00% Impervious Runoff Depth=3.97"
Flow Length=570' Slope=0.0200 '/' Tc=8.4 min CN=63 Runoff=5.29 cfs 17,893 cf

Subcatchment 16S: N PERF. DRAIN Runoff Area=35,583 sf 0.57% Impervious Runoff Depth=3.97"
Tc=5.0 min CN=63 Runoff=3.92 cfs 11,771 cf

Subcatchment 17S: SE PERF. DRAIN 1 Runoff Area=41,546 sf 20.00% Impervious Runoff Depth=4.79"
Flow Length=425' Slope=0.0200 '/' Tc=5.9 min CN=70 Runoff=5.38 cfs 16,593 cf

Subcatchment 18S: SE PERF. DRAIN 2 Runoff Area=25,304 sf 16.82% Impervious Runoff Depth=4.67"
Tc=5.0 min CN=69 Runoff=3.30 cfs 9,857 cf

Subcatchment 20S: SR4 Runoff Area=1,745 sf 100.00% Impervious Runoff Depth=8.14"
Tc=5.0 min CN=98 Runoff=0.34 cfs 1,184 cf

Subcatchment 21S: XFMR 1 Runoff Area=2,694 sf 100.00% Impervious Runoff Depth=8.14"
Tc=5.0 min CN=98 Runoff=0.53 cfs 1,827 cf

Subcatchment 22S: SR5 Runoff Area=1,745 sf 100.00% Impervious Runoff Depth=8.14"
Tc=5.0 min CN=98 Runoff=0.34 cfs 1,184 cf

Subcatchment 23S: XFMR 2 Runoff Area=2,694 sf 100.00% Impervious Runoff Depth=8.14"
Tc=5.0 min CN=98 Runoff=0.53 cfs 1,827 cf

Subcatchment 24S: XFMR 3 Runoff Area=2,694 sf 100.00% Impervious Runoff Depth=8.14"
Tc=5.0 min CN=98 Runoff=0.53 cfs 1,827 cf

Subcatchment 25S: SR6 Runoff Area=1,745 sf 100.00% Impervious Runoff Depth=8.14"
Tc=5.0 min CN=98 Runoff=0.34 cfs 1,184 cf

Subcatchment 26S: SR1 Runoff Area=1,600 sf 100.00% Impervious Runoff Depth=8.14"
Tc=5.0 min CN=98 Runoff=0.31 cfs 1,085 cf

Subcatchment 27S: SR2 Runoff Area=1,600 sf 100.00% Impervious Runoff Depth=8.14"
Tc=5.0 min CN=98 Runoff=0.31 cfs 1,085 cf

Subcatchment 28S: SR3 Runoff Area=1,600 sf 100.00% Impervious Runoff Depth=8.14"
Tc=5.0 min CN=98 Runoff=0.31 cfs 1,085 cf

Subcatchment 29S: STATCOM 1 Runoff Area=1,770 sf 100.00% Impervious Runoff Depth=8.14"
Tc=5.0 min CN=98 Runoff=0.35 cfs 1,201 cf

Subcatchment 30S: STATCOM 2 Runoff Area=1,770 sf 100.00% Impervious Runoff Depth=8.14"
Tc=5.0 min CN=98 Runoff=0.35 cfs 1,201 cf

Subcatchment 31S: STATCOM 3 Runoff Area=1,770 sf 100.00% Impervious Runoff Depth=8.14"
Tc=5.0 min CN=98 Runoff=0.35 cfs 1,201 cf

Reach 1R: S SWALE PART 1 Avg. Flow Depth=0.50' Max Vel=2.23 fps Inflow=1.80 cfs 5,769 cf
n=0.030 L=309.0' S=0.0137 '/' Capacity=10.56 cfs Outflow=1.70 cfs 5,769 cf

Reach 2R: S SWALE PART 2 Avg. Flow Depth=0.57' Max Vel=2.89 fps Inflow=2.88 cfs 10,513 cf
n=0.030 L=257.3' S=0.0195 '/' Capacity=12.62 cfs Outflow=2.81 cfs 10,513 cf

Reach 3R: S SWALE PART 3 Avg. Flow Depth=0.69' Max Vel=2.81 fps Inflow=4.20 cfs 15,897 cf
n=0.030 L=329.0' S=0.0142 '/' Capacity=10.77 cfs Outflow=4.06 cfs 15,897 cf

Reach 4R: S SWALE PART 4 Avg. Flow Depth=1.00' Max Vel=2.57 fps Inflow=7.94 cfs 30,904 cf
n=0.030 L=367.8' S=0.0073 '/' Capacity=9.98 cfs Outflow=7.66 cfs 30,904 cf

Reach 5R: DRAINAGE CHANNEL Avg. Flow Depth=0.42' Max Vel=5.74 fps Inflow=47.83 cfs 165,100 cf
n=0.078 L=175.0' S=0.3086 '/' Capacity=198.63 cfs Outflow=47.76 cfs 165,100 cf

Reach 11R: N SWALE PART 1 Avg. Flow Depth=0.55' Max Vel=2.51 fps Inflow=2.48 cfs 7,865 cf
n=0.030 L=447.0' S=0.0153 '/' Capacity=11.19 cfs Outflow=2.29 cfs 7,865 cf

Reach 12R: N SWALE PART 2 Avg. Flow Depth=0.71' Max Vel=2.82 fps Inflow=4.52 cfs 15,317 cf
n=0.030 L=431.0' S=0.0137 '/' Capacity=10.59 cfs Outflow=4.29 cfs 15,317 cf

Reach 13R: N SWALE PART 3 Avg. Flow Depth=0.82' Max Vel=3.00 fps Inflow=6.20 cfs 22,048 cf
n=0.030 L=386.0' S=0.0131 '/' Capacity=10.33 cfs Outflow=5.99 cfs 22,048 cf

Pond 1P: DETENTION AREA - Peak Elev=90.62' Storage=110,462 cf Inflow=47.83 cfs 179,128 cf
Discarded=2.16 cfs 178,091 cf Primary=0.33 cfs 1,037 cf Outflow=2.49 cfs 179,128 cf

Pond 2P: SEDIMENT FOREBAY Peak Elev=150.40' Storage=9,809 cf Inflow=13.61 cfs 52,952 cf
Discarded=0.14 cfs 16,828 cf Primary=13.35 cfs 36,124 cf Outflow=13.49 cfs 52,953 cf

Pond 3P: DMHs w/ Vortex Unit Peak Elev=150.76' Inflow=38.54 cfs 128,976 cf
36.0" Round Culvert n=0.011 L=25.0' S=0.1200 '/' Outflow=38.54 cfs 128,976 cf

Pond 4P: DMH Peak Elev=153.06' Inflow=38.54 cfs 128,976 cf
36.0" Round Culvert n=0.011 L=36.0' S=0.0639 '/' Outflow=38.54 cfs 128,976 cf

Pond 5P: DMH Peak Elev=158.96' Inflow=24.21 cfs 83,898 cf
24.0" Round Culvert n=0.011 L=263.0' S=0.0186 '/' Outflow=24.21 cfs 83,898 cf

Pond 6P: OIL/WATER SEPARATOR Peak Elev=158.98' Inflow=2.61 cfs 9,033 cf
24.0" Round Culvert n=0.012 L=27.0' S=0.0148 '/' Outflow=2.61 cfs 9,033 cf

Pond 7P: DMH Peak Elev=159.34' Inflow=2.61 cfs 9,033 cf
12.0" Round Culvert n=0.011 L=40.0' S=0.0100 '/' Outflow=2.61 cfs 9,033 cf

Pond 8P: DMH Peak Elev=159.60' Inflow=1.74 cfs 6,022 cf
12.0" Round Culvert n=0.011 L=154.0' S=0.0065 '/' Outflow=1.74 cfs 6,022 cf

Pond 9P: DMH Peak Elev=159.91' Inflow=0.87 cfs 3,011 cf
12.0" Round Culvert n=0.011 L=141.0' S=0.0092 '/' Outflow=0.87 cfs 3,011 cf

Pond 10P: 24" Petro-Barrier Peak Elev=162.81' Inflow=0.34 cfs 1,184 cf
6.0" Round Culvert n=0.010 L=30.0' S=0.0143 '/' Outflow=0.34 cfs 1,184 cf

Pond 11P: 24" Petro-Barrier Peak Elev=160.18' Inflow=0.53 cfs 1,827 cf
6.0" Round Culvert n=0.010 L=18.0' S=0.0122 '/' Outflow=0.53 cfs 1,827 cf

Pond 12P: 24" Petro-Barrier Peak Elev=161.08' Inflow=0.34 cfs 1,184 cf
6.0" Round Culvert n=0.010 L=32.0' S=0.0094 '/' Outflow=0.34 cfs 1,184 cf

Pond 13P: 24" Petro-Barrier Peak Elev=159.81' Inflow=0.53 cfs 1,827 cf
6.0" Round Culvert n=0.010 L=20.0' S=0.0115 '/' Outflow=0.53 cfs 1,827 cf

Pond 14P: 24" Petro-Barrier Peak Elev=159.55' Inflow=0.53 cfs 1,827 cf
6.0" Round Culvert n=0.010 L=21.0' S=0.0133 '/' Outflow=0.53 cfs 1,827 cf

Pond 15P: 24" Petro-Barrier Peak Elev=159.44' Inflow=0.34 cfs 1,184 cf
6.0" Round Culvert n=0.010 L=34.0' S=0.0076 '/' Outflow=0.34 cfs 1,184 cf

Pond 16P: DMH Peak Elev=161.70' Inflow=5.60 cfs 17,371 cf
12.0" Round Culvert n=0.011 L=17.0' S=0.0294 '/' Outflow=5.60 cfs 17,371 cf

Pond 17P: DMH Peak Elev=161.56' Inflow=16.29 cfs 57,493 cf
24.0" Round Culvert n=0.011 L=88.2' S=0.0442 '/' Outflow=16.29 cfs 57,493 cf

Pond 18P: DMH Peak Elev=164.45' Inflow=12.61 cfs 42,638 cf
18.0" Round Culvert n=0.011 L=92.0' S=0.0217 '/' Outflow=12.61 cfs 42,638 cf

Pond 20P: DMH Peak Elev=153.87' Inflow=12.58 cfs 38,221 cf
24.0" Round Culvert n=0.011 L=56.0' S=0.0286 '/' Outflow=12.58 cfs 38,221 cf

Pond 21P: DMH Peak Elev=156.20' Inflow=3.30 cfs 9,857 cf
12.0" Round Culvert n=0.011 L=62.0' S=0.0410 '/' Outflow=3.30 cfs 9,857 cf

Pond 22P: DMH Peak Elev=157.44' Inflow=9.29 cfs 28,364 cf
18.0" Round Culvert n=0.011 L=56.0' S=0.0089 '/' Outflow=9.29 cfs 28,364 cf

Pond 23P: OIL/WATER SEPARATOR Peak Elev=153.57' Inflow=1.98 cfs 6,858 cf
12.0" Round Culvert n=0.011 L=182.0' S=0.0093 '/' Outflow=2.01 cfs 6,858 cf

Pond 24P: DMH Peak Elev=153.81' Inflow=1.98 cfs 6,858 cf
12.0" Round Culvert n=0.011 L=1.0' S=0.1000 '/' Outflow=1.98 cfs 6,858 cf

Pond 25P: 24" Petro-Barrier Peak Elev=153.98' Inflow=0.35 cfs 1,201 cf
6.0" Round Culvert n=0.010 L=58.0' S=0.0102 '/' Outflow=0.35 cfs 1,201 cf

Pond 26P: 24" Petro-Barrier Peak Elev=153.92' Inflow=0.35 cfs 1,201 cf
6.0" Round Culvert n=0.010 L=17.0' S=0.0576 '/' Outflow=0.35 cfs 1,201 cf

Pond 27P: DMH Peak Elev=154.61' Inflow=1.29 cfs 4,457 cf
12.0" Round Culvert n=0.011 L=224.0' S=0.0085 '/' Outflow=1.29 cfs 4,457 cf

Pond 28P: DMH Peak Elev=155.04' Inflow=1.29 cfs 4,457 cf
12.0" Round Culvert n=0.011 L=50.0' S=0.0080 '/' Outflow=1.29 cfs 4,457 cf

Pond 29P: 24" Petro-Barrier Peak Elev=155.34' Inflow=0.35 cfs 1,201 cf
6.0" Round Culvert n=0.010 L=7.0' S=0.0643 '/' Outflow=0.35 cfs 1,201 cf

Pond 30P: DMH Peak Elev=160.90' Inflow=0.94 cfs 3,256 cf
12.0" Round Culvert n=0.011 L=98.0' S=0.0092 '/' Outflow=0.94 cfs 3,256 cf

Pond 31P: DMH Peak Elev=162.41' Inflow=0.94 cfs 3,256 cf
12.0" Round Culvert n=0.011 L=232.0' S=0.0060 '/' Outflow=0.94 cfs 3,256 cf

Pond 32P: 24" Petro-Barrier Peak Elev=162.80' Inflow=0.31 cfs 1,085 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.0240 '/' Outflow=0.31 cfs 1,085 cf

Pond 33P: DMH Peak Elev=163.60' Inflow=0.63 cfs 2,171 cf
12.0" Round Culvert n=0.011 L=159.0' S=0.0075 '/' Outflow=0.63 cfs 2,171 cf

Pond 34P: 24" Petro-Barrier Peak Elev=163.81' Inflow=0.31 cfs 1,085 cf
6.0" Round Culvert n=0.010 L=8.0' S=0.0162 '/' Outflow=0.31 cfs 1,085 cf

Pond 35P: 24" Petro-Barrier Peak Elev=164.75' Inflow=0.31 cfs 1,085 cf
6.0" Round Culvert n=0.010 L=38.0' S=0.0103 '/' Outflow=0.31 cfs 1,085 cf

Pond 40P: DMH Peak Elev=159.13' Inflow=6.02 cfs 24,192 cf
24.0" x 12.0" Box Culvert n=0.011 L=10.0' S=0.0300 '/' Outflow=6.02 cfs 24,192 cf

Pond 41P: CULVERT Peak Elev=159.74' Inflow=4.06 cfs 15,897 cf
24.0" x 12.0" Box Culvert n=0.011 L=55.0' S=0.0182 '/' Outflow=4.06 cfs 15,897 cf

Link 1L: OVERFLOW Inflow=0.33 cfs 1,037 cf
Primary=0.33 cfs 1,037 cf

Link 10L: OFF-SITE Inflow=1.69 cfs 14,486 cf
Primary=1.69 cfs 14,486 cf

Total Runoff Area = 1,041,520 sf Runoff Volume = 210,442 cf Average Runoff Depth = 2.42"
94.42% Pervious = 983,426 sf 5.58% Impervious = 58,094 sf

Summary for Subcatchment 1S: AREA OUTSIDE SUBSTATION - NOT TO POND

Runoff = 1.69 cfs @ 12.31 hrs, Volume= 14,486 cf, Depth= 0.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
179,269	30	Woods, Good, HSG A
72,994	30	Meadow, non-grazed, HSG A
6,387	96	Gravel surface, HSG A
258,650	32	Weighted Average
258,650		100.00% Pervious Area

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

Summary for Subcatchment 2S: AREA OUTSIDE SUBSTATION - TO POND

Runoff = 1.37 cfs @ 12.45 hrs, Volume= 14,027 cf, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
206,991	30	Woods, Good, HSG A
72,294	30	Meadow, non-grazed, HSG A
6,347	96	Gravel surface, HSG A
285,632	31	Weighted Average
285,632		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.5000	0.25		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.29"
8.9	441	0.1100	0.83		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
12.3	491	Total			

Summary for Subcatchment 3S: S SWALE 1

Runoff = 1.80 cfs @ 12.10 hrs, Volume= 5,769 cf, Depth= 3.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

	Area (sf)	CN	Description
*	3,599	63	Crushed Stone Surface, HSG A
	6,746	96	Gravel surface, HSG A
	7,202	30	Woods, Good, HSG A
	4,354	30	Meadow, non-grazed, HSG A
	21,901	56	Weighted Average
	21,901		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.9	328	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
6.2	378	Total			

Summary for Subcatchment 4S: S SWALE 2

Runoff = 1.22 cfs @ 12.09 hrs, Volume= 4,744 cf, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

	Area (sf)	CN	Description
	5,160	96	Gravel surface, HSG A
*	2,578	63	Crushed Stone Surface, HSG A
	20,025	30	Woods, Good, HSG A
	9,644	30	Meadow, non-grazed, HSG A
	37,407	41	Weighted Average
	37,407		100.00% Pervious Area

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

Summary for Subcatchment 5S: S SWALE 3

Runoff = 1.40 cfs @ 12.14 hrs, Volume= 5,385 cf, Depth= 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

	Area (sf)	CN	Description
*	3,335	63	Crushed Stone Surface, HSG A
	7,061	30	Woods, Good, HSG A
	6,315	96	Gravel surface, HSG A
	11,820	30	Meadow, non-grazed, HSG A
	28,531	48	Weighted Average
	28,531		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
7.0	594	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
9.3	644	Total			

Summary for Subcatchment 6S: ACCESS RAMP

Runoff = 2.74 cfs @ 12.07 hrs, Volume= 8,295 cf, Depth= 5.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

	Area (sf)	CN	Description
	12,617	96	Gravel surface, HSG A
	1,094	30	Woods, Good, HSG A
	3,620	30	Meadow, non-grazed, HSG A
	17,331	78	Weighted Average
	17,331		100.00% Pervious Area

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

Summary for Subcatchment 7S: S SWALE 4

Runoff = 1.93 cfs @ 12.13 hrs, Volume= 6,712 cf, Depth= 3.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

	Area (sf)	CN	Description
*	6,230	63	Crushed Stone Surface, HSG A
	7,051	96	Gravel surface, HSG A
	7,010	30	Meadow, non-grazed, HSG A
	20,291	63	Weighted Average
	20,291		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
7.0	594	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
9.3	644	Total			

Summary for Subcatchment 8S: N SWALE 1

Runoff = 2.48 cfs @ 12.09 hrs, Volume= 7,865 cf, Depth= 5.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

	Area (sf)	CN	Description
*	4,949	63	Crushed Stone Surface, HSG A
	9,543	96	Gravel surface, HSG A
	1,286	30	Meadow, non-grazed, HSG A
	15,778	80	Weighted Average
	15,778		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.9	328	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
6.2	378	Total			

Summary for Subcatchment 9S: N SWALE 2

Runoff = 2.32 cfs @ 12.09 hrs, Volume= 7,451 cf, Depth= 6.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

	Area (sf)	CN	Description
*	5,475	63	Crushed Stone Surface, HSG A
	8,626	96	Gravel surface, HSG A
	14,101	83	Weighted Average
	14,101		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.9	328	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
6.2	378	Total			

Summary for Subcatchment 10S: N SWALE 3

Runoff = 2.10 cfs @ 12.09 hrs, Volume= 6,731 cf, Depth= 6.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

	Area (sf)	CN	Description
*	4,958	63	Crushed Stone Surface, HSG A
	7,781	96	Gravel surface, HSG A
	12,739	83	Weighted Average
	12,739		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.9	328	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
6.2	378	Total			

Summary for Subcatchment 11S: NW PERF. DRAIN

Runoff = 4.88 cfs @ 12.09 hrs, Volume= 15,169 cf, Depth= 3.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

	Area (sf)	CN	Description
*	45,853	63	Crushed Stone Surface, HSG A
	45,853		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.0	255	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
0.7	355	0.0200	8.34	6.55	**Pipe Channel, Perf Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
6.0	660	Total			

Summary for Subcatchment 12S: CENTRAL PERF. DRAIN 2

Runoff = 0.73 cfs @ 12.08 hrs, Volume= 2,203 cf, Depth= 3.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

	Area (sf)	CN	Description
*	6,658	63	Crushed Stone Surface, HSG A
	6,658		100.00% Pervious Area

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

Summary for Subcatchment 13S: GIS BUILDINGS

Runoff = 4.29 cfs @ 12.07 hrs, Volume= 14,855 cf, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

	Area (sf)	CN	Description
	21,900	98	Roofs, HSG A
	21,900		100.00% Impervious Area

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

Summary for Subcatchment 14S: GIS BLDGS PERF DRAIN

Runoff = 7.32 cfs @ 12.12 hrs, Volume= 24,745 cf, Depth= 3.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

	Area (sf)	CN	Description
*	74,801	63	Crushed Stone Surface, HSG A
	74,801		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
6.1	520	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
8.4	570	Total			

Summary for Subcatchment 15S: CENTRAL PERF. DRAIN 1

Runoff = 5.29 cfs @ 12.12 hrs, Volume= 17,893 cf, Depth= 3.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

	Area (sf)	CN	Description
*	54,087	63	Crushed Stone Surface, HSG A
	54,087		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
6.1	520	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
8.4	570	Total			

Summary for Subcatchment 16S: N PERF. DRAIN

Runoff = 3.92 cfs @ 12.08 hrs, Volume= 11,771 cf, Depth= 3.97"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

	Area (sf)	CN	Description
*	35,381	63	Crushed Stone Surface, HSG A
	202	98	Roofs, HSG A
	35,583	63	Weighted Average
	35,381		99.43% Pervious Area
	202		0.57% Impervious Area

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

Summary for Subcatchment 17S: SE PERF. DRAIN 1

Runoff = 5.38 cfs @ 12.09 hrs, Volume= 16,593 cf, Depth= 4.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

	Area (sf)	CN	Description
	8,310	98	Roofs, HSG A
*	33,236	63	Crushed Stone Surface, HSG A
	41,546	70	Weighted Average
	33,236		80.00% Pervious Area
	8,310		20.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.5	300	0.0200	1.41		**Shallow Concentrated Flow, Shallow** Nearly Bare & Untilled Kv= 10.0 fps
0.1	75	0.0200	8.34	6.55	**Pipe Channel, Perf. Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
5.9	425	Total			

Summary for Subcatchment 18S: SE PERF. DRAIN 2

Runoff = 3.30 cfs @ 12.07 hrs, Volume= 9,857 cf, Depth= 4.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

	Area (sf)	CN	Description
	4,255	98	Roofs, HSG A
*	21,049	63	Crushed Stone Surface, HSG A
	25,304	69	Weighted Average
	21,049		83.18% Pervious Area
	4,255		16.82% Impervious Area

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

Summary for Subcatchment 20S: SR4

Runoff = 0.34 cfs @ 12.07 hrs, Volume= 1,184 cf, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
1,745	98	Concrete Containment
1,745		100.00% Impervious Area

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

Summary for Subcatchment 21S: XFMR 1

Runoff = 0.53 cfs @ 12.07 hrs, Volume= 1,827 cf, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
2,694	98	Concrete Containment
2,694		100.00% Impervious Area

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

Summary for Subcatchment 22S: SR5

Runoff = 0.34 cfs @ 12.07 hrs, Volume= 1,184 cf, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
1,745	98	Concrete Containment
1,745		100.00% Impervious Area

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

Summary for Subcatchment 23S: XFMR 2

Runoff = 0.53 cfs @ 12.07 hrs, Volume= 1,827 cf, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
2,694	98	Concrete Containment
2,694		100.00% Impervious Area

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

Summary for Subcatchment 24S: XFMR 3

Runoff = 0.53 cfs @ 12.07 hrs, Volume= 1,827 cf, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
2,694	98	Concrete Containment
2,694		100.00% Impervious Area

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

Summary for Subcatchment 25S: SR6

Runoff = 0.34 cfs @ 12.07 hrs, Volume= 1,184 cf, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
1,745	98	Concrete Containment
1,745		100.00% Impervious Area

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

Summary for Subcatchment 26S: SR1

Runoff = 0.31 cfs @ 12.07 hrs, Volume= 1,085 cf, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
1,600	98	Concrete Containment
1,600		100.00% Impervious Area

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

Summary for Subcatchment 27S: SR2

Runoff = 0.31 cfs @ 12.07 hrs, Volume= 1,085 cf, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
1,600	98	Concrete Containment
1,600		100.00% Impervious Area

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

Summary for Subcatchment 28S: SR3

Runoff = 0.31 cfs @ 12.07 hrs, Volume= 1,085 cf, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
1,600	98	Concrete Containment
1,600		100.00% Impervious Area

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

Summary for Subcatchment 29S: STATCOM 1 TRANSFORMER

Runoff = 0.35 cfs @ 12.07 hrs, Volume= 1,201 cf, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
1,770	98	Concrete Containment
1,770		100.00% Impervious Area

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

Summary for Subcatchment 30S: STATCOM 2 TRANSFORMER

Runoff = 0.35 cfs @ 12.07 hrs, Volume= 1,201 cf, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
1,770	98	Concrete Containment
1,770		100.00% Impervious Area

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

Summary for Subcatchment 31S: STATCOM 3 TRANSFORMER

Runoff = 0.35 cfs @ 12.07 hrs, Volume= 1,201 cf, Depth= 8.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 100YR 24H Rainfall=8.38"

Area (sf)	CN	Description
1,770	98	Concrete Containment
1,770		100.00% Impervious Area

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

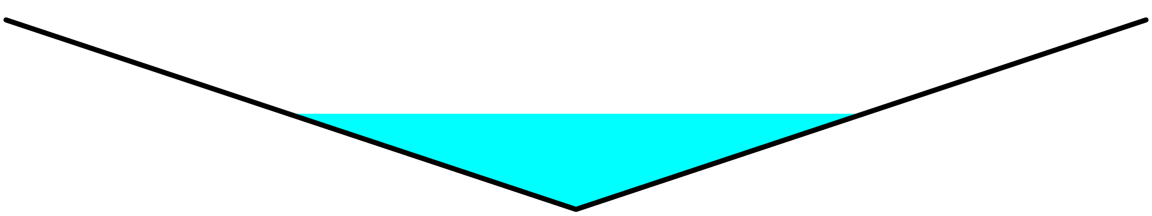
Summary for Reach 1R: S SWALE PART 1

Inflow Area = 21,901 sf, 0.00% Impervious, Inflow Depth = 3.16" for NRCC 100YR 24H event
Inflow = 1.80 cfs @ 12.10 hrs, Volume= 5,769 cf
Outflow = 1.70 cfs @ 12.12 hrs, Volume= 5,769 cf, Atten= 5%, Lag= 1.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.23 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 0.92 fps, Avg. Travel Time= 5.6 min

Peak Storage= 236 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.50'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 38.49 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 10.56 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 309.0' Slope= 0.0137 '/'
Inlet Invert= 174.13', Outlet Invert= 169.91'



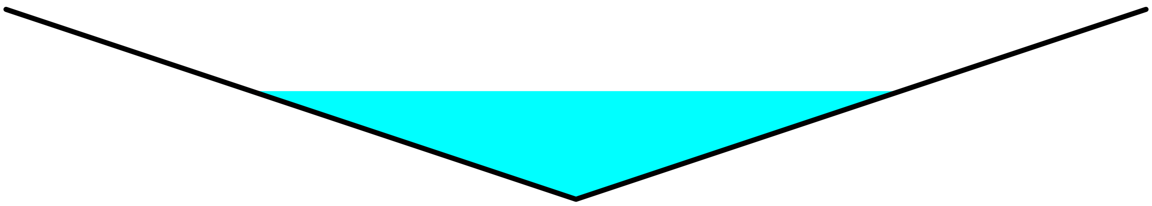
Summary for Reach 2R: S SWALE PART 2

Inflow Area = 59,308 sf, 0.00% Impervious, Inflow Depth = 2.13" for NRCC 100YR 24H event
Inflow = 2.88 cfs @ 12.11 hrs, Volume= 10,513 cf
Outflow = 2.81 cfs @ 12.13 hrs, Volume= 10,513 cf, Atten= 2%, Lag= 1.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.89 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 1.20 fps, Avg. Travel Time= 3.6 min

Peak Storage= 250 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.57'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 46.01 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 12.62 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 257.3' Slope= 0.0195 '/'
Inlet Invert= 169.90', Outlet Invert= 164.88'



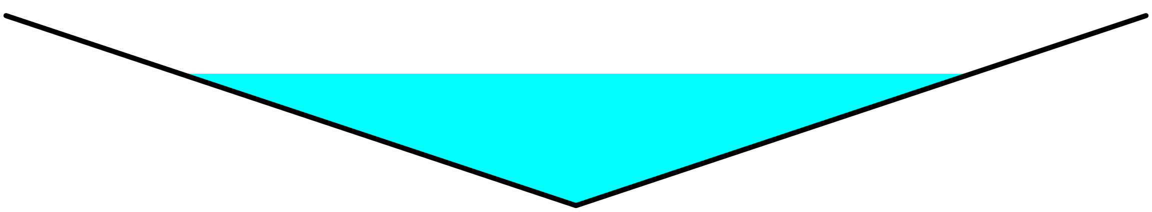
Summary for Reach 3R: S SWALE PART 3

Inflow Area =	87,839 sf, 0.00% Impervious,	Inflow Depth = 2.17" for NRCC 100YR 24H event
Inflow =	4.20 cfs @ 12.14 hrs, Volume=	15,897 cf
Outflow =	4.06 cfs @ 12.16 hrs, Volume=	15,897 cf, Atten= 3%, Lag= 1.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.81 fps, Min. Travel Time= 1.9 min
Avg. Velocity = 1.13 fps, Avg. Travel Time= 4.8 min

Peak Storage= 475 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.69'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 39.24 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 10.77 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 329.0' Slope= 0.0142 '/'
Inlet Invert= 164.80', Outlet Invert= 160.13'



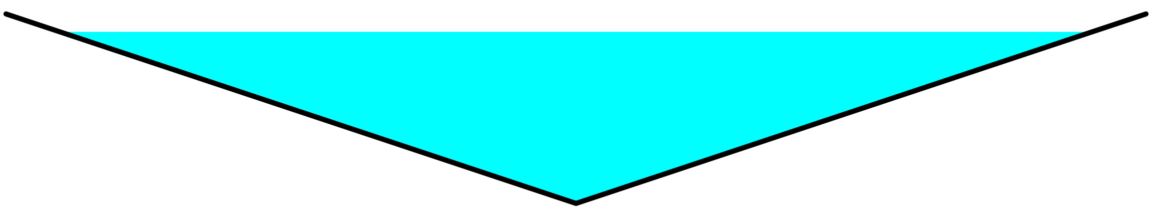
Summary for Reach 4R: S SWALE PART 4

Inflow Area = 125,461 sf, 0.00% Impervious, Inflow Depth = 2.96" for NRCC 100YR 24H event
Inflow = 7.94 cfs @ 12.13 hrs, Volume= 30,904 cf
Outflow = 7.66 cfs @ 12.16 hrs, Volume= 30,904 cf, Atten= 4%, Lag= 1.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.57 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 0.91 fps, Avg. Travel Time= 6.8 min

Peak Storage= 1,094 cf @ 12.16 hrs
Average Depth at Peak Storage= 1.00'
Defined Flood Depth= 2.00' Flow Area= 9.5 sf, Capacity= 31.59 cfs
Bank-Full Depth= 1.10' Flow Area= 3.6 sf, Capacity= 9.98 cfs

0.00' x 1.10' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.60'
Length= 367.8' Slope= 0.0073 '/'
Inlet Invert= 157.70', Outlet Invert= 155.00'



Summary for Reach 5R: DRAINAGE CHANNEL

Inflow Area = 497,238 sf, 11.68% Impervious, Inflow Depth = 3.98" for NRCC 100YR 24H event
Inflow = 47.83 cfs @ 12.12 hrs, Volume= 165,100 cf
Outflow = 47.76 cfs @ 12.12 hrs, Volume= 165,100 cf, Atten= 0%, Lag= 0.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.74 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.20 fps, Avg. Travel Time= 2.4 min

Peak Storage= 1,456 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.42'
Defined Flood Depth= 1.00' Flow Area= 20.0 sf, Capacity= 198.63 cfs
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 198.63 cfs

20.00' x 1.00' deep channel, n= 0.078 Riprap, 12-inch
Length= 175.0' Slope= 0.3086 '/'
Inlet Invert= 145.00', Outlet Invert= 91.00'

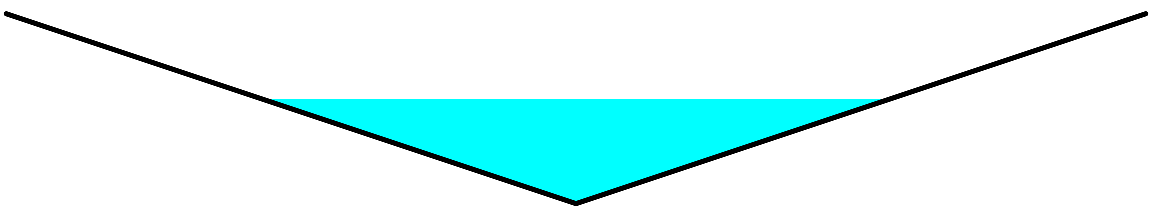
Summary for Reach 11R: N SWALE PART 1

Inflow Area = 15,778 sf, 0.00% Impervious, Inflow Depth = 5.98" for NRCC 100YR 24H event
Inflow = 2.48 cfs @ 12.09 hrs, Volume= 7,865 cf
Outflow = 2.29 cfs @ 12.12 hrs, Volume= 7,865 cf, Atten= 7%, Lag= 2.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.51 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 0.93 fps, Avg. Travel Time= 8.0 min

Peak Storage= 408 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.55'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 40.78 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 11.19 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 447.0' Slope= 0.0153 '/'
Inlet Invert= 174.03', Outlet Invert= 167.18'



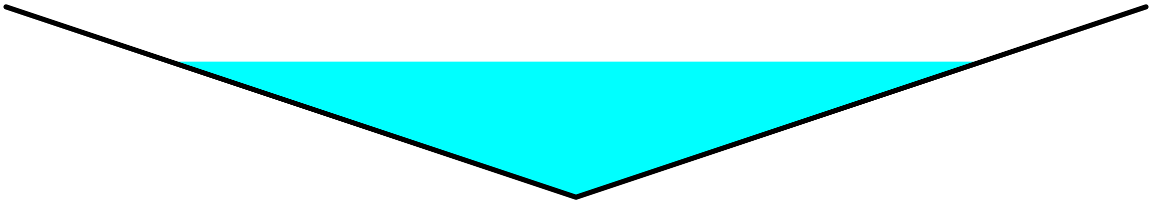
Summary for Reach 12R: N SWALE PART 2

Inflow Area = 29,879 sf, 0.00% Impervious, Inflow Depth = 6.15" for NRCC 100YR 24H event
Inflow = 4.52 cfs @ 12.10 hrs, Volume= 15,317 cf
Outflow = 4.29 cfs @ 12.13 hrs, Volume= 15,317 cf, Atten= 5%, Lag= 1.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.82 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 0.99 fps, Avg. Travel Time= 7.2 min

Peak Storage= 656 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.71'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 38.60 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 10.59 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 431.0' Slope= 0.0137 '/'
Inlet Invert= 167.10', Outlet Invert= 161.18'



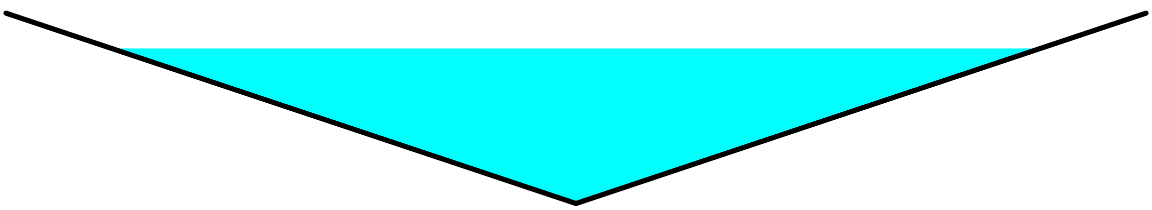
Summary for Reach 13R: N SWALE PART 3

Inflow Area = 42,618 sf, 0.00% Impervious, Inflow Depth = 6.21" for NRCC 100YR 24H event
Inflow = 6.20 cfs @ 12.12 hrs, Volume= 22,048 cf
Outflow = 5.99 cfs @ 12.14 hrs, Volume= 22,048 cf, Atten= 3%, Lag= 1.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.00 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 1.04 fps, Avg. Travel Time= 6.2 min

Peak Storage= 769 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.82'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 37.64 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 10.33 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 386.0' Slope= 0.0131 '/'
Inlet Invert= 161.10', Outlet Invert= 156.06'



Summary for Pond 1P: DETENTION AREA - LOCALIZED DEPRESSION NE

Inflow Area = 782,870 sf, 7.42% Impervious, Inflow Depth = 2.75" for NRCC 100YR 24H event
Inflow = 47.83 cfs @ 12.12 hrs, Volume= 179,128 cf
Outflow = 2.49 cfs @ 15.79 hrs, Volume= 179,128 cf, Atten= 95%, Lag= 219.8 min
Discarded = 2.16 cfs @ 15.79 hrs, Volume= 178,091 cf
Primary = 0.33 cfs @ 15.79 hrs, Volume= 1,037 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 90.62' @ 15.79 hrs Surf.Area= 38,660 sf Storage= 110,462 cf

Plug-Flow detention time= 693.1 min calculated for 179,103 cf (100% of inflow)
Center-of-Mass det. time= 693.3 min (1,524.8 - 831.5)

Volume	Invert	Avail.Storage	Storage Description
#1	83.00'	125,742 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
83.00	827	135.0	0	0	827
84.00	2,756	217.0	1,698	1,698	3,131
85.00	5,016	298.0	3,830	5,528	6,460
86.00	8,057	383.0	6,477	12,004	11,079
87.00	12,347	488.0	10,126	22,130	18,370
88.00	17,968	589.0	15,070	37,200	27,043
89.00	25,096	690.0	21,433	58,633	37,342
90.00	33,858	865.0	29,368	88,001	59,011
91.00	41,761	936.1	37,740	125,742	69,242

Device	Routing	Invert	Outlet Devices
#1	Discarded	83.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	90.60'	**50.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=2.16 cfs @ 15.79 hrs HW=90.62' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 2.16 cfs)

Primary OutFlow Max=0.33 cfs @ 15.79 hrs HW=90.62' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.33 cfs @ 0.34 fps)

Summary for Pond 2P: SEDIMENT FOREBAY

Inflow Area = 168,079 sf, 0.00% Impervious, Inflow Depth = 3.78" for NRCC 100YR 24H event
Inflow = 13.61 cfs @ 12.15 hrs, Volume= 52,952 cf
Outflow = 13.49 cfs @ 12.17 hrs, Volume= 52,953 cf, Atten= 1%, Lag= 0.9 min
Discarded = 0.14 cfs @ 12.17 hrs, Volume= 16,828 cf
Primary = 13.35 cfs @ 12.17 hrs, Volume= 36,124 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 150.40' @ 12.17 hrs Surf.Area= 2,464 sf Storage= 9,809 cf
Flood Elev= 151.00' Surf.Area= 2,531 sf Storage= 11,301 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 227.3 min (1,061.9 - 834.6)

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	22,348 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
146.00	2,000	0	0	2,000
155.00	3,000	22,348	22,348	3,876

Device	Routing	Invert	Outlet Devices
#1	Discarded	146.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	150.00'	**20.0' long x 2.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50
Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88 2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.14 cfs @ 12.17 hrs HW=150.40' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=13.34 cfs @ 12.17 hrs HW=150.40' TW=145.39' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 13.34 cfs @ 1.66 fps)

Summary for Pond 3P: DMHs w/ Vortex Unit

Inflow Area = 329,159 sf, 17.65% Impervious, Inflow Depth = 4.70" for NRCC 100YR 24H event
Inflow = 38.54 cfs @ 12.09 hrs, Volume= 128,976 cf
Outflow = 38.54 cfs @ 12.09 hrs, Volume= 128,976 cf, Atten= 0%, Lag= 0.0 min
Primary = 38.54 cfs @ 12.09 hrs, Volume= 128,976 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 150.76' @ 12.09 hrs
Flood Elev= 151.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	148.00'	**36.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 148.00' / 145.00' S= 0.1200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=38.53 cfs @ 12.09 hrs HW=150.76' TW=145.38' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 38.53 cfs @ 5.66 fps)

Summary for Pond 4P: DMH

Inflow Area = 329,159 sf, 17.65% Impervious, Inflow Depth = 4.70" for NRCC 100YR 24H event
Inflow = 38.54 cfs @ 12.09 hrs, Volume= 128,976 cf
Outflow = 38.54 cfs @ 12.09 hrs, Volume= 128,976 cf, Atten= 0%, Lag= 0.0 min
Primary = 38.54 cfs @ 12.09 hrs, Volume= 128,976 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.06' @ 12.09 hrs
Flood Elev= 158.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	150.30'	**36.0" Round Culvert** L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 150.30' / 148.00' S= 0.0639 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=38.53 cfs @ 12.09 hrs HW=153.06' TW=150.76' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 38.53 cfs @ 5.66 fps)

Summary for Pond 5P: DMH

Inflow Area = 216,616 sf, 16.26% Impervious, Inflow Depth = 4.65" for NRCC 100YR 24H event
Inflow = 24.21 cfs @ 12.10 hrs, Volume= 83,898 cf
Outflow = 24.21 cfs @ 12.10 hrs, Volume= 83,898 cf, Atten= 0%, Lag= 0.0 min
Primary = 24.21 cfs @ 12.10 hrs, Volume= 83,898 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 158.96' @ 12.10 hrs
Flood Elev= 161.58'

Device	Routing	Invert	Outlet Devices
#1	Primary	155.40'	**24.0" Round Culvert** L= 263.0' Ke= 0.500 Inlet / Outlet Invert= 155.40' / 150.50' S= 0.0186 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=24.18 cfs @ 12.10 hrs HW=158.96' TW=153.05' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 24.18 cfs @ 7.70 fps)

Summary for Pond 6P: OIL/WATER SEPARATOR

Inflow Area = 13,317 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 2.61 cfs @ 12.07 hrs, Volume= 9,033 cf
Outflow = 2.61 cfs @ 12.07 hrs, Volume= 9,033 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.61 cfs @ 12.07 hrs, Volume= 9,033 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 158.98' @ 12.11 hrs
Flood Elev= 162.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	155.90'	**24.0" Round Culvert** L= 27.0' Ke= 0.500 Inlet / Outlet Invert= 155.90' / 155.50' S= 0.0148 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=158.56' TW=158.72' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Summary for Pond 7P: DMH

Inflow Area = 13,317 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 2.61 cfs @ 12.07 hrs, Volume= 9,033 cf
Outflow = 2.61 cfs @ 12.07 hrs, Volume= 9,033 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.61 cfs @ 12.07 hrs, Volume= 9,033 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.34' @ 12.11 hrs
Flood Elev= 162.77'

Device	Routing	Invert	Outlet Devices
#1	Primary	156.40'	**12.0" Round Culvert** L= 40.0' Ke= 0.500

Inlet / Outlet Invert= 156.40' / 156.00' S= 0.0100 '/' Cc= 0.900
n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.88 cfs @ 12.07 hrs HW=158.80' TW=158.56' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.88 cfs @ 2.39 fps)

Summary for Pond 8P: DMH

Inflow Area = 8,878 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 1.74 cfs @ 12.07 hrs, Volume= 6,022 cf
Outflow = 1.74 cfs @ 12.07 hrs, Volume= 6,022 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.74 cfs @ 12.07 hrs, Volume= 6,022 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.60' @ 12.12 hrs
Flood Elev= 164.88'

Device	Routing	Invert	Outlet Devices
#1	Primary	157.50'	**12.0" Round Culvert** L= 154.0' Ke= 0.500 Inlet / Outlet Invert= 157.50' / 156.50' S= 0.0065 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.99 cfs @ 12.07 hrs HW=158.92' TW=158.80' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.99 cfs @ 1.26 fps)

Summary for Pond 9P: DMH

Inflow Area = 4,439 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 0.87 cfs @ 12.07 hrs, Volume= 3,011 cf
Outflow = 0.87 cfs @ 12.07 hrs, Volume= 3,011 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.87 cfs @ 12.07 hrs, Volume= 3,011 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.91' @ 12.12 hrs
Flood Elev= 166.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.30'	**12.0" Round Culvert** L= 141.0' Ke= 0.500 Inlet / Outlet Invert= 159.30' / 158.00' S= 0.0092 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.77 cfs @ 12.07 hrs HW=159.78' TW=158.92' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.77 cfs @ 3.06 fps)

Summary for Pond 10P: 24" Petro-Barrier

Inflow Area = 1,745 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 0.34 cfs @ 12.07 hrs, Volume= 1,184 cf
Outflow = 0.34 cfs @ 12.07 hrs, Volume= 1,184 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.34 cfs @ 12.07 hrs, Volume= 1,184 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 162.81' @ 12.07 hrs
Flood Elev= 169.43'

Device	Routing	Invert	Outlet Devices
#1	Primary	162.43'	**6.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 162.43' / 162.00' S= 0.0143 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.34 cfs @ 12.07 hrs HW=162.81' TW=159.78' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.34 cfs @ 2.11 fps)

Summary for Pond 11P: 24" Petro-Barrier

Inflow Area = 2,694 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 0.53 cfs @ 12.07 hrs, Volume= 1,827 cf
Outflow = 0.53 cfs @ 12.07 hrs, Volume= 1,827 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.53 cfs @ 12.07 hrs, Volume= 1,827 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 160.18' @ 12.07 hrs
Flood Elev= 168.62'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.62'	**6.0" Round Culvert** L= 18.0' Ke= 0.500 Inlet / Outlet Invert= 159.62' / 159.40' S= 0.0122 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.53 cfs @ 12.07 hrs HW=160.18' TW=159.78' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.53 cfs @ 2.68 fps)

Summary for Pond 12P: 24" Petro-Barrier

Inflow Area = 1,745 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 0.34 cfs @ 12.07 hrs, Volume= 1,184 cf
Outflow = 0.34 cfs @ 12.07 hrs, Volume= 1,184 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.34 cfs @ 12.07 hrs, Volume= 1,184 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 161.08' @ 12.07 hrs
Flood Elev= 167.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	160.70'	**6.0" Round Culvert** L= 32.0' Ke= 0.500 Inlet / Outlet Invert= 160.70' / 160.40' S= 0.0094 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.34 cfs @ 12.07 hrs HW=161.08' TW=158.92' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.34 cfs @ 2.11 fps)

Summary for Pond 13P: 24" Petro-Barrier

Inflow Area = 2,694 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 0.53 cfs @ 12.07 hrs, Volume= 1,827 cf
Outflow = 0.53 cfs @ 12.07 hrs, Volume= 1,827 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.53 cfs @ 12.07 hrs, Volume= 1,827 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.81' @ 12.12 hrs
Flood Elev= 166.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	157.83'	**6.0" Round Culvert** L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 157.83' / 157.60' S= 0.0115 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.18 cfs @ 12.07 hrs HW=158.96' TW=158.92' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.18 cfs @ 0.94 fps)

Summary for Pond 14P: 24" Petro-Barrier

Inflow Area = 2,694 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 0.53 cfs @ 12.07 hrs, Volume= 1,827 cf
Outflow = 0.53 cfs @ 12.07 hrs, Volume= 1,827 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.53 cfs @ 12.07 hrs, Volume= 1,827 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.55' @ 12.12 hrs
Flood Elev= 165.88'

Device	Routing	Invert	Outlet Devices
#1	Primary	156.88'	**6.0" Round Culvert** L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 156.88' / 156.60' S= 0.0133 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.22 cfs @ 12.07 hrs HW=158.86' TW=158.80' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.22 cfs @ 1.14 fps)

Summary for Pond 15P: 24" Petro-Barrier

Inflow Area = 1,745 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 0.34 cfs @ 12.07 hrs, Volume= 1,184 cf
Outflow = 0.34 cfs @ 12.07 hrs, Volume= 1,184 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.34 cfs @ 12.07 hrs, Volume= 1,184 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.44' @ 12.12 hrs
Flood Elev= 164.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	157.66'	**6.0" Round Culvert** L= 34.0' Ke= 0.500

Inlet / Outlet Invert= 157.66' / 157.40' S= 0.0076 '/' Cc= 0.900
n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=158.69' TW=158.80' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Summary for Pond 16P: DMH

Inflow Area = 52,511 sf, 0.00% Impervious, Inflow Depth = 3.97" for NRCC 100YR 24H event
Inflow = 5.60 cfs @ 12.09 hrs, Volume= 17,371 cf
Outflow = 5.60 cfs @ 12.09 hrs, Volume= 17,371 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.60 cfs @ 12.09 hrs, Volume= 17,371 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 161.70' @ 12.09 hrs
Flood Elev= 162.19'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.00'	**12.0" Round Culvert** L= 17.0' Ke= 0.500 Inlet / Outlet Invert= 159.00' / 158.50' S= 0.0294 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=5.60 cfs @ 12.09 hrs HW=161.69' TW=158.93' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 5.60 cfs @ 7.13 fps)

Summary for Pond 17P: DMH

Inflow Area = 150,788 sf, 14.52% Impervious, Inflow Depth = 4.58" for NRCC 100YR 24H event
Inflow = 16.29 cfs @ 12.11 hrs, Volume= 57,493 cf
Outflow = 16.29 cfs @ 12.11 hrs, Volume= 57,493 cf, Atten= 0%, Lag= 0.0 min
Primary = 16.29 cfs @ 12.11 hrs, Volume= 57,493 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 161.56' @ 12.11 hrs
Flood Elev= 163.59'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.40'	**24.0" Round Culvert** L= 88.2' Ke= 0.500 Inlet / Outlet Invert= 159.40' / 155.50' S= 0.0442 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=16.27 cfs @ 12.11 hrs HW=161.56' TW=158.93' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 16.27 cfs @ 5.18 fps)

Summary for Pond 18P: DMH

Inflow Area = 128,888 sf, 0.00% Impervious, Inflow Depth = 3.97" for NRCC 100YR 24H event
Inflow = 12.61 cfs @ 12.12 hrs, Volume= 42,638 cf
Outflow = 12.61 cfs @ 12.12 hrs, Volume= 42,638 cf, Atten= 0%, Lag= 0.0 min
Primary = 12.61 cfs @ 12.12 hrs, Volume= 42,638 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 164.45' @ 12.12 hrs
Flood Elev= 165.39'

Device	Routing	Invert	Outlet Devices
#1	Primary	161.50'	**18.0" Round Culvert** L= 92.0' Ke= 0.500 Inlet / Outlet Invert= 161.50' / 159.50' S= 0.0217 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf

Primary OutFlow Max=12.60 cfs @ 12.12 hrs HW=164.44' TW=161.53' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 12.60 cfs @ 7.13 fps)

Summary for Pond 20P: DMH

Inflow Area = 102,433 sf, 12.46% Impervious, Inflow Depth = 4.48" for NRCC 100YR 24H event
Inflow = 12.58 cfs @ 12.08 hrs, Volume= 38,221 cf
Outflow = 12.58 cfs @ 12.08 hrs, Volume= 38,221 cf, Atten= 0%, Lag= 0.0 min
Primary = 12.58 cfs @ 12.08 hrs, Volume= 38,221 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.87' @ 12.09 hrs
Flood Elev= 158.03'

Device	Routing	Invert	Outlet Devices
#1	Primary	152.00'	**24.0" Round Culvert** L= 56.0' Ke= 0.500 Inlet / Outlet Invert= 152.00' / 150.40' S= 0.0286 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=12.26 cfs @ 12.08 hrs HW=153.86' TW=153.05' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 12.26 cfs @ 5.25 fps)

Summary for Pond 21P: DMH

Inflow Area = 25,304 sf, 16.82% Impervious, Inflow Depth = 4.67" for NRCC 100YR 24H event
Inflow = 3.30 cfs @ 12.07 hrs, Volume= 9,857 cf
Outflow = 3.30 cfs @ 12.07 hrs, Volume= 9,857 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.30 cfs @ 12.07 hrs, Volume= 9,857 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 156.20' @ 12.07 hrs
Flood Elev= 157.94'

Device	Routing	Invert	Outlet Devices
#1	Primary	154.94'	**12.0" Round Culvert** L= 62.0' Ke= 0.500 Inlet / Outlet Invert= 154.94' / 152.40' S= 0.0410 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=3.29 cfs @ 12.07 hrs HW=156.20' TW=153.83' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.29 cfs @ 4.19 fps)

Summary for Pond 22P: DMH

Inflow Area = 77,129 sf, 11.04% Impervious, Inflow Depth = 4.41" for NRCC 100YR 24H event
Inflow = 9.29 cfs @ 12.08 hrs, Volume= 28,364 cf
Outflow = 9.29 cfs @ 12.08 hrs, Volume= 28,364 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.29 cfs @ 12.08 hrs, Volume= 28,364 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 157.44' @ 12.08 hrs
Flood Elev= 158.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	155.50'	**18.0" Round Culvert** L= 56.0' Ke= 0.500 Inlet / Outlet Invert= 155.50' / 155.00' S= 0.0089 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf

Primary OutFlow Max=9.27 cfs @ 12.08 hrs HW=157.44' TW=153.86' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 9.27 cfs @ 5.25 fps)

Summary for Pond 23P: OIL/WATER SEPARATOR

Inflow Area = 10,110 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 1.98 cfs @ 12.07 hrs, Volume= 6,858 cf
Outflow = 2.01 cfs @ 12.07 hrs, Volume= 6,858 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.01 cfs @ 12.07 hrs, Volume= 6,858 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.57' @ 12.09 hrs
Flood Elev= 159.18'

Device	Routing	Invert	Outlet Devices
#1	Primary	141.80'	**12.0" Round Culvert** L= 182.0' Ke= 0.500 Inlet / Outlet Invert= 141.80' / 140.10' S= 0.0093 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.86 cfs @ 12.07 hrs HW=153.49' TW=153.00' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 1.86 cfs @ 2.37 fps)

Summary for Pond 24P: DMH

Inflow Area = 10,110 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 1.98 cfs @ 12.07 hrs, Volume= 6,858 cf
Outflow = 1.98 cfs @ 12.07 hrs, Volume= 6,858 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.98 cfs @ 12.07 hrs, Volume= 6,858 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.81' @ 12.10 hrs
Flood Elev= 159.61'

Device	Routing	Invert	Outlet Devices
#1	Primary	150.20'	**12.0" Round Culvert** L= 1.0' Ke= 0.500

Inlet / Outlet Invert= 150.20' / 150.10' S= 0.1000 '/' Cc= 0.900
n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.40 cfs @ 12.07 hrs HW=153.63' TW=153.49' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.40 cfs @ 1.79 fps)

Summary for Pond 25P: 24" Petro-Barrier

Inflow Area = 1,770 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 0.35 cfs @ 12.07 hrs, Volume= 1,201 cf
Outflow = 0.35 cfs @ 12.07 hrs, Volume= 1,201 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.35 cfs @ 12.07 hrs, Volume= 1,201 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.98' @ 12.11 hrs
Flood Elev= 159.89'

Device	Routing	Invert	Outlet Devices
#1	Primary	150.89'	**6.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 150.89' / 150.30' S= 0.0102 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.22 cfs @ 12.07 hrs HW=153.71' TW=153.63' (Dynamic Tailwater)
└**1=Culvert** (Outlet Controls 0.22 cfs @ 1.11 fps)

Summary for Pond 26P: 24" Petro-Barrier

Inflow Area = 1,770 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 0.35 cfs @ 12.07 hrs, Volume= 1,201 cf
Outflow = 0.35 cfs @ 12.07 hrs, Volume= 1,201 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.35 cfs @ 12.07 hrs, Volume= 1,201 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.92' @ 12.11 hrs
Flood Elev= 161.98'

Device	Routing	Invert	Outlet Devices
#1	Primary	152.98'	**6.0" Round Culvert** L= 17.0' Ke= 0.500 Inlet / Outlet Invert= 152.98' / 152.00' S= 0.0576 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.10 cfs @ 12.07 hrs HW=153.64' TW=153.63' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 0.10 cfs @ 0.51 fps)

Summary for Pond 27P: DMH

Inflow Area = 6,570 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 1.29 cfs @ 12.07 hrs, Volume= 4,457 cf
Outflow = 1.29 cfs @ 12.07 hrs, Volume= 4,457 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.29 cfs @ 12.07 hrs, Volume= 4,457 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 154.61' @ 12.09 hrs
Flood Elev= 162.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	153.90'	**12.0" Round Culvert** L= 224.0' Ke= 0.500 Inlet / Outlet Invert= 153.90' / 152.00' S= 0.0085 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.21 cfs @ 12.07 hrs HW=154.57' TW=153.63' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.21 cfs @ 3.06 fps)

Summary for Pond 28P: DMH

Inflow Area = 6,570 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 1.29 cfs @ 12.07 hrs, Volume= 4,457 cf
Outflow = 1.29 cfs @ 12.07 hrs, Volume= 4,457 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.29 cfs @ 12.07 hrs, Volume= 4,457 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 155.04' @ 12.08 hrs
Flood Elev= 163.41'

Device	Routing	Invert	Outlet Devices
#1	Primary	154.40'	**12.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 154.40' / 154.00' S= 0.0080 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.24 cfs @ 12.07 hrs HW=155.04' TW=154.57' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.24 cfs @ 3.35 fps)

Summary for Pond 29P: 24" Petro-Barrier

Inflow Area = 1,770 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 0.35 cfs @ 12.07 hrs, Volume= 1,201 cf
Outflow = 0.35 cfs @ 12.07 hrs, Volume= 1,201 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.35 cfs @ 12.07 hrs, Volume= 1,201 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 155.34' @ 12.07 hrs
Flood Elev= 163.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	154.95'	**6.0" Round Culvert** L= 7.0' Ke= 0.500 Inlet / Outlet Invert= 154.95' / 154.50' S= 0.0643 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.35 cfs @ 12.07 hrs HW=155.34' TW=155.04' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.35 cfs @ 2.12 fps)

Summary for Pond 30P: DMH

Inflow Area = 4,800 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 0.94 cfs @ 12.07 hrs, Volume= 3,256 cf
Outflow = 0.94 cfs @ 12.07 hrs, Volume= 3,256 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.94 cfs @ 12.07 hrs, Volume= 3,256 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 160.90' @ 12.07 hrs
Flood Elev= 165.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	160.40'	**12.0" Round Culvert** L= 98.0' Ke= 0.500 Inlet / Outlet Invert= 160.40' / 159.50' S= 0.0092 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.94 cfs @ 12.07 hrs HW=160.90' TW=155.04' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.94 cfs @ 2.40 fps)

Summary for Pond 31P: DMH

Inflow Area = 4,800 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 0.94 cfs @ 12.07 hrs, Volume= 3,256 cf
Outflow = 0.94 cfs @ 12.07 hrs, Volume= 3,256 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.94 cfs @ 12.07 hrs, Volume= 3,256 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 162.41' @ 12.07 hrs
Flood Elev= 168.53'

Device	Routing	Invert	Outlet Devices
#1	Primary	161.90'	**12.0" Round Culvert** L= 232.0' Ke= 0.500 Inlet / Outlet Invert= 161.90' / 160.50' S= 0.0060 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.94 cfs @ 12.07 hrs HW=162.41' TW=160.90' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.94 cfs @ 3.43 fps)

Summary for Pond 32P: 24" Petro-Barrier

Inflow Area = 1,600 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 0.31 cfs @ 12.07 hrs, Volume= 1,085 cf
Outflow = 0.31 cfs @ 12.07 hrs, Volume= 1,085 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.31 cfs @ 12.07 hrs, Volume= 1,085 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 162.80' @ 12.07 hrs
Flood Elev= 170.69'

Device	Routing	Invert	Outlet Devices
#1	Primary	162.44'	**6.0" Round Culvert** L= 10.0' Ke= 0.500

Inlet / Outlet Invert= 162.44' / 162.20' S= 0.0240 '/' Cc= 0.900
n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.31 cfs @ 12.07 hrs HW=162.80' TW=162.41' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.31 cfs @ 2.05 fps)

Summary for Pond 33P: DMH

Inflow Area = 3,200 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 0.63 cfs @ 12.07 hrs, Volume= 2,171 cf
Outflow = 0.63 cfs @ 12.07 hrs, Volume= 2,171 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.63 cfs @ 12.07 hrs, Volume= 2,171 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 163.60' @ 12.07 hrs
Flood Elev= 170.43'

Device	Routing	Invert	Outlet Devices
#1	Primary	163.20'	**12.0" Round Culvert** L= 159.0' Ke= 0.500 Inlet / Outlet Invert= 163.20' / 162.00' S= 0.0075 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.63 cfs @ 12.07 hrs HW=163.60' TW=162.41' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.63 cfs @ 2.15 fps)

Summary for Pond 34P: 24" Petro-Barrier

Inflow Area = 1,600 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 0.31 cfs @ 12.07 hrs, Volume= 1,085 cf
Outflow = 0.31 cfs @ 12.07 hrs, Volume= 1,085 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.31 cfs @ 12.07 hrs, Volume= 1,085 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 163.81' @ 12.07 hrs
Flood Elev= 171.68'

Device	Routing	Invert	Outlet Devices
#1	Primary	163.43'	**6.0" Round Culvert** L= 8.0' Ke= 0.500 Inlet / Outlet Invert= 163.43' / 163.30' S= 0.0162 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.31 cfs @ 12.07 hrs HW=163.81' TW=163.60' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.31 cfs @ 2.71 fps)

Summary for Pond 35P: 24" Petro-Barrier

Inflow Area = 1,600 sf,100.00% Impervious, Inflow Depth = 8.14" for NRCC 100YR 24H event
Inflow = 0.31 cfs @ 12.07 hrs, Volume= 1,085 cf
Outflow = 0.31 cfs @ 12.07 hrs, Volume= 1,085 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.31 cfs @ 12.07 hrs, Volume= 1,085 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 164.75' @ 12.07 hrs
Flood Elev= 172.64'

Device	Routing	Invert	Outlet Devices
#1	Primary	164.39'	**6.0" Round Culvert** L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 164.39' / 164.00' S= 0.0103 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.31 cfs @ 12.07 hrs HW=164.75' TW=163.60' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.31 cfs @ 2.05 fps)

Summary for Pond 40P: DMH

Inflow Area = 105,170 sf, 0.00% Impervious, Inflow Depth = 2.76" for NRCC 100YR 24H event
Inflow = 6.02 cfs @ 12.13 hrs, Volume= 24,192 cf
Outflow = 6.02 cfs @ 12.13 hrs, Volume= 24,192 cf, Atten= 0%, Lag= 0.0 min
Primary = 6.02 cfs @ 12.13 hrs, Volume= 24,192 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.13' @ 12.14 hrs
Flood Elev= 160.03'

Device	Routing	Invert	Outlet Devices
#1	Primary	158.00'	**24.0" W x 12.0" H Box Culvert** L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.00' / 157.70' S= 0.0300 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 2.00 sf

Primary OutFlow Max=5.96 cfs @ 12.13 hrs HW=159.12' TW=158.68' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 5.96 cfs @ 2.98 fps)

Summary for Pond 41P: CULVERT

Inflow Area = 87,839 sf, 0.00% Impervious, Inflow Depth = 2.17" for NRCC 100YR 24H event
Inflow = 4.06 cfs @ 12.16 hrs, Volume= 15,897 cf
Outflow = 4.06 cfs @ 12.16 hrs, Volume= 15,897 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.06 cfs @ 12.16 hrs, Volume= 15,897 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.74' @ 12.16 hrs
Flood Elev= 161.08'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.00'	**24.0" W x 12.0" H Box Culvert** L= 55.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.00' / 158.00' S= 0.0182 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 2.00 sf

Primary OutFlow Max=4.07 cfs @ 12.16 hrs HW=159.74' TW=159.11' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.07 cfs @ 2.74 fps)

Summary for Link 1L: OVERFLOW

Inflow Area = 782,870 sf, 7.42% Impervious, Inflow Depth = 0.02" for NRCC 100YR 24H event
Inflow = 0.33 cfs @ 15.79 hrs, Volume= 1,037 cf
Primary = 0.33 cfs @ 15.79 hrs, Volume= 1,037 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link 10L: OFF-SITE

Inflow Area = 258,650 sf, 0.00% Impervious, Inflow Depth = 0.67" for NRCC 100YR 24H event
Inflow = 1.69 cfs @ 12.31 hrs, Volume= 14,486 cf
Primary = 1.69 cfs @ 12.31 hrs, Volume= 14,486 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: AREA OUTSIDE Runoff Area=258,650 sf 0.00% Impervious Runoff Depth=0.02"
Tc=5.0 min CN=32 Runoff=0.01 cfs 332 cf

Subcatchment 2S: AREA OUTSIDE Runoff Area=285,632 sf 0.00% Impervious Runoff Depth=0.01"
Flow Length=491' Tc=12.3 min CN=31 Runoff=0.01 cfs 151 cf

Subcatchment 3S: S SWALE 1 Runoff Area=21,901 sf 0.00% Impervious Runoff Depth=0.96"
Flow Length=378' Slope=0.0200 '/' Tc=6.2 min CN=56 Runoff=0.45 cfs 1,743 cf

Subcatchment 4S: S SWALE 2 Runoff Area=37,407 sf 0.00% Impervious Runoff Depth=0.23"
Tc=5.0 min CN=41 Runoff=0.05 cfs 727 cf

Subcatchment 5S: S SWALE 3 Runoff Area=28,531 sf 0.00% Impervious Runoff Depth=0.53"
Flow Length=644' Slope=0.0200 '/' Tc=9.3 min CN=48 Runoff=0.17 cfs 1,250 cf

Subcatchment 6S: ACCESS RAMP Runoff Area=17,331 sf 0.00% Impervious Runoff Depth=2.57"
Tc=5.0 min CN=78 Runoff=1.24 cfs 3,709 cf

Subcatchment 7S: S SWALE 4 Runoff Area=20,291 sf 0.00% Impervious Runoff Depth=1.40"
Flow Length=644' Slope=0.0200 '/' Tc=9.3 min CN=63 Runoff=0.63 cfs 2,371 cf

Subcatchment 8S: N SWALE 1 Runoff Area=15,778 sf 0.00% Impervious Runoff Depth=2.75"
Flow Length=378' Slope=0.0200 '/' Tc=6.2 min CN=80 Runoff=1.16 cfs 3,609 cf

Subcatchment 9S: N SWALE 2 Runoff Area=14,101 sf 0.00% Impervious Runoff Depth=3.02"
Flow Length=378' Slope=0.0200 '/' Tc=6.2 min CN=83 Runoff=1.13 cfs 3,550 cf

Subcatchment 10S: N SWALE 3 Runoff Area=12,739 sf 0.00% Impervious Runoff Depth=3.02"
Flow Length=378' Slope=0.0200 '/' Tc=6.2 min CN=83 Runoff=1.03 cfs 3,207 cf

Subcatchment 11S: NW PERF. DRAIN Runoff Area=45,853 sf 0.00% Impervious Runoff Depth=1.40"
Flow Length=660' Slope=0.0200 '/' Tc=6.0 min CN=63 Runoff=1.60 cfs 5,358 cf

Subcatchment 12S: CENTRAL PERF. DRAIN Runoff Area=6,658 sf 0.00% Impervious Runoff Depth=1.40"
Tc=5.0 min CN=63 Runoff=0.24 cfs 778 cf

Subcatchment 13S: GIS BUILDINGS Runoff Area=21,900 sf 100.00% Impervious Runoff Depth=4.59"
Tc=5.0 min CN=98 Runoff=2.46 cfs 8,383 cf

Subcatchment 14S: GIS BLDGS PERF Runoff Area=74,801 sf 0.00% Impervious Runoff Depth=1.40"
Flow Length=570' Slope=0.0200 '/' Tc=8.4 min CN=63 Runoff=2.39 cfs 8,741 cf

Subcatchment 15S: CENTRAL PERF. DRAIN Runoff Area=54,087 sf 0.00% Impervious Runoff Depth=1.40"
Flow Length=570' Slope=0.0200 '/' Tc=8.4 min CN=63 Runoff=1.73 cfs 6,321 cf

Subcatchment 16S: N PERF. DRAIN Runoff Area=35,583 sf 0.57% Impervious Runoff Depth=1.40"
Tc=5.0 min CN=63 Runoff=1.29 cfs 4,158 cf

Subcatchment 17S: SE PERF. DRAIN 1 Runoff Area=41,546 sf 20.00% Impervious Runoff Depth=1.91"
Flow Length=425' Slope=0.0200 '/' Tc=5.9 min CN=70 Runoff=2.10 cfs 6,617 cf

Subcatchment 18S: SE PERF. DRAIN 2 Runoff Area=25,304 sf 16.82% Impervious Runoff Depth=1.83"
Tc=5.0 min CN=69 Runoff=1.26 cfs 3,869 cf

Subcatchment 20S: SR4 Runoff Area=1,745 sf 100.00% Impervious Runoff Depth=4.59"
Tc=5.0 min CN=98 Runoff=0.20 cfs 668 cf

Subcatchment 21S: XFMR 1 Runoff Area=2,694 sf 100.00% Impervious Runoff Depth=4.59"
Tc=5.0 min CN=98 Runoff=0.30 cfs 1,031 cf

Subcatchment 22S: SR5 Runoff Area=1,745 sf 100.00% Impervious Runoff Depth=4.59"
Tc=5.0 min CN=98 Runoff=0.20 cfs 668 cf

Subcatchment 23S: XFMR 2 Runoff Area=2,694 sf 100.00% Impervious Runoff Depth=4.59"
Tc=5.0 min CN=98 Runoff=0.30 cfs 1,031 cf

Subcatchment 24S: XFMR 3 Runoff Area=2,694 sf 100.00% Impervious Runoff Depth=4.59"
Tc=5.0 min CN=98 Runoff=0.30 cfs 1,031 cf

Subcatchment 25S: SR6 Runoff Area=1,745 sf 100.00% Impervious Runoff Depth=4.59"
Tc=5.0 min CN=98 Runoff=0.20 cfs 668 cf

Subcatchment 26S: SR1 Runoff Area=1,600 sf 100.00% Impervious Runoff Depth=4.59"
Tc=5.0 min CN=98 Runoff=0.18 cfs 612 cf

Subcatchment 27S: SR2 Runoff Area=1,600 sf 100.00% Impervious Runoff Depth=4.59"
Tc=5.0 min CN=98 Runoff=0.18 cfs 612 cf

Subcatchment 28S: SR3 Runoff Area=1,600 sf 100.00% Impervious Runoff Depth=4.59"
Tc=5.0 min CN=98 Runoff=0.18 cfs 612 cf

Subcatchment 29S: STATCOM 1 Runoff Area=1,770 sf 100.00% Impervious Runoff Depth=4.59"
Tc=5.0 min CN=98 Runoff=0.20 cfs 678 cf

Subcatchment 30S: STATCOM 2 Runoff Area=1,770 sf 100.00% Impervious Runoff Depth=4.59"
Tc=5.0 min CN=98 Runoff=0.20 cfs 678 cf

Subcatchment 31S: STATCOM 3 Runoff Area=1,770 sf 100.00% Impervious Runoff Depth=4.59"
Tc=5.0 min CN=98 Runoff=0.20 cfs 678 cf

Reach 1R: S SWALE PART 1 Avg. Flow Depth=0.29' Max Vel=1.56 fps Inflow=0.45 cfs 1,743 cf
n=0.030 L=309.0' S=0.0137 '/' Capacity=10.56 cfs Outflow=0.40 cfs 1,743 cf

Reach 2R: S SWALE PART 2 Avg. Flow Depth=0.27' Max Vel=1.76 fps Inflow=0.40 cfs 2,470 cf
n=0.030 L=257.3' S=0.0195 '/' Capacity=12.62 cfs Outflow=0.38 cfs 2,470 cf

Reach 3R: S SWALE PART 3 Avg. Flow Depth=0.32' Max Vel=1.69 fps Inflow=0.55 cfs 3,720 cf
n=0.030 L=329.0' S=0.0142 '/' Capacity=10.77 cfs Outflow=0.53 cfs 3,720 cf

Reach 4R: S SWALE PART 4 Avg. Flow Depth=0.58' Max Vel=1.79 fps Inflow=1.91 cfs 9,800 cf
n=0.030 L=367.8' S=0.0073 '/' Capacity=9.98 cfs Outflow=1.80 cfs 9,800 cf

Reach 5R: DRAINAGE CHANNEL Avg. Flow Depth=0.21' Max Vel=3.65 fps Inflow=15.16 cfs 57,843 cf
n=0.078 L=175.0' S=0.3086 '/' Capacity=198.63 cfs Outflow=15.05 cfs 57,843 cf

Reach 11R: N SWALE PART 1 Avg. Flow Depth=0.41' Max Vel=2.06 fps Inflow=1.16 cfs 3,609 cf
n=0.030 L=447.0' S=0.0153 '/' Capacity=11.19 cfs Outflow=1.04 cfs 3,609 cf

Reach 12R: N SWALE PART 2 Avg. Flow Depth=0.53' Max Vel=2.32 fps Inflow=2.12 cfs 7,159 cf
n=0.030 L=431.0' S=0.0137 '/' Capacity=10.59 cfs Outflow=1.97 cfs 7,159 cf

Reach 13R: N SWALE PART 3 Avg. Flow Depth=0.61' Max Vel=2.47 fps Inflow=2.88 cfs 10,366 cf
n=0.030 L=386.0' S=0.0131 '/' Capacity=10.33 cfs Outflow=2.75 cfs 10,366 cf

Pond 1P: DETENTION AREA - LOCALIZED Peak Elev=87.70' Storage=32,038 cf Inflow=15.05 cfs 57,994 cf
Discarded=0.90 cfs 57,994 cf Primary=0.00 cfs 0 cf Outflow=0.90 cfs 57,994 cf

Pond 2P: SEDIMENT FOREBAY Peak Elev=150.06' Storage=8,963 cf Inflow=4.55 cfs 20,165 cf
Discarded=0.14 cfs 15,515 cf Primary=0.68 cfs 4,651 cf Outflow=0.82 cfs 20,166 cf

Pond 3P: DMHs w/ Vortex Unit Peak Elev=149.52' Inflow=15.16 cfs 53,192 cf
36.0" Round Culvert n=0.011 L=25.0' S=0.1200 '/' Outflow=15.16 cfs 53,192 cf

Pond 4P: DMH Peak Elev=151.82' Inflow=15.16 cfs 53,192 cf
36.0" Round Culvert n=0.011 L=36.0' S=0.0639 '/' Outflow=15.16 cfs 53,192 cf

Pond 5P: DMH Peak Elev=156.80' Inflow=9.41 cfs 34,679 cf
24.0" Round Culvert n=0.011 L=263.0' S=0.0186 '/' Outflow=9.41 cfs 34,679 cf

Pond 6P: OIL/WATER SEPARATOR Peak Elev=156.85' Inflow=1.50 cfs 5,098 cf
24.0" Round Culvert n=0.012 L=27.0' S=0.0148 '/' Outflow=1.50 cfs 5,098 cf

Pond 7P: DMH Peak Elev=157.17' Inflow=1.50 cfs 5,098 cf
12.0" Round Culvert n=0.011 L=40.0' S=0.0100 '/' Outflow=1.50 cfs 5,098 cf

Pond 8P: DMH Peak Elev=158.05' Inflow=1.00 cfs 3,398 cf
12.0" Round Culvert n=0.011 L=154.0' S=0.0065 '/' Outflow=1.00 cfs 3,398 cf

Pond 9P: DMH Peak Elev=159.65' Inflow=0.50 cfs 1,699 cf
12.0" Round Culvert n=0.011 L=141.0' S=0.0092 '/' Outflow=0.50 cfs 1,699 cf

Pond 10P: 24" Petro-Barrier Peak Elev=162.70' Inflow=0.20 cfs 668 cf
6.0" Round Culvert n=0.010 L=30.0' S=0.0143 '/' Outflow=0.20 cfs 668 cf

Pond 11P: 24" Petro-Barrier Peak Elev=159.98' Inflow=0.30 cfs 1,031 cf
6.0" Round Culvert n=0.010 L=18.0' S=0.0122 '/' Outflow=0.30 cfs 1,031 cf

Pond 12P: 24" Petro-Barrier Peak Elev=160.97' Inflow=0.20 cfs 668 cf
6.0" Round Culvert n=0.010 L=32.0' S=0.0094 '/' Outflow=0.20 cfs 668 cf

Pond 13P: 24" Petro-Barrier Peak Elev=158.25' Inflow=0.30 cfs 1,031 cf
6.0" Round Culvert n=0.010 L=20.0' S=0.0115 '/' Outflow=0.30 cfs 1,031 cf

Pond 14P: 24" Petro-Barrier Peak Elev=157.32' Inflow=0.30 cfs 1,031 cf
6.0" Round Culvert n=0.010 L=21.0' S=0.0133 '/' Outflow=0.30 cfs 1,031 cf

Pond 15P: 24" Petro-Barrier Peak Elev=157.94' Inflow=0.20 cfs 668 cf
6.0" Round Culvert n=0.010 L=34.0' S=0.0076 '/' Outflow=0.20 cfs 668 cf

Pond 16P: DMH Peak Elev=159.74' Inflow=1.84 cfs 6,136 cf
12.0" Round Culvert n=0.011 L=17.0' S=0.0294 '/' Outflow=1.84 cfs 6,136 cf

Pond 17P: DMH Peak Elev=160.49' Inflow=6.20 cfs 23,445 cf
24.0" Round Culvert n=0.011 L=88.2' S=0.0442 '/' Outflow=6.20 cfs 23,445 cf

Pond 18P: DMH Peak Elev=162.48' Inflow=4.12 cfs 15,062 cf
18.0" Round Culvert n=0.011 L=92.0' S=0.0217 '/' Outflow=4.12 cfs 15,062 cf

Pond 20P: DMH Peak Elev=152.92' Inflow=4.64 cfs 14,644 cf
24.0" Round Culvert n=0.011 L=56.0' S=0.0286 '/' Outflow=4.64 cfs 14,644 cf

Pond 21P: DMH Peak Elev=155.53' Inflow=1.26 cfs 3,869 cf
12.0" Round Culvert n=0.011 L=62.0' S=0.0410 '/' Outflow=1.26 cfs 3,869 cf

Pond 22P: DMH Peak Elev=156.39' Inflow=3.38 cfs 10,775 cf
18.0" Round Culvert n=0.011 L=56.0' S=0.0089 '/' Outflow=3.38 cfs 10,775 cf

Pond 23P: OIL/WATER SEPARATOR Peak Elev=152.00' Inflow=1.14 cfs 3,870 cf
12.0" Round Culvert n=0.011 L=182.0' S=0.0093 '/' Outflow=1.18 cfs 3,869 cf

Pond 24P: DMH Peak Elev=152.07' Inflow=1.14 cfs 3,870 cf
12.0" Round Culvert n=0.011 L=1.0' S=0.1000 '/' Outflow=1.14 cfs 3,870 cf

Pond 25P: 24" Petro-Barrier Peak Elev=152.13' Inflow=0.20 cfs 678 cf
6.0" Round Culvert n=0.010 L=58.0' S=0.0102 '/' Outflow=0.20 cfs 678 cf

Pond 26P: 24" Petro-Barrier Peak Elev=153.26' Inflow=0.20 cfs 678 cf
6.0" Round Culvert n=0.010 L=17.0' S=0.0576 '/' Outflow=0.20 cfs 678 cf

Pond 27P: DMH Peak Elev=154.34' Inflow=0.74 cfs 2,515 cf
12.0" Round Culvert n=0.011 L=224.0' S=0.0085 '/' Outflow=0.74 cfs 2,515 cf

Pond 28P: DMH Peak Elev=154.84' Inflow=0.74 cfs 2,515 cf
12.0" Round Culvert n=0.011 L=50.0' S=0.0080 '/' Outflow=0.74 cfs 2,515 cf

Pond 29P: 24" Petro-Barrier Peak Elev=155.23' Inflow=0.20 cfs 678 cf
6.0" Round Culvert n=0.010 L=7.0' S=0.0643 '/' Outflow=0.20 cfs 678 cf

Pond 30P: DMH Peak Elev=160.77' Inflow=0.54 cfs 1,837 cf
12.0" Round Culvert n=0.011 L=98.0' S=0.0092 '/' Outflow=0.54 cfs 1,837 cf

Pond 31P: DMH Peak Elev=162.27' Inflow=0.54 cfs 1,837 cf
12.0" Round Culvert n=0.011 L=232.0' S=0.0060 '/' Outflow=0.54 cfs 1,837 cf

Pond 32P: 24" Petro-Barrier Peak Elev=162.70' Inflow=0.18 cfs 612 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.0240 '/' Outflow=0.18 cfs 612 cf

Pond 33P: DMH Peak Elev=163.50' Inflow=0.36 cfs 1,225 cf
12.0" Round Culvert n=0.011 L=159.0' S=0.0075 '/' Outflow=0.36 cfs 1,225 cf

Pond 34P: 24" Petro-Barrier Peak Elev=163.69' Inflow=0.18 cfs 612 cf
6.0" Round Culvert n=0.010 L=8.0' S=0.0162 '/' Outflow=0.18 cfs 612 cf

Pond 35P: 24" Petro-Barrier Peak Elev=164.65' Inflow=0.18 cfs 612 cf
6.0" Round Culvert n=0.010 L=38.0' S=0.0103 '/' Outflow=0.18 cfs 612 cf

Pond 40P: DMH Peak Elev=158.40' Inflow=1.35 cfs 7,429 cf
24.0" x 12.0" Box Culvert n=0.011 L=10.0' S=0.0300 '/' Outflow=1.35 cfs 7,429 cf

Pond 41P: CULVERT Peak Elev=159.19' Inflow=0.53 cfs 3,720 cf
24.0" x 12.0" Box Culvert n=0.011 L=55.0' S=0.0182 '/' Outflow=0.53 cfs 3,720 cf

Link 1L: OVERFLOW Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 10L: OFF-SITE Inflow=0.01 cfs 332 cf
Primary=0.01 cfs 332 cf

Total Runoff Area = 1,041,520 sf Runoff Volume = 73,841 cf Average Runoff Depth = 0.85"
94.42% Pervious = 983,426 sf 5.58% Impervious = 58,094 sf

Summary for Subcatchment 1S: AREA OUTSIDE SUBSTATION - NOT TO POND

Runoff = 0.01 cfs @ 22.05 hrs, Volume= 332 cf, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
179,269	30	Woods, Good, HSG A
72,994	30	Meadow, non-grazed, HSG A
6,387	96	Gravel surface, HSG A
258,650	32	Weighted Average
258,650		100.00% Pervious Area

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

Summary for Subcatchment 2S: AREA OUTSIDE SUBSTATION - TO POND

Runoff = 0.01 cfs @ 23.63 hrs, Volume= 151 cf, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
206,991	30	Woods, Good, HSG A
72,294	30	Meadow, non-grazed, HSG A
6,347	96	Gravel surface, HSG A
285,632	31	Weighted Average
285,632		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.5000	0.25		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.29"
8.9	441	0.1100	0.83		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
12.3	491	Total			

Summary for Subcatchment 3S: S SWALE 1

Runoff = 0.45 cfs @ 12.11 hrs, Volume= 1,743 cf, Depth= 0.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

	Area (sf)	CN	Description
*	3,599	63	Crushed Stone Surface, HSG A
	6,746	96	Gravel surface, HSG A
	7,202	30	Woods, Good, HSG A
	4,354	30	Meadow, non-grazed, HSG A
	21,901	56	Weighted Average
	21,901		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.9	328	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
6.2	378	Total			

Summary for Subcatchment 4S: S SWALE 2

Runoff = 0.05 cfs @ 12.42 hrs, Volume= 727 cf, Depth= 0.23"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

	Area (sf)	CN	Description
	5,160	96	Gravel surface, HSG A
*	2,578	63	Crushed Stone Surface, HSG A
	20,025	30	Woods, Good, HSG A
	9,644	30	Meadow, non-grazed, HSG A
	37,407	41	Weighted Average
	37,407		100.00% Pervious Area

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

Summary for Subcatchment 5S: S SWALE 3

Runoff = 0.17 cfs @ 12.27 hrs, Volume= 1,250 cf, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

	Area (sf)	CN	Description
*	3,335	63	Crushed Stone Surface, HSG A
	7,061	30	Woods, Good, HSG A
	6,315	96	Gravel surface, HSG A
	11,820	30	Meadow, non-grazed, HSG A
	28,531	48	Weighted Average
	28,531		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
7.0	594	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
9.3	644	Total			

Summary for Subcatchment 6S: ACCESS RAMP

Runoff = 1.24 cfs @ 12.08 hrs, Volume= 3,709 cf, Depth= 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
12,617	96	Gravel surface, HSG A
1,094	30	Woods, Good, HSG A
3,620	30	Meadow, non-grazed, HSG A
17,331	78	Weighted Average
17,331		100.00% Pervious Area

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

Summary for Subcatchment 7S: S SWALE 4

Runoff = 0.63 cfs @ 12.14 hrs, Volume= 2,371 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

	Area (sf)	CN	Description
*	6,230	63	Crushed Stone Surface, HSG A
	7,051	96	Gravel surface, HSG A
	7,010	30	Meadow, non-grazed, HSG A
	20,291	63	Weighted Average
	20,291		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
7.0	594	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
9.3	644	Total			

Summary for Subcatchment 8S: N SWALE 1

Runoff = 1.16 cfs @ 12.09 hrs, Volume= 3,609 cf, Depth= 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

	Area (sf)	CN	Description
*	4,949	63	Crushed Stone Surface, HSG A
	9,543	96	Gravel surface, HSG A
	1,286	30	Meadow, non-grazed, HSG A
	15,778	80	Weighted Average
	15,778		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.9	328	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
6.2	378	Total			

Summary for Subcatchment 9S: N SWALE 2

Runoff = 1.13 cfs @ 12.09 hrs, Volume= 3,550 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

	Area (sf)	CN	Description
*	5,475	63	Crushed Stone Surface, HSG A
	8,626	96	Gravel surface, HSG A
	14,101	83	Weighted Average
	14,101		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.9	328	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
6.2	378	Total			

Summary for Subcatchment 10S: N SWALE 3

Runoff = 1.03 cfs @ 12.09 hrs, Volume= 3,207 cf, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

	Area (sf)	CN	Description
*	4,958	63	Crushed Stone Surface, HSG A
	7,781	96	Gravel surface, HSG A
	12,739	83	Weighted Average
	12,739		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.9	328	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
6.2	378	Total			

Summary for Subcatchment 11S: NW PERF. DRAIN

Runoff = 1.60 cfs @ 12.10 hrs, Volume= 5,358 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

	Area (sf)	CN	Description
*	45,853	63	Crushed Stone Surface, HSG A
	45,853		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.0	255	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
0.7	355	0.0200	8.34	6.55	**Pipe Channel, Perf Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
6.0	660	Total			

Summary for Subcatchment 12S: CENTRAL PERF. DRAIN 2

Runoff = 0.24 cfs @ 12.08 hrs, Volume= 778 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

	Area (sf)	CN	Description
*	6,658	63	Crushed Stone Surface, HSG A
	6,658		100.00% Pervious Area

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

Summary for Subcatchment 13S: GIS BUILDINGS

Runoff = 2.46 cfs @ 12.07 hrs, Volume= 8,383 cf, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

	Area (sf)	CN	Description
	21,900	98	Roofs, HSG A
	21,900		100.00% Impervious Area

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

Summary for Subcatchment 14S: GIS BLDGS PERF DRAIN

Runoff = 2.39 cfs @ 12.13 hrs, Volume= 8,741 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

	Area (sf)	CN	Description
*	74,801	63	Crushed Stone Surface, HSG A
	74,801		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
6.1	520	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
8.4	570	Total			

Summary for Subcatchment 15S: CENTRAL PERF. DRAIN 1

Runoff = 1.73 cfs @ 12.13 hrs, Volume= 6,321 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

	Area (sf)	CN	Description
*	54,087	63	Crushed Stone Surface, HSG A
	54,087		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
6.1	520	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
8.4	570	Total			

Summary for Subcatchment 16S: N PERF. DRAIN

Runoff = 1.29 cfs @ 12.08 hrs, Volume= 4,158 cf, Depth= 1.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

	Area (sf)	CN	Description
*	35,381	63	Crushed Stone Surface, HSG A
	202	98	Roofs, HSG A
	35,583	63	Weighted Average
	35,381		99.43% Pervious Area
	202		0.57% Impervious Area

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

Summary for Subcatchment 17S: SE PERF. DRAIN 1

Runoff = 2.10 cfs @ 12.09 hrs, Volume= 6,617 cf, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

	Area (sf)	CN	Description
	8,310	98	Roofs, HSG A
*	33,236	63	Crushed Stone Surface, HSG A
	41,546	70	Weighted Average
	33,236		80.00% Pervious Area
	8,310		20.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.5	300	0.0200	1.41		**Shallow Concentrated Flow, Shallow** Nearly Bare & Untilled Kv= 10.0 fps
0.1	75	0.0200	8.34	6.55	**Pipe Channel, Perf. Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
5.9	425	Total			

Summary for Subcatchment 18S: SE PERF. DRAIN 2

Runoff = 1.26 cfs @ 12.08 hrs, Volume= 3,869 cf, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

	Area (sf)	CN	Description
	4,255	98	Roofs, HSG A
*	21,049	63	Crushed Stone Surface, HSG A
	25,304	69	Weighted Average
	21,049		83.18% Pervious Area
	4,255		16.82% Impervious Area

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

Summary for Subcatchment 20S: SR4

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 668 cf, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
1,745	98	Concrete Containment
1,745		100.00% Impervious Area

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

Summary for Subcatchment 21S: XFMR 1

Runoff = 0.30 cfs @ 12.07 hrs, Volume= 1,031 cf, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
2,694	98	Concrete Containment
2,694		100.00% Impervious Area

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

Summary for Subcatchment 22S: SR5

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 668 cf, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
1,745	98	Concrete Containment
1,745		100.00% Impervious Area

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

Summary for Subcatchment 23S: XFMR 2

Runoff = 0.30 cfs @ 12.07 hrs, Volume= 1,031 cf, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
2,694	98	Concrete Containment
2,694		100.00% Impervious Area

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

Summary for Subcatchment 24S: XFMR 3

Runoff = 0.30 cfs @ 12.07 hrs, Volume= 1,031 cf, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
2,694	98	Concrete Containment
2,694		100.00% Impervious Area

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

Summary for Subcatchment 25S: SR6

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 668 cf, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
1,745	98	Concrete Containment
1,745		100.00% Impervious Area

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

Summary for Subcatchment 26S: SR1

Runoff = 0.18 cfs @ 12.07 hrs, Volume= 612 cf, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
1,600	98	Concrete Containment
1,600		100.00% Impervious Area

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

Summary for Subcatchment 27S: SR2

Runoff = 0.18 cfs @ 12.07 hrs, Volume= 612 cf, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
1,600	98	Concrete Containment
1,600		100.00% Impervious Area

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

Summary for Subcatchment 28S: SR3

Runoff = 0.18 cfs @ 12.07 hrs, Volume= 612 cf, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
1,600	98	Concrete Containment
1,600		100.00% Impervious Area

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

Summary for Subcatchment 29S: STATCOM 1 TRANSFORMER

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 678 cf, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
1,770	98	Concrete Containment
1,770		100.00% Impervious Area

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

Summary for Subcatchment 30S: STATCOM 2 TRANSFORMER

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 678 cf, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
1,770	98	Concrete Containment
1,770		100.00% Impervious Area

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

Summary for Subcatchment 31S: STATCOM 3 TRANSFORMER

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 678 cf, Depth= 4.59"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 10YR 24H Rainfall=4.83"

Area (sf)	CN	Description
1,770	98	Concrete Containment
1,770		100.00% Impervious Area

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

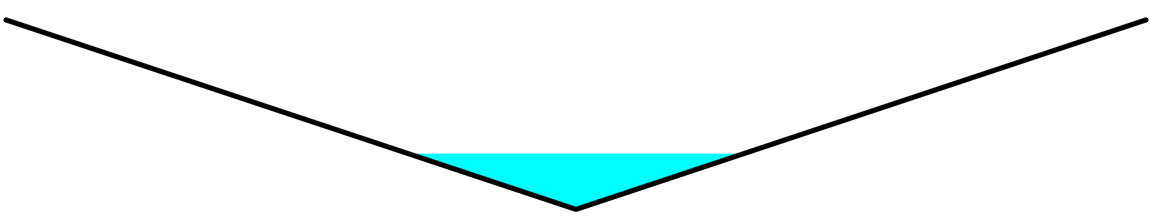
Summary for Reach 1R: S SWALE PART 1

Inflow Area = 21,901 sf, 0.00% Impervious, Inflow Depth = 0.96" for NRCC 10YR 24H event
Inflow = 0.45 cfs @ 12.11 hrs, Volume= 1,743 cf
Outflow = 0.40 cfs @ 12.15 hrs, Volume= 1,743 cf, Atten= 10%, Lag= 2.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.56 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 0.73 fps, Avg. Travel Time= 7.1 min

Peak Storage= 80 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.29'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 38.49 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 10.56 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 309.0' Slope= 0.0137 '/'
Inlet Invert= 174.13', Outlet Invert= 169.91'



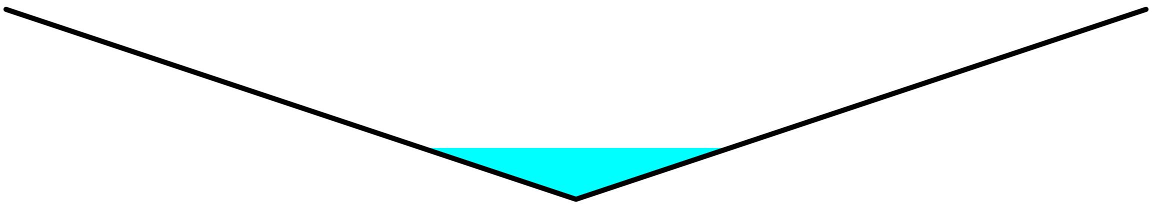
Summary for Reach 2R: S SWALE PART 2

Inflow Area = 59,308 sf, 0.00% Impervious, Inflow Depth = 0.50" for NRCC 10YR 24H event
Inflow = 0.40 cfs @ 12.15 hrs, Volume= 2,470 cf
Outflow = 0.38 cfs @ 12.19 hrs, Volume= 2,470 cf, Atten= 5%, Lag= 2.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.76 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 0.92 fps, Avg. Travel Time= 4.7 min

Peak Storage= 56 cf @ 12.19 hrs
Average Depth at Peak Storage= 0.27'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 46.01 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 12.62 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 257.3' Slope= 0.0195 '/'
Inlet Invert= 169.90', Outlet Invert= 164.88'



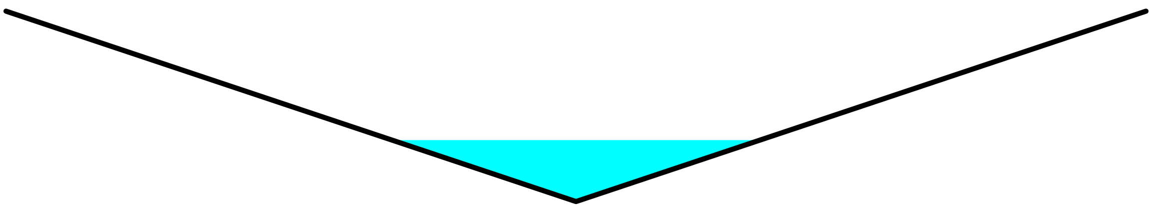
Summary for Reach 3R: S SWALE PART 3

Inflow Area = 87,839 sf, 0.00% Impervious, Inflow Depth = 0.51" for NRCC 10YR 24H event
Inflow = 0.55 cfs @ 12.20 hrs, Volume= 3,720 cf
Outflow = 0.53 cfs @ 12.27 hrs, Volume= 3,720 cf, Atten= 5%, Lag= 4.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.69 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 0.87 fps, Avg. Travel Time= 6.3 min

Peak Storage= 103 cf @ 12.27 hrs
Average Depth at Peak Storage= 0.32'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 39.24 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 10.77 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 329.0' Slope= 0.0142 '/'
Inlet Invert= 164.80', Outlet Invert= 160.13'



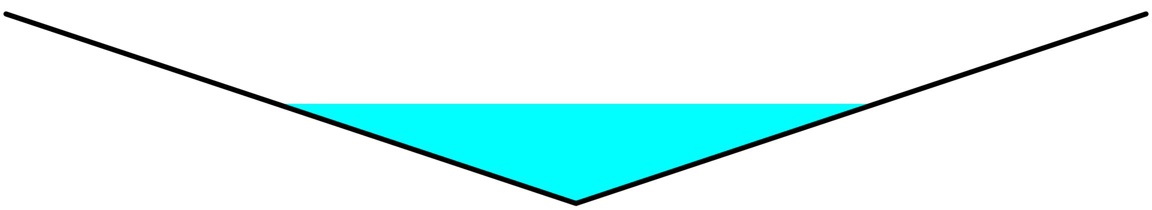
Summary for Reach 4R: S SWALE PART 4

Inflow Area = 125,461 sf, 0.00% Impervious, Inflow Depth = 0.94" for NRCC 10YR 24H event
Inflow = 1.91 cfs @ 12.11 hrs, Volume= 9,800 cf
Outflow = 1.80 cfs @ 12.16 hrs, Volume= 9,800 cf, Atten= 6%, Lag= 3.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.79 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 0.74 fps, Avg. Travel Time= 8.3 min

Peak Storage= 369 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.58'
Defined Flood Depth= 2.00' Flow Area= 9.5 sf, Capacity= 31.59 cfs
Bank-Full Depth= 1.10' Flow Area= 3.6 sf, Capacity= 9.98 cfs

0.00' x 1.10' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.60'
Length= 367.8' Slope= 0.0073 '/'
Inlet Invert= 157.70', Outlet Invert= 155.00'



Summary for Reach 5R: DRAINAGE CHANNEL

Inflow Area = 497,238 sf, 11.68% Impervious, Inflow Depth = 1.40" for NRCC 10YR 24H event
Inflow = 15.16 cfs @ 12.09 hrs, Volume= 57,843 cf
Outflow = 15.05 cfs @ 12.10 hrs, Volume= 57,843 cf, Atten= 1%, Lag= 0.5 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.65 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.87 fps, Avg. Travel Time= 3.4 min

Peak Storage= 722 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.21'
Defined Flood Depth= 1.00' Flow Area= 20.0 sf, Capacity= 198.63 cfs
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 198.63 cfs

20.00' x 1.00' deep channel, n= 0.078 Riprap, 12-inch
Length= 175.0' Slope= 0.3086 '/'
Inlet Invert= 145.00', Outlet Invert= 91.00'

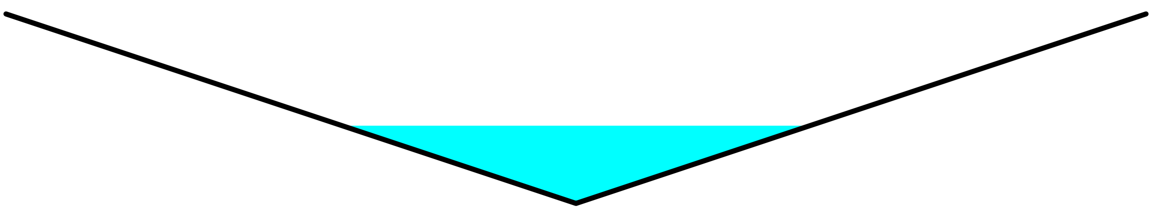
Summary for Reach 11R: N SWALE PART 1

Inflow Area = 15,778 sf, 0.00% Impervious, Inflow Depth = 2.75" for NRCC 10YR 24H event
Inflow = 1.16 cfs @ 12.09 hrs, Volume= 3,609 cf
Outflow = 1.04 cfs @ 12.13 hrs, Volume= 3,609 cf, Atten= 10%, Lag= 2.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.06 fps, Min. Travel Time= 3.6 min
Avg. Velocity = 0.80 fps, Avg. Travel Time= 9.3 min

Peak Storage= 226 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.41'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 40.78 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 11.19 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 447.0' Slope= 0.0153 '/'
Inlet Invert= 174.03', Outlet Invert= 167.18'



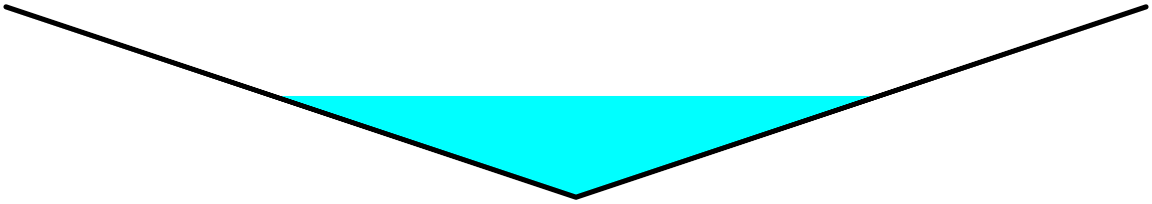
Summary for Reach 12R: N SWALE PART 2

Inflow Area = 29,879 sf, 0.00% Impervious, Inflow Depth = 2.88" for NRCC 10YR 24H event
Inflow = 2.12 cfs @ 12.11 hrs, Volume= 7,159 cf
Outflow = 1.97 cfs @ 12.14 hrs, Volume= 7,159 cf, Atten= 7%, Lag= 2.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.32 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 0.85 fps, Avg. Travel Time= 8.4 min

Peak Storage= 367 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.53'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 38.60 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 10.59 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 431.0' Slope= 0.0137 '/'
Inlet Invert= 167.10', Outlet Invert= 161.18'



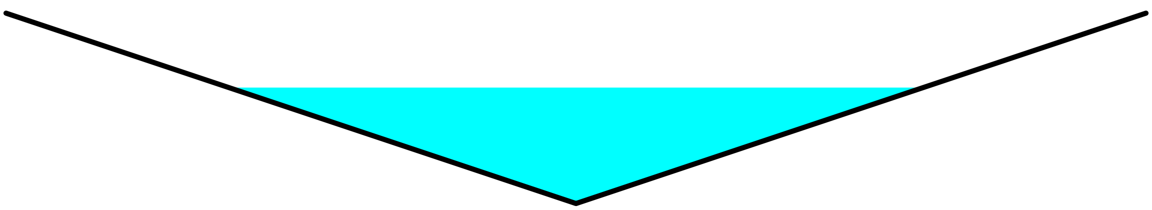
Summary for Reach 13R: N SWALE PART 3

Inflow Area = 42,618 sf, 0.00% Impervious, Inflow Depth = 2.92" for NRCC 10YR 24H event
Inflow = 2.88 cfs @ 12.12 hrs, Volume= 10,366 cf
Outflow = 2.75 cfs @ 12.16 hrs, Volume= 10,366 cf, Atten= 4%, Lag= 2.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.47 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 0.89 fps, Avg. Travel Time= 7.2 min

Peak Storage= 430 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.61'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 37.64 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 10.33 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 386.0' Slope= 0.0131 '/'
Inlet Invert= 161.10', Outlet Invert= 156.06'



Summary for Pond 1P: DETENTION AREA - LOCALIZED DEPRESSION NE

Inflow Area = 782,870 sf, 7.42% Impervious, Inflow Depth = 0.89" for NRCC 10YR 24H event
Inflow = 15.05 cfs @ 12.10 hrs, Volume= 57,994 cf
Outflow = 0.90 cfs @ 15.76 hrs, Volume= 57,994 cf, Atten= 94%, Lag= 219.5 min
Discarded = 0.90 cfs @ 15.76 hrs, Volume= 57,994 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 87.70' @ 15.76 hrs Surf.Area= 16,155 sf Storage= 32,038 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 481.1 min (1,314.5 - 833.5)

Volume	Invert	Avail.Storage	Storage Description
#1	83.00'	125,742 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
83.00	827	135.0	0	0	827
84.00	2,756	217.0	1,698	1,698	3,131
85.00	5,016	298.0	3,830	5,528	6,460
86.00	8,057	383.0	6,477	12,004	11,079
87.00	12,347	488.0	10,126	22,130	18,370
88.00	17,968	589.0	15,070	37,200	27,043
89.00	25,096	690.0	21,433	58,633	37,342
90.00	33,858	865.0	29,368	88,001	59,011
91.00	41,761	936.1	37,740	125,742	69,242

Device	Routing	Invert	Outlet Devices
#1	Discarded	83.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	90.60'	**50.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.90 cfs @ 15.76 hrs HW=87.70' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.90 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=83.00' TW=0.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: SEDIMENT FOREBAY

Inflow Area = 168,079 sf, 0.00% Impervious, Inflow Depth = 1.44" for NRCC 10YR 24H event
Inflow = 4.55 cfs @ 12.16 hrs, Volume= 20,165 cf
Outflow = 0.82 cfs @ 12.96 hrs, Volume= 20,166 cf, Atten= 82%, Lag= 48.1 min
Discarded = 0.14 cfs @ 12.96 hrs, Volume= 15,515 cf
Primary = 0.68 cfs @ 12.96 hrs, Volume= 4,651 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 150.06' @ 12.96 hrs Surf.Area= 2,426 sf Storage= 8,963 cf
Flood Elev= 151.00' Surf.Area= 2,531 sf Storage= 11,301 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 554.3 min (1,410.1 - 855.8)

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	22,348 cf	**Custom Stage Data (Conic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
146.00	2,000	0	0	2,000
155.00	3,000	22,348	22,348	3,876

Device	Routing	Invert	Outlet Devices
#1	Discarded	146.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	150.00'	**20.0' long x 2.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
2.50 3.00 3.50
Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88
2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.14 cfs @ 12.96 hrs HW=150.06' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=0.68 cfs @ 12.96 hrs HW=150.06' TW=145.07' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 0.68 cfs @ 0.60 fps)

Summary for Pond 3P: DMHs w/ Vortex Unit

Inflow Area = 329,159 sf, 17.65% Impervious, Inflow Depth = 1.94" for NRCC 10YR 24H event
Inflow = 15.16 cfs @ 12.09 hrs, Volume= 53,192 cf
Outflow = 15.16 cfs @ 12.09 hrs, Volume= 53,192 cf, Atten= 0%, Lag= 0.0 min
Primary = 15.16 cfs @ 12.09 hrs, Volume= 53,192 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 149.52' @ 12.09 hrs
Flood Elev= 151.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	148.00'	**36.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 148.00' / 145.00' S= 0.1200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=15.15 cfs @ 12.09 hrs HW=149.52' TW=145.21' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 15.15 cfs @ 4.20 fps)

Summary for Pond 4P: DMH

Inflow Area = 329,159 sf, 17.65% Impervious, Inflow Depth = 1.94" for NRCC 10YR 24H event
Inflow = 15.16 cfs @ 12.09 hrs, Volume= 53,192 cf
Outflow = 15.16 cfs @ 12.09 hrs, Volume= 53,192 cf, Atten= 0%, Lag= 0.0 min
Primary = 15.16 cfs @ 12.09 hrs, Volume= 53,192 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 151.82' @ 12.09 hrs
Flood Elev= 158.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	150.30'	**36.0" Round Culvert** L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 150.30' / 148.00' S= 0.0639 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=15.15 cfs @ 12.09 hrs HW=151.82' TW=149.52' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 15.15 cfs @ 4.20 fps)

Summary for Pond 5P: DMH

Inflow Area = 216,616 sf, 16.26% Impervious, Inflow Depth = 1.92" for NRCC 10YR 24H event
Inflow = 9.41 cfs @ 12.10 hrs, Volume= 34,679 cf
Outflow = 9.41 cfs @ 12.10 hrs, Volume= 34,679 cf, Atten= 0%, Lag= 0.0 min
Primary = 9.41 cfs @ 12.10 hrs, Volume= 34,679 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 156.80' @ 12.10 hrs
Flood Elev= 161.58'

Device	Routing	Invert	Outlet Devices
#1	Primary	155.40'	**24.0" Round Culvert** L= 263.0' Ke= 0.500 Inlet / Outlet Invert= 155.40' / 150.50' S= 0.0186 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=9.40 cfs @ 12.10 hrs HW=156.79' TW=151.82' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 9.40 cfs @ 4.02 fps)

Summary for Pond 6P: OIL/WATER SEPARATOR

Inflow Area = 13,317 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 1.50 cfs @ 12.07 hrs, Volume= 5,098 cf
Outflow = 1.50 cfs @ 12.07 hrs, Volume= 5,098 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.50 cfs @ 12.07 hrs, Volume= 5,098 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 156.85' @ 12.10 hrs
Flood Elev= 162.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	155.90'	**24.0" Round Culvert** L= 27.0' Ke= 0.500 Inlet / Outlet Invert= 155.90' / 155.50' S= 0.0148 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=1.10 cfs @ 12.07 hrs HW=156.80' TW=156.75' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 1.10 cfs @ 1.18 fps)

Summary for Pond 7P: DMH

Inflow Area = 13,317 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 1.50 cfs @ 12.07 hrs, Volume= 5,098 cf
Outflow = 1.50 cfs @ 12.07 hrs, Volume= 5,098 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.50 cfs @ 12.07 hrs, Volume= 5,098 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 157.17' @ 12.09 hrs
Flood Elev= 162.77'

Device	Routing	Invert	Outlet Devices
#1	Primary	156.40'	**12.0" Round Culvert** L= 40.0' Ke= 0.500

Inlet / Outlet Invert= 156.40' / 156.00' S= 0.0100 '/' Cc= 0.900
n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.42 cfs @ 12.07 hrs HW=157.15' TW=156.80' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 1.42 cfs @ 3.13 fps)

Summary for Pond 8P: DMH

Inflow Area = 8,878 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 1.00 cfs @ 12.07 hrs, Volume= 3,398 cf
Outflow = 1.00 cfs @ 12.07 hrs, Volume= 3,398 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.00 cfs @ 12.07 hrs, Volume= 3,398 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 158.05' @ 12.08 hrs
Flood Elev= 164.88'

Device	Routing	Invert	Outlet Devices
#1	Primary	157.50'	**12.0" Round Culvert** L= 154.0' Ke= 0.500 Inlet / Outlet Invert= 157.50' / 156.50' S= 0.0065 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.99 cfs @ 12.07 hrs HW=158.05' TW=157.15' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.99 cfs @ 3.22 fps)

Summary for Pond 9P: DMH

Inflow Area = 4,439 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 0.50 cfs @ 12.07 hrs, Volume= 1,699 cf
Outflow = 0.50 cfs @ 12.07 hrs, Volume= 1,699 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.50 cfs @ 12.07 hrs, Volume= 1,699 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.65' @ 12.07 hrs
Flood Elev= 166.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.30'	**12.0" Round Culvert** L= 141.0' Ke= 0.500 Inlet / Outlet Invert= 159.30' / 158.00' S= 0.0092 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.50 cfs @ 12.07 hrs HW=159.65' TW=158.05' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.50 cfs @ 2.02 fps)

Summary for Pond 10P: 24" Petro-Barrier

Inflow Area = 1,745 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 0.20 cfs @ 12.07 hrs, Volume= 668 cf
Outflow = 0.20 cfs @ 12.07 hrs, Volume= 668 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.20 cfs @ 12.07 hrs, Volume= 668 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 162.70' @ 12.07 hrs
Flood Elev= 169.43'

Device	Routing	Invert	Outlet Devices
#1	Primary	162.43'	**6.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 162.43' / 162.00' S= 0.0143 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.20 cfs @ 12.07 hrs HW=162.70' TW=159.65' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.20 cfs @ 1.78 fps)

Summary for Pond 11P: 24" Petro-Barrier

Inflow Area = 2,694 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 0.30 cfs @ 12.07 hrs, Volume= 1,031 cf
Outflow = 0.30 cfs @ 12.07 hrs, Volume= 1,031 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.30 cfs @ 12.07 hrs, Volume= 1,031 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.98' @ 12.07 hrs
Flood Elev= 168.62'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.62'	**6.0" Round Culvert** L= 18.0' Ke= 0.500 Inlet / Outlet Invert= 159.62' / 159.40' S= 0.0122 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.30 cfs @ 12.07 hrs HW=159.98' TW=159.65' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.30 cfs @ 2.03 fps)

Summary for Pond 12P: 24" Petro-Barrier

Inflow Area = 1,745 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 0.20 cfs @ 12.07 hrs, Volume= 668 cf
Outflow = 0.20 cfs @ 12.07 hrs, Volume= 668 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.20 cfs @ 12.07 hrs, Volume= 668 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 160.97' @ 12.07 hrs
Flood Elev= 167.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	160.70'	**6.0" Round Culvert** L= 32.0' Ke= 0.500 Inlet / Outlet Invert= 160.70' / 160.40' S= 0.0094 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.20 cfs @ 12.07 hrs HW=160.97' TW=158.05' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.20 cfs @ 1.78 fps)

Summary for Pond 13P: 24" Petro-Barrier

Inflow Area = 2,694 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 0.30 cfs @ 12.07 hrs, Volume= 1,031 cf
Outflow = 0.30 cfs @ 12.07 hrs, Volume= 1,031 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.30 cfs @ 12.07 hrs, Volume= 1,031 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 158.25' @ 12.08 hrs
Flood Elev= 166.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	157.83'	**6.0" Round Culvert** L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 157.83' / 157.60' S= 0.0115 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.30 cfs @ 12.07 hrs HW=158.24' TW=158.05' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.30 cfs @ 2.32 fps)

Summary for Pond 14P: 24" Petro-Barrier

Inflow Area = 2,694 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 0.30 cfs @ 12.07 hrs, Volume= 1,031 cf
Outflow = 0.30 cfs @ 12.07 hrs, Volume= 1,031 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.30 cfs @ 12.07 hrs, Volume= 1,031 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 157.32' @ 12.09 hrs
Flood Elev= 165.88'

Device	Routing	Invert	Outlet Devices
#1	Primary	156.88'	**6.0" Round Culvert** L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 156.88' / 156.60' S= 0.0133 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.28 cfs @ 12.07 hrs HW=157.31' TW=157.15' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.28 cfs @ 2.12 fps)

Summary for Pond 15P: 24" Petro-Barrier

Inflow Area = 1,745 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 0.20 cfs @ 12.07 hrs, Volume= 668 cf
Outflow = 0.20 cfs @ 12.07 hrs, Volume= 668 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.20 cfs @ 12.07 hrs, Volume= 668 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 157.94' @ 12.07 hrs
Flood Elev= 164.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	157.66'	**6.0" Round Culvert** L= 34.0' Ke= 0.500

Inlet / Outlet Invert= 157.66' / 157.40' S= 0.0076 '/' Cc= 0.900
n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.20 cfs @ 12.07 hrs HW=157.94' TW=157.15' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.20 cfs @ 2.51 fps)

Summary for Pond 16P: DMH

Inflow Area =	52,511 sf,	0.00% Impervious,	Inflow Depth = 1.40"	for NRCC 10YR 24H event	
Inflow =	1.84 cfs @	12.10 hrs,	Volume=	6,136 cf	
Outflow =	1.84 cfs @	12.10 hrs,	Volume=	6,136 cf,	Atten= 0%, Lag= 0.0 min
Primary =	1.84 cfs @	12.10 hrs,	Volume=	6,136 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.74' @ 12.10 hrs
Flood Elev= 162.19'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.00'	**12.0" Round Culvert** L= 17.0' Ke= 0.500 Inlet / Outlet Invert= 159.00' / 158.50' S= 0.0294 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.83 cfs @ 12.10 hrs HW=159.74' TW=156.79' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.83 cfs @ 2.93 fps)

Summary for Pond 17P: DMH

Inflow Area =	150,788 sf,	14.52% Impervious,	Inflow Depth = 1.87"	for NRCC 10YR 24H event	
Inflow =	6.20 cfs @	12.11 hrs,	Volume=	23,445 cf	
Outflow =	6.20 cfs @	12.11 hrs,	Volume=	23,445 cf,	Atten= 0%, Lag= 0.0 min
Primary =	6.20 cfs @	12.11 hrs,	Volume=	23,445 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 160.49' @ 12.11 hrs
Flood Elev= 163.59'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.40'	**24.0" Round Culvert** L= 88.2' Ke= 0.500 Inlet / Outlet Invert= 159.40' / 155.50' S= 0.0442 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=6.19 cfs @ 12.11 hrs HW=160.49' TW=156.79' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 6.19 cfs @ 3.55 fps)

Summary for Pond 18P: DMH

Inflow Area =	128,888 sf,	0.00% Impervious,	Inflow Depth = 1.40"	for NRCC 10YR 24H event	
Inflow =	4.12 cfs @	12.13 hrs,	Volume=	15,062 cf	
Outflow =	4.12 cfs @	12.13 hrs,	Volume=	15,062 cf,	Atten= 0%, Lag= 0.0 min
Primary =	4.12 cfs @	12.13 hrs,	Volume=	15,062 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 162.48' @ 12.13 hrs
Flood Elev= 165.39'

Device	Routing	Invert	Outlet Devices
#1	Primary	161.50'	**18.0" Round Culvert** L= 92.0' Ke= 0.500 Inlet / Outlet Invert= 161.50' / 159.50' S= 0.0217 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf

Primary OutFlow Max=4.12 cfs @ 12.13 hrs HW=162.48' TW=160.47' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 4.12 cfs @ 3.37 fps)

Summary for Pond 20P: DMH

Inflow Area = 102,433 sf, 12.46% Impervious, Inflow Depth = 1.72" for NRCC 10YR 24H event
Inflow = 4.64 cfs @ 12.09 hrs, Volume= 14,644 cf
Outflow = 4.64 cfs @ 12.09 hrs, Volume= 14,644 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.64 cfs @ 12.09 hrs, Volume= 14,644 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 152.92' @ 12.09 hrs
Flood Elev= 158.03'

Device	Routing	Invert	Outlet Devices
#1	Primary	152.00'	**24.0" Round Culvert** L= 56.0' Ke= 0.500 Inlet / Outlet Invert= 152.00' / 150.40' S= 0.0286 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=4.63 cfs @ 12.09 hrs HW=152.92' TW=151.82' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 4.63 cfs @ 3.27 fps)

Summary for Pond 21P: DMH

Inflow Area = 25,304 sf, 16.82% Impervious, Inflow Depth = 1.83" for NRCC 10YR 24H event
Inflow = 1.26 cfs @ 12.08 hrs, Volume= 3,869 cf
Outflow = 1.26 cfs @ 12.08 hrs, Volume= 3,869 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.26 cfs @ 12.08 hrs, Volume= 3,869 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 155.53' @ 12.08 hrs
Flood Elev= 157.94'

Device	Routing	Invert	Outlet Devices
#1	Primary	154.94'	**12.0" Round Culvert** L= 62.0' Ke= 0.500 Inlet / Outlet Invert= 154.94' / 152.40' S= 0.0410 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.26 cfs @ 12.08 hrs HW=155.53' TW=152.92' (Dynamic Tailwater)
└**1=Culvert** (Inlet Controls 1.26 cfs @ 2.62 fps)

Summary for Pond 22P: DMH

Inflow Area = 77,129 sf, 11.04% Impervious, Inflow Depth = 1.68" for NRCC 10YR 24H event
Inflow = 3.38 cfs @ 12.09 hrs, Volume= 10,775 cf
Outflow = 3.38 cfs @ 12.09 hrs, Volume= 10,775 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.38 cfs @ 12.09 hrs, Volume= 10,775 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 156.39' @ 12.09 hrs
Flood Elev= 158.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	155.50'	**18.0" Round Culvert** L= 56.0' Ke= 0.500 Inlet / Outlet Invert= 155.50' / 155.00' S= 0.0089 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf

Primary OutFlow Max=3.38 cfs @ 12.09 hrs HW=156.39' TW=152.92' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 3.38 cfs @ 4.48 fps)

Summary for Pond 23P: OIL/WATER SEPARATOR

Inflow Area = 10,110 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 1.14 cfs @ 12.07 hrs, Volume= 3,870 cf
Outflow = 1.18 cfs @ 12.07 hrs, Volume= 3,869 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.18 cfs @ 12.07 hrs, Volume= 3,869 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 152.00' @ 12.09 hrs
Flood Elev= 159.18'

Device	Routing	Invert	Outlet Devices
#1	Primary	141.80'	**12.0" Round Culvert** L= 182.0' Ke= 0.500 Inlet / Outlet Invert= 141.80' / 140.10' S= 0.0093 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.06 cfs @ 12.07 hrs HW=151.96' TW=151.80' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.06 cfs @ 1.35 fps)

Summary for Pond 24P: DMH

Inflow Area = 10,110 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 1.14 cfs @ 12.07 hrs, Volume= 3,870 cf
Outflow = 1.14 cfs @ 12.07 hrs, Volume= 3,870 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.14 cfs @ 12.07 hrs, Volume= 3,870 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 152.07' @ 12.10 hrs
Flood Elev= 159.61'

Device	Routing	Invert	Outlet Devices
#1	Primary	150.20'	**12.0" Round Culvert** L= 1.0' Ke= 0.500

Inlet / Outlet Invert= 150.20' / 150.10' S= 0.1000 '/' Cc= 0.900
n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.52 cfs @ 12.07 hrs HW=151.98' TW=151.96' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.52 cfs @ 0.66 fps)

Summary for Pond 25P: 24" Petro-Barrier

Inflow Area =	1,770 sf,100.00% Impervious,	Inflow Depth = 4.59"	for NRCC 10YR 24H event		
Inflow =	0.20 cfs @	12.07 hrs,	Volume=	678 cf	
Outflow =	0.20 cfs @	12.07 hrs,	Volume=	678 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.20 cfs @	12.07 hrs,	Volume=	678 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 152.13' @ 12.11 hrs
Flood Elev= 159.89'

Device	Routing	Invert	Outlet Devices
#1	Primary	150.89'	**6.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 150.89' / 150.30' S= 0.0102 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.12 cfs @ 12.07 hrs HW=152.00' TW=151.98' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.12 cfs @ 0.60 fps)

Summary for Pond 26P: 24" Petro-Barrier

Inflow Area =	1,770 sf,100.00% Impervious,	Inflow Depth = 4.59"	for NRCC 10YR 24H event		
Inflow =	0.20 cfs @	12.07 hrs,	Volume=	678 cf	
Outflow =	0.20 cfs @	12.07 hrs,	Volume=	678 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.20 cfs @	12.07 hrs,	Volume=	678 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.26' @ 12.07 hrs
Flood Elev= 161.98'

Device	Routing	Invert	Outlet Devices
#1	Primary	152.98'	**6.0" Round Culvert** L= 17.0' Ke= 0.500 Inlet / Outlet Invert= 152.98' / 152.00' S= 0.0576 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.20 cfs @ 12.07 hrs HW=153.26' TW=151.98' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.20 cfs @ 1.79 fps)

Summary for Pond 27P: DMH

Inflow Area =	6,570 sf,100.00% Impervious,	Inflow Depth = 4.59"	for NRCC 10YR 24H event		
Inflow =	0.74 cfs @	12.07 hrs,	Volume=	2,515 cf	
Outflow =	0.74 cfs @	12.07 hrs,	Volume=	2,515 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.74 cfs @	12.07 hrs,	Volume=	2,515 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 154.34' @ 12.07 hrs
Flood Elev= 162.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	153.90'	**12.0" Round Culvert** L= 224.0' Ke= 0.500 Inlet / Outlet Invert= 153.90' / 152.00' S= 0.0085 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.74 cfs @ 12.07 hrs HW=154.34' TW=151.98' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.74 cfs @ 2.25 fps)

Summary for Pond 28P: DMH

Inflow Area = 6,570 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 0.74 cfs @ 12.07 hrs, Volume= 2,515 cf
Outflow = 0.74 cfs @ 12.07 hrs, Volume= 2,515 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.74 cfs @ 12.07 hrs, Volume= 2,515 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 154.84' @ 12.07 hrs
Flood Elev= 163.41'

Device	Routing	Invert	Outlet Devices
#1	Primary	154.40'	**12.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 154.40' / 154.00' S= 0.0080 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.74 cfs @ 12.07 hrs HW=154.84' TW=154.34' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.74 cfs @ 3.22 fps)

Summary for Pond 29P: 24" Petro-Barrier

Inflow Area = 1,770 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 0.20 cfs @ 12.07 hrs, Volume= 678 cf
Outflow = 0.20 cfs @ 12.07 hrs, Volume= 678 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.20 cfs @ 12.07 hrs, Volume= 678 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 155.23' @ 12.07 hrs
Flood Elev= 163.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	154.95'	**6.0" Round Culvert** L= 7.0' Ke= 0.500 Inlet / Outlet Invert= 154.95' / 154.50' S= 0.0643 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.20 cfs @ 12.07 hrs HW=155.23' TW=154.84' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.20 cfs @ 1.79 fps)

Summary for Pond 30P: DMH

Inflow Area = 4,800 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 0.54 cfs @ 12.07 hrs, Volume= 1,837 cf
Outflow = 0.54 cfs @ 12.07 hrs, Volume= 1,837 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.54 cfs @ 12.07 hrs, Volume= 1,837 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 160.77' @ 12.07 hrs
Flood Elev= 165.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	160.40'	**12.0" Round Culvert** L= 98.0' Ke= 0.500 Inlet / Outlet Invert= 160.40' / 159.50' S= 0.0092 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.54 cfs @ 12.07 hrs HW=160.77' TW=154.84' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.54 cfs @ 2.06 fps)

Summary for Pond 31P: DMH

Inflow Area = 4,800 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 0.54 cfs @ 12.07 hrs, Volume= 1,837 cf
Outflow = 0.54 cfs @ 12.07 hrs, Volume= 1,837 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.54 cfs @ 12.07 hrs, Volume= 1,837 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 162.27' @ 12.07 hrs
Flood Elev= 168.53'

Device	Routing	Invert	Outlet Devices
#1	Primary	161.90'	**12.0" Round Culvert** L= 232.0' Ke= 0.500 Inlet / Outlet Invert= 161.90' / 160.50' S= 0.0060 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.54 cfs @ 12.07 hrs HW=162.27' TW=160.77' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.54 cfs @ 2.98 fps)

Summary for Pond 32P: 24" Petro-Barrier

Inflow Area = 1,600 sf,100.00% Impervious, Inflow Depth = 4.59" for NRCC 10YR 24H event
Inflow = 0.18 cfs @ 12.07 hrs, Volume= 612 cf
Outflow = 0.18 cfs @ 12.07 hrs, Volume= 612 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.18 cfs @ 12.07 hrs, Volume= 612 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 162.70' @ 12.07 hrs
Flood Elev= 170.69'

Device	Routing	Invert	Outlet Devices
#1	Primary	162.44'	**6.0" Round Culvert** L= 10.0' Ke= 0.500

Inlet / Outlet Invert= 162.44' / 162.20' S= 0.0240 '/' Cc= 0.900
n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.18 cfs @ 12.07 hrs HW=162.70' TW=162.27' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.18 cfs @ 1.74 fps)

Summary for Pond 33P: DMH

Inflow Area =	3,200 sf,100.00% Impervious,	Inflow Depth = 4.59"	for NRCC 10YR 24H event
Inflow =	0.36 cfs @ 12.07 hrs, Volume=	1,225 cf	
Outflow =	0.36 cfs @ 12.07 hrs, Volume=	1,225 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.36 cfs @ 12.07 hrs, Volume=	1,225 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 163.50' @ 12.07 hrs
Flood Elev= 170.43'

Device	Routing	Invert	Outlet Devices
#1	Primary	163.20'	**12.0" Round Culvert** L= 159.0' Ke= 0.500 Inlet / Outlet Invert= 163.20' / 162.00' S= 0.0075 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.36 cfs @ 12.07 hrs HW=163.50' TW=162.27' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.36 cfs @ 1.85 fps)

Summary for Pond 34P: 24" Petro-Barrier

Inflow Area =	1,600 sf,100.00% Impervious,	Inflow Depth = 4.59"	for NRCC 10YR 24H event
Inflow =	0.18 cfs @ 12.07 hrs, Volume=	612 cf	
Outflow =	0.18 cfs @ 12.07 hrs, Volume=	612 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.18 cfs @ 12.07 hrs, Volume=	612 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 163.69' @ 12.07 hrs
Flood Elev= 171.68'

Device	Routing	Invert	Outlet Devices
#1	Primary	163.43'	**6.0" Round Culvert** L= 8.0' Ke= 0.500 Inlet / Outlet Invert= 163.43' / 163.30' S= 0.0162 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.18 cfs @ 12.07 hrs HW=163.69' TW=163.50' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.18 cfs @ 2.53 fps)

Summary for Pond 35P: 24" Petro-Barrier

Inflow Area =	1,600 sf,100.00% Impervious,	Inflow Depth = 4.59"	for NRCC 10YR 24H event
Inflow =	0.18 cfs @ 12.07 hrs, Volume=	612 cf	
Outflow =	0.18 cfs @ 12.07 hrs, Volume=	612 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.18 cfs @ 12.07 hrs, Volume=	612 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 164.65' @ 12.07 hrs
Flood Elev= 172.64'

Device	Routing	Invert	Outlet Devices
#1	Primary	164.39'	**6.0" Round Culvert** L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 164.39' / 164.00' S= 0.0103 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.18 cfs @ 12.07 hrs HW=164.65' TW=163.50' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.18 cfs @ 1.74 fps)

Summary for Pond 40P: DMH

Inflow Area = 105,170 sf, 0.00% Impervious, Inflow Depth = 0.85" for NRCC 10YR 24H event
Inflow = 1.35 cfs @ 12.09 hrs, Volume= 7,429 cf
Outflow = 1.35 cfs @ 12.09 hrs, Volume= 7,429 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.35 cfs @ 12.09 hrs, Volume= 7,429 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 158.40' @ 12.12 hrs
Flood Elev= 160.03'

Device	Routing	Invert	Outlet Devices
#1	Primary	158.00'	**24.0" W x 12.0" H Box Culvert** L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.00' / 157.70' S= 0.0300 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 2.00 sf

Primary OutFlow Max=1.31 cfs @ 12.09 hrs HW=158.40' TW=158.24' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.31 cfs @ 1.65 fps)

Summary for Pond 41P: CULVERT

Inflow Area = 87,839 sf, 0.00% Impervious, Inflow Depth = 0.51" for NRCC 10YR 24H event
Inflow = 0.53 cfs @ 12.27 hrs, Volume= 3,720 cf
Outflow = 0.53 cfs @ 12.27 hrs, Volume= 3,720 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.53 cfs @ 12.27 hrs, Volume= 3,720 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.19' @ 12.27 hrs
Flood Elev= 161.08'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.00'	**24.0" W x 12.0" H Box Culvert** L= 55.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.00' / 158.00' S= 0.0182 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 2.00 sf

Primary OutFlow Max=0.53 cfs @ 12.27 hrs HW=159.19' TW=158.37' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.53 cfs @ 1.40 fps)

Summary for Link 1L: OVERFLOW

Inflow Area = 782,870 sf, 7.42% Impervious, Inflow Depth = 0.00" for NRCC 10YR 24H event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link 10L: OFF-SITE

Inflow Area = 258,650 sf, 0.00% Impervious, Inflow Depth = 0.02" for NRCC 10YR 24H event
Inflow = 0.01 cfs @ 22.05 hrs, Volume= 332 cf
Primary = 0.01 cfs @ 22.05 hrs, Volume= 332 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: AREA OUTSIDE Runoff Area=258,650 sf 0.00% Impervious Runoff Depth=0.00"
Tc=5.0 min CN=32 Runoff=0.00 cfs 0 cf

Subcatchment 2S: AREA OUTSIDE Runoff Area=285,632 sf 0.00% Impervious Runoff Depth=0.00"
Flow Length=491' Tc=12.3 min CN=31 Runoff=0.00 cfs 0 cf

Subcatchment 3S: S SWALE 1 Runoff Area=21,901 sf 0.00% Impervious Runoff Depth=0.31"
Flow Length=378' Slope=0.0200 '/' Tc=6.2 min CN=56 Runoff=0.07 cfs 563 cf

Subcatchment 4S: S SWALE 2 Runoff Area=37,407 sf 0.00% Impervious Runoff Depth=0.01"
Tc=5.0 min CN=41 Runoff=0.00 cfs 36 cf

Subcatchment 5S: S SWALE 3 Runoff Area=28,531 sf 0.00% Impervious Runoff Depth=0.11"
Flow Length=644' Slope=0.0200 '/' Tc=9.3 min CN=48 Runoff=0.01 cfs 251 cf

Subcatchment 6S: ACCESS RAMP Runoff Area=17,331 sf 0.00% Impervious Runoff Depth=1.34"
Tc=5.0 min CN=78 Runoff=0.64 cfs 1,935 cf

Subcatchment 7S: S SWALE 4 Runoff Area=20,291 sf 0.00% Impervious Runoff Depth=0.56"
Flow Length=644' Slope=0.0200 '/' Tc=9.3 min CN=63 Runoff=0.20 cfs 947 cf

Subcatchment 8S: N SWALE 1 Runoff Area=15,778 sf 0.00% Impervious Runoff Depth=1.47"
Flow Length=378' Slope=0.0200 '/' Tc=6.2 min CN=80 Runoff=0.62 cfs 1,935 cf

Subcatchment 9S: N SWALE 2 Runoff Area=14,101 sf 0.00% Impervious Runoff Depth=1.68"
Flow Length=378' Slope=0.0200 '/' Tc=6.2 min CN=83 Runoff=0.63 cfs 1,978 cf

Subcatchment 10S: N SWALE 3 Runoff Area=12,739 sf 0.00% Impervious Runoff Depth=1.68"
Flow Length=378' Slope=0.0200 '/' Tc=6.2 min CN=83 Runoff=0.57 cfs 1,787 cf

Subcatchment 11S: NW PERF. DRAIN Runoff Area=45,853 sf 0.00% Impervious Runoff Depth=0.56"
Flow Length=660' Slope=0.0200 '/' Tc=6.0 min CN=63 Runoff=0.51 cfs 2,140 cf

Subcatchment 12S: CENTRAL PERF. DRAIN Runoff Area=6,658 sf 0.00% Impervious Runoff Depth=0.56"
Tc=5.0 min CN=63 Runoff=0.08 cfs 311 cf

Subcatchment 13S: GIS BUILDINGS Runoff Area=21,900 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=1.66 cfs 5,579 cf

Subcatchment 14S: GIS BLDGS PERF Runoff Area=74,801 sf 0.00% Impervious Runoff Depth=0.56"
Flow Length=570' Slope=0.0200 '/' Tc=8.4 min CN=63 Runoff=0.76 cfs 3,492 cf

Subcatchment 15S: CENTRAL PERF. DRAIN Runoff Area=54,087 sf 0.00% Impervious Runoff Depth=0.56"
Flow Length=570' Slope=0.0200 '/' Tc=8.4 min CN=63 Runoff=0.55 cfs 2,525 cf

Subcatchment 16S: N PERF. DRAIN Runoff Area=35,583 sf 0.57% Impervious Runoff Depth=0.56"
Tc=5.0 min CN=63 Runoff=0.41 cfs 1,661 cf

Subcatchment 17S: SE PERF. DRAIN 1 Runoff Area=41,546 sf 20.00% Impervious Runoff Depth=0.88"
Flow Length=425' Slope=0.0200 '/' Tc=5.9 min CN=70 Runoff=0.89 cfs 3,050 cf

Subcatchment 18S: SE PERF. DRAIN 2 Runoff Area=25,304 sf 16.82% Impervious Runoff Depth=0.83"
Tc=5.0 min CN=69 Runoff=0.52 cfs 1,752 cf

Subcatchment 20S: SR4 Runoff Area=1,745 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.13 cfs 445 cf

Subcatchment 21S: XFMR 1 Runoff Area=2,694 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.20 cfs 686 cf

Subcatchment 22S: SR5 Runoff Area=1,745 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.13 cfs 445 cf

Subcatchment 23S: XFMR 2 Runoff Area=2,694 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.20 cfs 686 cf

Subcatchment 24S: XFMR 3 Runoff Area=2,694 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.20 cfs 686 cf

Subcatchment 25S: SR6 Runoff Area=1,745 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.13 cfs 445 cf

Subcatchment 26S: SR1 Runoff Area=1,600 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.12 cfs 408 cf

Subcatchment 27S: SR2 Runoff Area=1,600 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.12 cfs 408 cf

Subcatchment 28S: SR3 Runoff Area=1,600 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.12 cfs 408 cf

Subcatchment 29S: STATCOM 1 Runoff Area=1,770 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.13 cfs 451 cf

Subcatchment 30S: STATCOM 2 Runoff Area=1,770 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.13 cfs 451 cf

Subcatchment 31S: STATCOM 3 Runoff Area=1,770 sf 100.00% Impervious Runoff Depth=3.06"
Tc=5.0 min CN=98 Runoff=0.13 cfs 451 cf

Reach 1R: S SWALE PART 1 Avg. Flow Depth=0.15' Max Vel=1.00 fps Inflow=0.07 cfs 563 cf
n=0.030 L=309.0' S=0.0137 '/' Capacity=10.56 cfs Outflow=0.07 cfs 563 cf

Reach 2R: S SWALE PART 2 Avg. Flow Depth=0.14' Max Vel=1.14 fps Inflow=0.07 cfs 599 cf
n=0.030 L=257.3' S=0.0195 '/' Capacity=12.62 cfs Outflow=0.07 cfs 599 cf

Reach 3R: S SWALE PART 3 Avg. Flow Depth=0.15' Max Vel=1.01 fps Inflow=0.07 cfs 850 cf
n=0.030 L=329.0' S=0.0142 '/' Capacity=10.77 cfs Outflow=0.07 cfs 850 cf

Reach 4R: S SWALE PART 4 Avg. Flow Depth=0.40' Max Vel=1.40 fps Inflow=0.78 cfs 3,732 cf
n=0.030 L=367.8' S=0.0073 '/' Capacity=9.98 cfs Outflow=0.68 cfs 3,732 cf

Reach 5R: DRAINAGE CHANNEL Avg. Flow Depth=0.13' Max Vel=2.65 fps Inflow=6.76 cfs 26,478 cf
n=0.078 L=175.0' S=0.3086 '/' Capacity=198.63 cfs Outflow=6.70 cfs 26,478 cf

Reach 11R: N SWALE PART 1 Avg. Flow Depth=0.32' Max Vel=1.75 fps Inflow=0.62 cfs 1,935 cf
n=0.030 L=447.0' S=0.0153 '/' Capacity=11.19 cfs Outflow=0.54 cfs 1,935 cf

Reach 12R: N SWALE PART 2 Avg. Flow Depth=0.42' Max Vel=1.97 fps Inflow=1.13 cfs 3,913 cf
n=0.030 L=431.0' S=0.0137 '/' Capacity=10.59 cfs Outflow=1.03 cfs 3,913 cf

Reach 13R: N SWALE PART 3 Avg. Flow Depth=0.48' Max Vel=2.11 fps Inflow=1.53 cfs 5,700 cf
n=0.030 L=386.0' S=0.0131 '/' Capacity=10.33 cfs Outflow=1.45 cfs 5,700 cf

Pond 1P: DETENTION AREA - LOCALIZED Peak Elev=86.09' Storage=12,721 cf Inflow=6.70 cfs 26,478 cf
Discarded=0.47 cfs 26,478 cf Primary=0.00 cfs 0 cf Outflow=0.47 cfs 26,478 cf

Pond 2P: SEDIMENT FOREBAY Peak Elev=148.32' Storage=4,904 cf Inflow=2.11 cfs 9,431 cf
Discarded=0.12 cfs 9,433 cf Primary=0.00 cfs 0 cf Outflow=0.12 cfs 9,433 cf

Pond 3P: DMHs w/ Vortex Unit Peak Elev=148.98' Inflow=6.76 cfs 26,478 cf
36.0" Round Culvert n=0.011 L=25.0' S=0.1200 '/' Outflow=6.76 cfs 26,478 cf

Pond 4P: DMH Peak Elev=151.28' Inflow=6.76 cfs 26,478 cf
36.0" Round Culvert n=0.011 L=36.0' S=0.0639 '/' Outflow=6.76 cfs 26,478 cf

Pond 5P: DMH Peak Elev=156.27' Inflow=4.21 cfs 17,440 cf
24.0" Round Culvert n=0.011 L=263.0' S=0.0186 '/' Outflow=4.21 cfs 17,440 cf

Pond 6P: OIL/WATER SEPARATOR Peak Elev=156.43' Inflow=1.01 cfs 3,393 cf
24.0" Round Culvert n=0.012 L=27.0' S=0.0148 '/' Outflow=1.01 cfs 3,393 cf

Pond 7P: DMH Peak Elev=156.92' Inflow=1.01 cfs 3,393 cf
12.0" Round Culvert n=0.011 L=40.0' S=0.0100 '/' Outflow=1.01 cfs 3,393 cf

Pond 8P: DMH Peak Elev=157.93' Inflow=0.67 cfs 2,262 cf
12.0" Round Culvert n=0.011 L=154.0' S=0.0065 '/' Outflow=0.67 cfs 2,262 cf

Pond 9P: DMH Peak Elev=159.59' Inflow=0.34 cfs 1,131 cf
12.0" Round Culvert n=0.011 L=141.0' S=0.0092 '/' Outflow=0.34 cfs 1,131 cf

Pond 10P: 24" Petro-Barrier Peak Elev=162.65' Inflow=0.13 cfs 445 cf
6.0" Round Culvert n=0.010 L=30.0' S=0.0143 '/' Outflow=0.13 cfs 445 cf

Pond 11P: 24" Petro-Barrier Peak Elev=159.90' Inflow=0.20 cfs 686 cf
6.0" Round Culvert n=0.010 L=18.0' S=0.0122 '/' Outflow=0.20 cfs 686 cf

Pond 12P: 24" Petro-Barrier Peak Elev=160.92' Inflow=0.13 cfs 445 cf
6.0" Round Culvert n=0.010 L=32.0' S=0.0094 '/' Outflow=0.13 cfs 445 cf

Pond 13P: 24" Petro-Barrier Peak Elev=158.14' Inflow=0.20 cfs 686 cf
6.0" Round Culvert n=0.010 L=20.0' S=0.0115 '/' Outflow=0.20 cfs 686 cf

Pond 14P: 24" Petro-Barrier Peak Elev=157.17' Inflow=0.20 cfs 686 cf
6.0" Round Culvert n=0.010 L=21.0' S=0.0133 '/' Outflow=0.20 cfs 686 cf

Pond 15P: 24" Petro-Barrier Peak Elev=157.88' Inflow=0.13 cfs 445 cf
6.0" Round Culvert n=0.010 L=34.0' S=0.0076 '/' Outflow=0.13 cfs 445 cf

Pond 16P: DMH Peak Elev=159.38' Inflow=0.58 cfs 2,451 cf
12.0" Round Culvert n=0.011 L=17.0' S=0.0294 '/' Outflow=0.58 cfs 2,451 cf

Pond 17P: DMH Peak Elev=160.08' Inflow=2.68 cfs 11,596 cf
24.0" Round Culvert n=0.011 L=88.2' S=0.0442 '/' Outflow=2.68 cfs 11,596 cf

Pond 18P: DMH Peak Elev=162.01' Inflow=1.30 cfs 6,017 cf
18.0" Round Culvert n=0.011 L=92.0' S=0.0217 '/' Outflow=1.30 cfs 6,017 cf

Pond 20P: DMH Peak Elev=152.56' Inflow=1.82 cfs 6,463 cf
24.0" Round Culvert n=0.011 L=56.0' S=0.0286 '/' Outflow=1.82 cfs 6,463 cf

Pond 21P: DMH Peak Elev=155.30' Inflow=0.52 cfs 1,752 cf
12.0" Round Culvert n=0.011 L=62.0' S=0.0410 '/' Outflow=0.52 cfs 1,752 cf

Pond 22P: DMH Peak Elev=156.01' Inflow=1.30 cfs 4,711 cf
18.0" Round Culvert n=0.011 L=56.0' S=0.0089 '/' Outflow=1.30 cfs 4,711 cf

Pond 23P: OIL/WATER SEPARATOR Peak Elev=151.35' Inflow=0.78 cfs 2,576 cf
12.0" Round Culvert n=0.011 L=182.0' S=0.0093 '/' Outflow=0.77 cfs 2,575 cf

Pond 24P: DMH Peak Elev=151.39' Inflow=0.77 cfs 2,576 cf
12.0" Round Culvert n=0.011 L=1.0' S=0.1000 '/' Outflow=0.78 cfs 2,576 cf

Pond 25P: 24" Petro-Barrier Peak Elev=151.42' Inflow=0.13 cfs 451 cf
6.0" Round Culvert n=0.010 L=58.0' S=0.0102 '/' Outflow=0.13 cfs 451 cf

Pond 26P: 24" Petro-Barrier Peak Elev=153.20' Inflow=0.13 cfs 451 cf
6.0" Round Culvert n=0.010 L=17.0' S=0.0576 '/' Outflow=0.13 cfs 451 cf

Pond 27P: DMH Peak Elev=154.25' Inflow=0.50 cfs 1,674 cf
12.0" Round Culvert n=0.011 L=224.0' S=0.0085 '/' Outflow=0.50 cfs 1,674 cf

Pond 28P: DMH Peak Elev=154.76' Inflow=0.50 cfs 1,674 cf
12.0" Round Culvert n=0.011 L=50.0' S=0.0080 '/' Outflow=0.50 cfs 1,674 cf

Pond 29P: 24" Petro-Barrier Peak Elev=155.17' Inflow=0.13 cfs 451 cf
6.0" Round Culvert n=0.010 L=7.0' S=0.0643 '/' Outflow=0.13 cfs 451 cf

Pond 30P: DMH Peak Elev=160.70' Inflow=0.36 cfs 1,223 cf
12.0" Round Culvert n=0.011 L=98.0' S=0.0092 '/' Outflow=0.36 cfs 1,223 cf

Pond 31P: DMH Peak Elev=162.21' Inflow=0.36 cfs 1,223 cf
12.0" Round Culvert n=0.011 L=232.0' S=0.0060 '/' Outflow=0.36 cfs 1,223 cf

Pond 32P: 24" Petro-Barrier Peak Elev=162.65' Inflow=0.12 cfs 408 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.0240 '/' Outflow=0.12 cfs 408 cf

Pond 33P: DMH Peak Elev=163.44' Inflow=0.24 cfs 815 cf
12.0" Round Culvert n=0.011 L=159.0' S=0.0075 '/' Outflow=0.24 cfs 815 cf

Pond 34P: 24" Petro-Barrier Peak Elev=163.64' Inflow=0.12 cfs 408 cf
6.0" Round Culvert n=0.010 L=8.0' S=0.0162 '/' Outflow=0.12 cfs 408 cf

Pond 35P: 24" Petro-Barrier Peak Elev=164.60' Inflow=0.12 cfs 408 cf
6.0" Round Culvert n=0.010 L=38.0' S=0.0103 '/' Outflow=0.12 cfs 408 cf

Pond 40P: DMH Peak Elev=158.22' Inflow=0.64 cfs 2,784 cf
24.0" x 12.0" Box Culvert n=0.011 L=10.0' S=0.0300 '/' Outflow=0.64 cfs 2,784 cf

Pond 41P: CULVERT Peak Elev=159.05' Inflow=0.07 cfs 850 cf
24.0" x 12.0" Box Culvert n=0.011 L=55.0' S=0.0182 '/' Outflow=0.07 cfs 850 cf

Link 1L: OVERFLOW Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 10L: OFF-SITE Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Total Runoff Area = 1,041,520 sf Runoff Volume = 35,910 cf Average Runoff Depth = 0.41"
94.42% Pervious = 983,426 sf 5.58% Impervious = 58,094 sf

Summary for Subcatchment 1S: AREA OUTSIDE SUBSTATION - NOT TO POND

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
179,269	30	Woods, Good, HSG A
72,994	30	Meadow, non-grazed, HSG A
6,387	96	Gravel surface, HSG A
258,650	32	Weighted Average
258,650		100.00% Pervious Area

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

Summary for Subcatchment 2S: AREA OUTSIDE SUBSTATION - TO POND

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
206,991	30	Woods, Good, HSG A
72,294	30	Meadow, non-grazed, HSG A
6,347	96	Gravel surface, HSG A
285,632	31	Weighted Average
285,632		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.5000	0.25		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.29"
8.9	441	0.1100	0.83		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
12.3	491	Total			

Summary for Subcatchment 3S: S SWALE 1

Runoff = 0.07 cfs @ 12.29 hrs, Volume= 563 cf, Depth= 0.31"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

	Area (sf)	CN	Description
*	3,599	63	Crushed Stone Surface, HSG A
	6,746	96	Gravel surface, HSG A
	7,202	30	Woods, Good, HSG A
	4,354	30	Meadow, non-grazed, HSG A
	21,901	56	Weighted Average
	21,901		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.9	328	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
6.2	378	Total			

Summary for Subcatchment 4S: S SWALE 2

Runoff = 0.00 cfs @ 21.85 hrs, Volume= 36 cf, Depth= 0.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

	Area (sf)	CN	Description
	5,160	96	Gravel surface, HSG A
*	2,578	63	Crushed Stone Surface, HSG A
	20,025	30	Woods, Good, HSG A
	9,644	30	Meadow, non-grazed, HSG A
	37,407	41	Weighted Average
	37,407		100.00% Pervious Area

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

Summary for Subcatchment 5S: S SWALE 3

Runoff = 0.01 cfs @ 13.77 hrs, Volume= 251 cf, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

	Area (sf)	CN	Description
*	3,335	63	Crushed Stone Surface, HSG A
	7,061	30	Woods, Good, HSG A
	6,315	96	Gravel surface, HSG A
	11,820	30	Meadow, non-grazed, HSG A
	28,531	48	Weighted Average
	28,531		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
7.0	594	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
9.3	644	Total			

Summary for Subcatchment 6S: ACCESS RAMP

Runoff = 0.64 cfs @ 12.08 hrs, Volume= 1,935 cf, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
12,617	96	Gravel surface, HSG A
1,094	30	Woods, Good, HSG A
3,620	30	Meadow, non-grazed, HSG A
17,331	78	Weighted Average
17,331		100.00% Pervious Area

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

Summary for Subcatchment 7S: S SWALE 4

Runoff = 0.20 cfs @ 12.16 hrs, Volume= 947 cf, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

	Area (sf)	CN	Description
*	6,230	63	Crushed Stone Surface, HSG A
	7,051	96	Gravel surface, HSG A
	7,010	30	Meadow, non-grazed, HSG A
	20,291	63	Weighted Average
	20,291		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
7.0	594	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
9.3	644	Total			

Summary for Subcatchment 8S: N SWALE 1

Runoff = 0.62 cfs @ 12.09 hrs, Volume= 1,935 cf, Depth= 1.47"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

	Area (sf)	CN	Description
*	4,949	63	Crushed Stone Surface, HSG A
	9,543	96	Gravel surface, HSG A
	1,286	30	Meadow, non-grazed, HSG A
	15,778	80	Weighted Average
	15,778		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.9	328	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
6.2	378	Total			

Summary for Subcatchment 9S: N SWALE 2

Runoff = 0.63 cfs @ 12.09 hrs, Volume= 1,978 cf, Depth= 1.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

	Area (sf)	CN	Description
*	5,475	63	Crushed Stone Surface, HSG A
	8,626	96	Gravel surface, HSG A
	14,101	83	Weighted Average
	14,101		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.9	328	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
6.2	378	Total			

Summary for Subcatchment 10S: N SWALE 3

Runoff = 0.57 cfs @ 12.09 hrs, Volume= 1,787 cf, Depth= 1.68"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

	Area (sf)	CN	Description
*	4,958	63	Crushed Stone Surface, HSG A
	7,781	96	Gravel surface, HSG A
	12,739	83	Weighted Average
	12,739		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.9	328	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
6.2	378	Total			

Summary for Subcatchment 11S: NW PERF. DRAIN

Runoff = 0.51 cfs @ 12.11 hrs, Volume= 2,140 cf, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

	Area (sf)	CN	Description
*	45,853	63	Crushed Stone Surface, HSG A
	45,853		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.0	255	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
0.7	355	0.0200	8.34	6.55	**Pipe Channel, Perf Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
6.0	660	Total			

Summary for Subcatchment 12S: CENTRAL PERF. DRAIN 2

Runoff = 0.08 cfs @ 12.10 hrs, Volume= 311 cf, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

	Area (sf)	CN	Description
*	6,658	63	Crushed Stone Surface, HSG A
	6,658		100.00% Pervious Area

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

Summary for Subcatchment 13S: GIS BUILDINGS

Runoff = 1.66 cfs @ 12.07 hrs, Volume= 5,579 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

	Area (sf)	CN	Description
	21,900	98	Roofs, HSG A
	21,900		100.00% Impervious Area

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

Summary for Subcatchment 14S: GIS BLDGS PERF DRAIN

Runoff = 0.76 cfs @ 12.15 hrs, Volume= 3,492 cf, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

	Area (sf)	CN	Description
*	74,801	63	Crushed Stone Surface, HSG A
	74,801		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
6.1	520	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
8.4	570	Total			

Summary for Subcatchment 15S: CENTRAL PERF. DRAIN 1

Runoff = 0.55 cfs @ 12.15 hrs, Volume= 2,525 cf, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

	Area (sf)	CN	Description
*	54,087	63	Crushed Stone Surface, HSG A
	54,087		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
6.1	520	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
8.4	570	Total			

Summary for Subcatchment 16S: N PERF. DRAIN

Runoff = 0.41 cfs @ 12.10 hrs, Volume= 1,661 cf, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

	Area (sf)	CN	Description
*	35,381	63	Crushed Stone Surface, HSG A
	202	98	Roofs, HSG A
	35,583	63	Weighted Average
	35,381		99.43% Pervious Area
	202		0.57% Impervious Area

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

Summary for Subcatchment 17S: SE PERF. DRAIN 1

Runoff = 0.89 cfs @ 12.10 hrs, Volume= 3,050 cf, Depth= 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

	Area (sf)	CN	Description
	8,310	98	Roofs, HSG A
*	33,236	63	Crushed Stone Surface, HSG A
	41,546	70	Weighted Average
	33,236		80.00% Pervious Area
	8,310		20.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.5	300	0.0200	1.41		**Shallow Concentrated Flow, Shallow** Nearly Bare & Untilled Kv= 10.0 fps
0.1	75	0.0200	8.34	6.55	**Pipe Channel, Perf. Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
5.9	425	Total			

Summary for Subcatchment 18S: SE PERF. DRAIN 2

Runoff = 0.52 cfs @ 12.09 hrs, Volume= 1,752 cf, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

	Area (sf)	CN	Description
	4,255	98	Roofs, HSG A
*	21,049	63	Crushed Stone Surface, HSG A
	25,304	69	Weighted Average
	21,049		83.18% Pervious Area
	4,255		16.82% Impervious Area

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

Summary for Subcatchment 20S: SR4

Runoff = 0.13 cfs @ 12.07 hrs, Volume= 445 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
1,745	98	Concrete Containment
1,745		100.00% Impervious Area

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

Summary for Subcatchment 21S: XFMR 1

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 686 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
2,694	98	Concrete Containment
2,694		100.00% Impervious Area

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

Summary for Subcatchment 22S: SR5

Runoff = 0.13 cfs @ 12.07 hrs, Volume= 445 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
1,745	98	Concrete Containment
1,745		100.00% Impervious Area

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

Summary for Subcatchment 23S: XFMR 2

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 686 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
2,694	98	Concrete Containment
2,694		100.00% Impervious Area

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

Summary for Subcatchment 24S: XFMR 3

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 686 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
2,694	98	Concrete Containment
2,694		100.00% Impervious Area

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

Summary for Subcatchment 25S: SR6

Runoff = 0.13 cfs @ 12.07 hrs, Volume= 445 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
1,745	98	Concrete Containment
1,745		100.00% Impervious Area

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

Summary for Subcatchment 26S: SR1

Runoff = 0.12 cfs @ 12.07 hrs, Volume= 408 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
1,600	98	Concrete Containment
1,600		100.00% Impervious Area

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

Summary for Subcatchment 27S: SR2

Runoff = 0.12 cfs @ 12.07 hrs, Volume= 408 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
1,600	98	Concrete Containment
1,600		100.00% Impervious Area

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

Summary for Subcatchment 28S: SR3

Runoff = 0.12 cfs @ 12.07 hrs, Volume= 408 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
1,600	98	Concrete Containment
1,600		100.00% Impervious Area

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

Summary for Subcatchment 29S: STATCOM 1 TRANSFORMER

Runoff = 0.13 cfs @ 12.07 hrs, Volume= 451 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
1,770	98	Concrete Containment
1,770		100.00% Impervious Area

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

Summary for Subcatchment 30S: STATCOM 2 TRANSFORMER

Runoff = 0.13 cfs @ 12.07 hrs, Volume= 451 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
1,770	98	Concrete Containment
1,770		100.00% Impervious Area

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

Summary for Subcatchment 31S: STATCOM 3 TRANSFORMER

Runoff = 0.13 cfs @ 12.07 hrs, Volume= 451 cf, Depth= 3.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr NRCC 2YR 24H Rainfall=3.29"

Area (sf)	CN	Description
1,770	98	Concrete Containment
1,770		100.00% Impervious Area

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

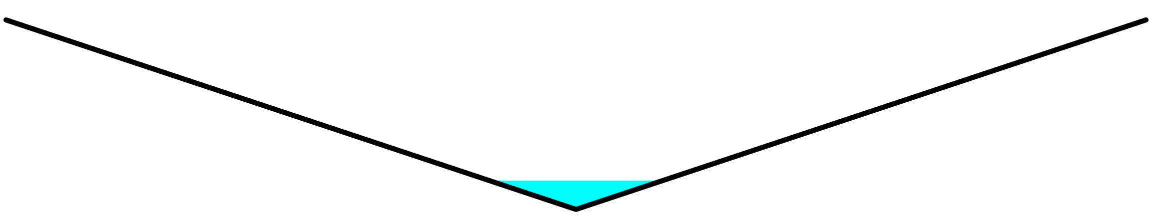
Summary for Reach 1R: S SWALE PART 1

Inflow Area = 21,901 sf, 0.00% Impervious, Inflow Depth = 0.31" for NRCC 2YR 24H event
Inflow = 0.07 cfs @ 12.29 hrs, Volume= 563 cf
Outflow = 0.07 cfs @ 12.37 hrs, Volume= 563 cf, Atten= 4%, Lag= 4.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.00 fps, Min. Travel Time= 5.1 min
Avg. Velocity = 0.58 fps, Avg. Travel Time= 8.8 min

Peak Storage= 21 cf @ 12.37 hrs
Average Depth at Peak Storage= 0.15'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 38.49 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 10.56 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 309.0' Slope= 0.0137 '/'
Inlet Invert= 174.13', Outlet Invert= 169.91'



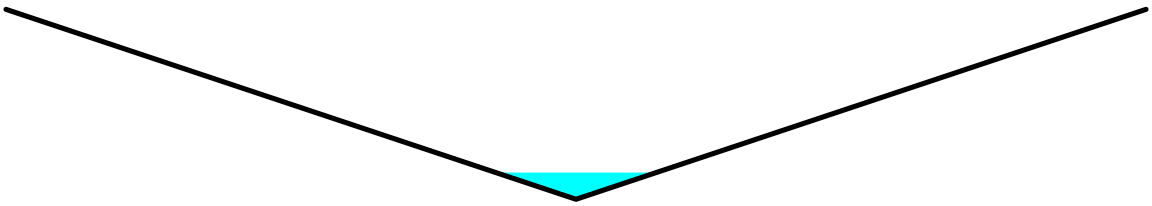
Summary for Reach 2R: S SWALE PART 2

Inflow Area = 59,308 sf, 0.00% Impervious, Inflow Depth = 0.12" for NRCC 2YR 24H event
Inflow = 0.07 cfs @ 12.37 hrs, Volume= 599 cf
Outflow = 0.07 cfs @ 12.42 hrs, Volume= 599 cf, Atten= 2%, Lag= 3.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.14 fps, Min. Travel Time= 3.8 min
Avg. Velocity = 0.67 fps, Avg. Travel Time= 6.4 min

Peak Storage= 15 cf @ 12.42 hrs
Average Depth at Peak Storage= 0.14'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 46.01 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 12.62 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 257.3' Slope= 0.0195 '/'
Inlet Invert= 169.90', Outlet Invert= 164.88'



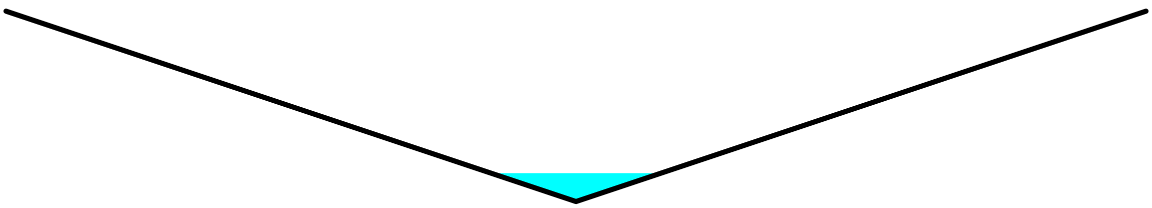
Summary for Reach 3R: S SWALE PART 3

Inflow Area =	87,839 sf,	0.00% Impervious, Inflow Depth = 0.12"	for NRCC 2YR 24H event
Inflow =	0.07 cfs @ 12.46 hrs, Volume=	850 cf	
Outflow =	0.07 cfs @ 12.53 hrs, Volume=	850 cf, Atten= 4%, Lag= 4.1 min	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.01 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 0.64 fps, Avg. Travel Time= 8.6 min

Peak Storage= 22 cf @ 12.53 hrs
Average Depth at Peak Storage= 0.15'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 39.24 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 10.77 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 329.0' Slope= 0.0142 '/'
Inlet Invert= 164.80', Outlet Invert= 160.13'



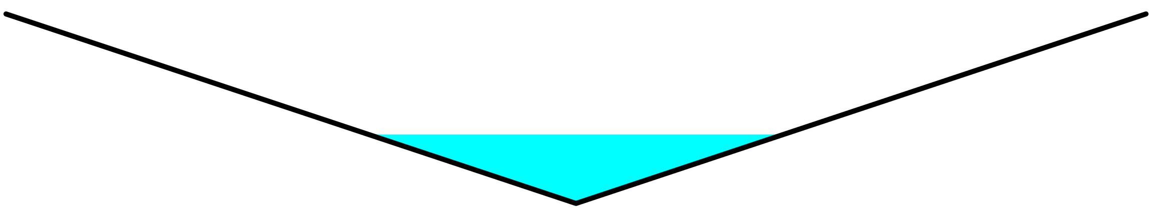
Summary for Reach 4R: S SWALE PART 4

Inflow Area = 125,461 sf, 0.00% Impervious, Inflow Depth = 0.36" for NRCC 2YR 24H event
Inflow = 0.78 cfs @ 12.09 hrs, Volume= 3,732 cf
Outflow = 0.68 cfs @ 12.14 hrs, Volume= 3,732 cf, Atten= 13%, Lag= 3.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.40 fps, Min. Travel Time= 4.4 min
Avg. Velocity = 0.61 fps, Avg. Travel Time= 10.1 min

Peak Storage= 177 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.40'
Defined Flood Depth= 2.00' Flow Area= 9.5 sf, Capacity= 31.59 cfs
Bank-Full Depth= 1.10' Flow Area= 3.6 sf, Capacity= 9.98 cfs

0.00' x 1.10' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.60'
Length= 367.8' Slope= 0.0073 '/'
Inlet Invert= 157.70', Outlet Invert= 155.00'



Summary for Reach 5R: DRAINAGE CHANNEL

Inflow Area = 497,238 sf, 11.68% Impervious, Inflow Depth = 0.64" for NRCC 2YR 24H event
Inflow = 6.76 cfs @ 12.09 hrs, Volume= 26,478 cf
Outflow = 6.70 cfs @ 12.10 hrs, Volume= 26,478 cf, Atten= 1%, Lag= 0.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.65 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 0.70 fps, Avg. Travel Time= 4.2 min

Peak Storage= 443 cf @ 12.10 hrs
Average Depth at Peak Storage= 0.13'
Defined Flood Depth= 1.00' Flow Area= 20.0 sf, Capacity= 198.63 cfs
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 198.63 cfs

20.00' x 1.00' deep channel, n= 0.078 Riprap, 12-inch
Length= 175.0' Slope= 0.3086 '/'
Inlet Invert= 145.00', Outlet Invert= 91.00'

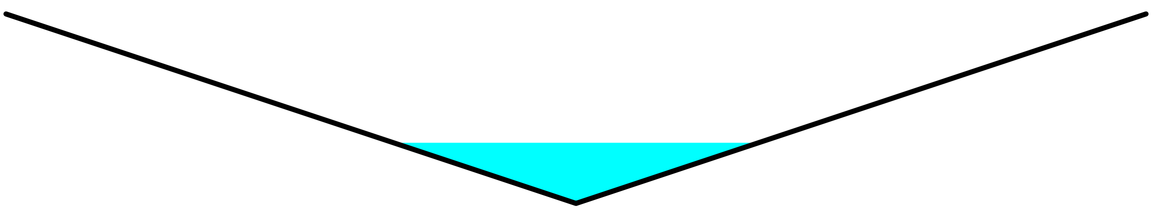
Summary for Reach 11R: N SWALE PART 1

Inflow Area = 15,778 sf, 0.00% Impervious, Inflow Depth = 1.47" for NRCC 2YR 24H event
Inflow = 0.62 cfs @ 12.09 hrs, Volume= 1,935 cf
Outflow = 0.54 cfs @ 12.14 hrs, Volume= 1,935 cf, Atten= 13%, Lag= 2.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.75 fps, Min. Travel Time= 4.3 min
Avg. Velocity = 0.71 fps, Avg. Travel Time= 10.5 min

Peak Storage= 138 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.32'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 40.78 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 11.19 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 447.0' Slope= 0.0153 '/'
Inlet Invert= 174.03', Outlet Invert= 167.18'



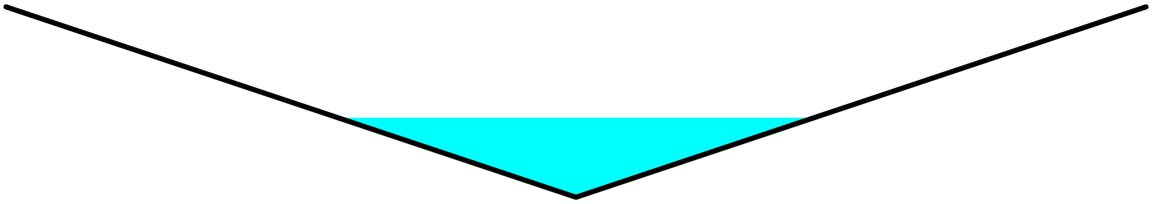
Summary for Reach 12R: N SWALE PART 2

Inflow Area = 29,879 sf, 0.00% Impervious, Inflow Depth = 1.57" for NRCC 2YR 24H event
Inflow = 1.13 cfs @ 12.11 hrs, Volume= 3,913 cf
Outflow = 1.03 cfs @ 12.16 hrs, Volume= 3,913 cf, Atten= 9%, Lag= 2.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 1.97 fps, Min. Travel Time= 3.6 min
Avg. Velocity = 0.76 fps, Avg. Travel Time= 9.5 min

Peak Storage= 226 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.42'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 38.60 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 10.59 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 431.0' Slope= 0.0137 '/'
Inlet Invert= 167.10', Outlet Invert= 161.18'



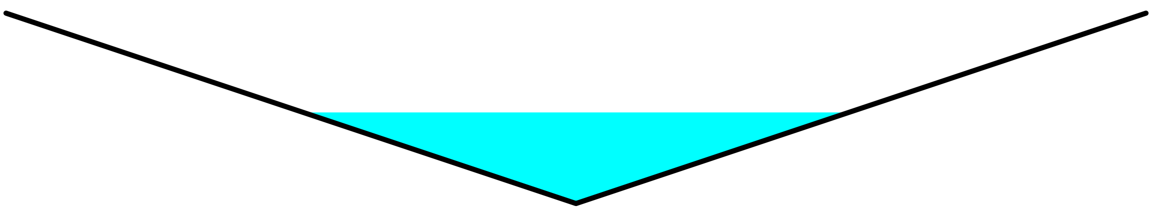
Summary for Reach 13R: N SWALE PART 3

Inflow Area = 42,618 sf, 0.00% Impervious, Inflow Depth = 1.60" for NRCC 2YR 24H event
Inflow = 1.53 cfs @ 12.13 hrs, Volume= 5,700 cf
Outflow = 1.45 cfs @ 12.17 hrs, Volume= 5,700 cf, Atten= 5%, Lag= 2.4 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.11 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 0.79 fps, Avg. Travel Time= 8.1 min

Peak Storage= 265 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.48'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 37.64 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 10.33 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 386.0' Slope= 0.0131 '/'
Inlet Invert= 161.10', Outlet Invert= 156.06'



Summary for Pond 1P: DETENTION AREA - LOCALIZED DEPRESSION NE

Inflow Area = 782,870 sf, 7.42% Impervious, Inflow Depth = 0.41" for NRCC 2YR 24H event
Inflow = 6.70 cfs @ 12.10 hrs, Volume= 26,478 cf
Outflow = 0.47 cfs @ 15.13 hrs, Volume= 26,478 cf, Atten= 93%, Lag= 181.7 min
Discarded = 0.47 cfs @ 15.13 hrs, Volume= 26,478 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 86.09' @ 15.13 hrs Surf.Area= 8,395 sf Storage= 12,721 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 351.3 min (1,187.3 - 836.0)

Volume	Invert	Avail.Storage	Storage Description
#1	83.00'	125,742 cf	**Custom Stage Data (Irregular)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
83.00	827	135.0	0	0	827
84.00	2,756	217.0	1,698	1,698	3,131
85.00	5,016	298.0	3,830	5,528	6,460
86.00	8,057	383.0	6,477	12,004	11,079
87.00	12,347	488.0	10,126	22,130	18,370
88.00	17,968	589.0	15,070	37,200	27,043
89.00	25,096	690.0	21,433	58,633	37,342
90.00	33,858	865.0	29,368	88,001	59,011
91.00	41,761	936.1	37,740	125,742	69,242

Device	Routing	Invert	Outlet Devices
#1	Discarded	83.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	90.60'	**50.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=0.47 cfs @ 15.13 hrs HW=86.09' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.47 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=83.00' TW=0.00' (Dynamic Tailwater)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: SEDIMENT FOREBAY

Inflow Area = 168,079 sf, 0.00% Impervious, Inflow Depth = 0.67" for NRCC 2YR 24H event
Inflow = 2.11 cfs @ 12.16 hrs, Volume= 9,431 cf
Outflow = 0.12 cfs @ 16.35 hrs, Volume= 9,433 cf, Atten= 94%, Lag= 251.0 min
Discarded = 0.12 cfs @ 16.35 hrs, Volume= 9,433 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 148.32' @ 16.35 hrs Surf.Area= 2,238 sf Storage= 4,904 cf
Flood Elev= 151.00' Surf.Area= 2,531 sf Storage= 11,301 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 423.8 min (1,292.8 - 868.9)

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	22,348 cf	**Custom Stage Data (Conic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
146.00	2,000	0	0	2,000
155.00	3,000	22,348	22,348	3,876

Device	Routing	Invert	Outlet Devices
#1	Discarded	146.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	150.00'	**20.0' long x 2.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
2.50 3.00 3.50
Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88
2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.12 cfs @ 16.35 hrs HW=148.32' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=146.00' TW=145.00' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 3P: DMHs w/ Vortex Unit

Inflow Area =	329,159 sf, 17.65% Impervious,	Inflow Depth = 0.97"	for NRCC 2YR 24H event
Inflow =	6.76 cfs @ 12.09 hrs, Volume=	26,478 cf	
Outflow =	6.76 cfs @ 12.09 hrs, Volume=	26,478 cf,	Atten= 0%, Lag= 0.0 min
Primary =	6.76 cfs @ 12.09 hrs, Volume=	26,478 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 148.98' @ 12.09 hrs
Flood Elev= 151.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	148.00'	**36.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 148.00' / 145.00' S= 0.1200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=6.75 cfs @ 12.09 hrs HW=148.98' TW=145.13' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 6.75 cfs @ 3.37 fps)

Summary for Pond 4P: DMH

Inflow Area =	329,159 sf, 17.65% Impervious,	Inflow Depth = 0.97"	for NRCC 2YR 24H event
Inflow =	6.76 cfs @ 12.09 hrs, Volume=	26,478 cf	
Outflow =	6.76 cfs @ 12.09 hrs, Volume=	26,478 cf,	Atten= 0%, Lag= 0.0 min
Primary =	6.76 cfs @ 12.09 hrs, Volume=	26,478 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 151.28' @ 12.09 hrs
Flood Elev= 158.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	150.30'	**36.0" Round Culvert** L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 150.30' / 148.00' S= 0.0639 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=6.75 cfs @ 12.09 hrs HW=151.28' TW=148.98' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 6.75 cfs @ 3.37 fps)

Summary for Pond 5P: DMH

Inflow Area = 216,616 sf, 16.26% Impervious, Inflow Depth = 0.97" for NRCC 2YR 24H event
Inflow = 4.21 cfs @ 12.09 hrs, Volume= 17,440 cf
Outflow = 4.21 cfs @ 12.09 hrs, Volume= 17,440 cf, Atten= 0%, Lag= 0.0 min
Primary = 4.21 cfs @ 12.09 hrs, Volume= 17,440 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 156.27' @ 12.09 hrs
Flood Elev= 161.58'

Device	Routing	Invert	Outlet Devices
#1	Primary	155.40'	**24.0" Round Culvert** L= 263.0' Ke= 0.500 Inlet / Outlet Invert= 155.40' / 150.50' S= 0.0186 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=4.20 cfs @ 12.09 hrs HW=156.27' TW=151.28' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 4.20 cfs @ 3.18 fps)

Summary for Pond 6P: OIL/WATER SEPARATOR

Inflow Area = 13,317 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 1.01 cfs @ 12.07 hrs, Volume= 3,393 cf
Outflow = 1.01 cfs @ 12.07 hrs, Volume= 3,393 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.01 cfs @ 12.07 hrs, Volume= 3,393 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 156.43' @ 12.09 hrs
Flood Elev= 162.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	155.90'	**24.0" Round Culvert** L= 27.0' Ke= 0.500 Inlet / Outlet Invert= 155.90' / 155.50' S= 0.0148 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=0.96 cfs @ 12.07 hrs HW=156.43' TW=156.26' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.96 cfs @ 2.19 fps)

Summary for Pond 7P: DMH

Inflow Area = 13,317 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 1.01 cfs @ 12.07 hrs, Volume= 3,393 cf
Outflow = 1.01 cfs @ 12.07 hrs, Volume= 3,393 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.01 cfs @ 12.07 hrs, Volume= 3,393 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 156.92' @ 12.08 hrs
Flood Elev= 162.77'

Device	Routing	Invert	Outlet Devices
#1	Primary	156.40'	**12.0" Round Culvert** L= 40.0' Ke= 0.500

Inlet / Outlet Invert= 156.40' / 156.00' S= 0.0100 '/' Cc= 0.900
n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.00 cfs @ 12.07 hrs HW=156.92' TW=156.43' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.00 cfs @ 3.49 fps)

Summary for Pond 8P: DMH

Inflow Area =	8,878 sf,100.00% Impervious,	Inflow Depth = 3.06"	for NRCC 2YR 24H event		
Inflow =	0.67 cfs @	12.07 hrs, Volume=	2,262 cf		
Outflow =	0.67 cfs @	12.07 hrs, Volume=	2,262 cf,	Atten= 0%,	Lag= 0.0 min
Primary =	0.67 cfs @	12.07 hrs, Volume=	2,262 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 157.93' @ 12.07 hrs
Flood Elev= 164.88'

Device	Routing	Invert	Outlet Devices
#1	Primary	157.50'	**12.0" Round Culvert** L= 154.0' Ke= 0.500 Inlet / Outlet Invert= 157.50' / 156.50' S= 0.0065 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.67 cfs @ 12.07 hrs HW=157.93' TW=156.92' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.67 cfs @ 3.08 fps)

Summary for Pond 9P: DMH

Inflow Area =	4,439 sf,100.00% Impervious,	Inflow Depth = 3.06"	for NRCC 2YR 24H event		
Inflow =	0.34 cfs @	12.07 hrs, Volume=	1,131 cf		
Outflow =	0.34 cfs @	12.07 hrs, Volume=	1,131 cf,	Atten= 0%,	Lag= 0.0 min
Primary =	0.34 cfs @	12.07 hrs, Volume=	1,131 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.59' @ 12.07 hrs
Flood Elev= 166.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.30'	**12.0" Round Culvert** L= 141.0' Ke= 0.500 Inlet / Outlet Invert= 159.30' / 158.00' S= 0.0092 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.34 cfs @ 12.07 hrs HW=159.59' TW=157.93' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.34 cfs @ 1.82 fps)

Summary for Pond 10P: 24" Petro-Barrier

Inflow Area =	1,745 sf,100.00% Impervious,	Inflow Depth = 3.06"	for NRCC 2YR 24H event		
Inflow =	0.13 cfs @	12.07 hrs, Volume=	445 cf		
Outflow =	0.13 cfs @	12.07 hrs, Volume=	445 cf,	Atten= 0%,	Lag= 0.0 min
Primary =	0.13 cfs @	12.07 hrs, Volume=	445 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 162.65' @ 12.07 hrs
Flood Elev= 169.43'

Device	Routing	Invert	Outlet Devices
#1	Primary	162.43'	**6.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 162.43' / 162.00' S= 0.0143 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.13 cfs @ 12.07 hrs HW=162.65' TW=159.59' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.13 cfs @ 1.60 fps)

Summary for Pond 11P: 24" Petro-Barrier

Inflow Area = 2,694 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 0.20 cfs @ 12.07 hrs, Volume= 686 cf
Outflow = 0.20 cfs @ 12.07 hrs, Volume= 686 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.20 cfs @ 12.07 hrs, Volume= 686 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.90' @ 12.07 hrs
Flood Elev= 168.62'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.62'	**6.0" Round Culvert** L= 18.0' Ke= 0.500 Inlet / Outlet Invert= 159.62' / 159.40' S= 0.0122 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.20 cfs @ 12.07 hrs HW=159.90' TW=159.59' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.20 cfs @ 1.80 fps)

Summary for Pond 12P: 24" Petro-Barrier

Inflow Area = 1,745 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 0.13 cfs @ 12.07 hrs, Volume= 445 cf
Outflow = 0.13 cfs @ 12.07 hrs, Volume= 445 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 12.07 hrs, Volume= 445 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 160.92' @ 12.07 hrs
Flood Elev= 167.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	160.70'	**6.0" Round Culvert** L= 32.0' Ke= 0.500 Inlet / Outlet Invert= 160.70' / 160.40' S= 0.0094 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.13 cfs @ 12.07 hrs HW=160.92' TW=157.93' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.13 cfs @ 1.60 fps)

Summary for Pond 13P: 24" Petro-Barrier

Inflow Area = 2,694 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 0.20 cfs @ 12.07 hrs, Volume= 686 cf
Outflow = 0.20 cfs @ 12.07 hrs, Volume= 686 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.20 cfs @ 12.07 hrs, Volume= 686 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 158.14' @ 12.07 hrs
Flood Elev= 166.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	157.83'	**6.0" Round Culvert** L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 157.83' / 157.60' S= 0.0115 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.20 cfs @ 12.07 hrs HW=158.14' TW=157.93' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.20 cfs @ 2.31 fps)

Summary for Pond 14P: 24" Petro-Barrier

Inflow Area = 2,694 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 0.20 cfs @ 12.07 hrs, Volume= 686 cf
Outflow = 0.20 cfs @ 12.07 hrs, Volume= 686 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.20 cfs @ 12.07 hrs, Volume= 686 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 157.17' @ 12.08 hrs
Flood Elev= 165.88'

Device	Routing	Invert	Outlet Devices
#1	Primary	156.88'	**6.0" Round Culvert** L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 156.88' / 156.60' S= 0.0133 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.20 cfs @ 12.07 hrs HW=157.17' TW=156.92' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.20 cfs @ 2.47 fps)

Summary for Pond 15P: 24" Petro-Barrier

Inflow Area = 1,745 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 0.13 cfs @ 12.07 hrs, Volume= 445 cf
Outflow = 0.13 cfs @ 12.07 hrs, Volume= 445 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 12.07 hrs, Volume= 445 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 157.88' @ 12.07 hrs
Flood Elev= 164.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	157.66'	**6.0" Round Culvert** L= 34.0' Ke= 0.500

Inlet / Outlet Invert= 157.66' / 157.40' S= 0.0076 '/' Cc= 0.900
n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.13 cfs @ 12.07 hrs HW=157.88' TW=156.92' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.13 cfs @ 2.30 fps)

Summary for Pond 16P: DMH

Inflow Area =	52,511 sf,	0.00% Impervious,	Inflow Depth = 0.56"	for NRCC 2YR 24H event
Inflow =	0.58 cfs @	12.11 hrs, Volume=	2,451 cf	
Outflow =	0.58 cfs @	12.11 hrs, Volume=	2,451 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.58 cfs @	12.11 hrs, Volume=	2,451 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.38' @ 12.11 hrs
Flood Elev= 162.19'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.00'	**12.0" Round Culvert** L= 17.0' Ke= 0.500 Inlet / Outlet Invert= 159.00' / 158.50' S= 0.0294 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.58 cfs @ 12.11 hrs HW=159.38' TW=156.27' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.58 cfs @ 2.11 fps)

Summary for Pond 17P: DMH

Inflow Area =	150,788 sf,	14.52% Impervious,	Inflow Depth = 0.92"	for NRCC 2YR 24H event
Inflow =	2.68 cfs @	12.10 hrs, Volume=	11,596 cf	
Outflow =	2.68 cfs @	12.10 hrs, Volume=	11,596 cf,	Atten= 0%, Lag= 0.0 min
Primary =	2.68 cfs @	12.10 hrs, Volume=	11,596 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 160.08' @ 12.10 hrs
Flood Elev= 163.59'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.40'	**24.0" Round Culvert** L= 88.2' Ke= 0.500 Inlet / Outlet Invert= 159.40' / 155.50' S= 0.0442 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=2.67 cfs @ 12.10 hrs HW=160.08' TW=156.27' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 2.67 cfs @ 2.82 fps)

Summary for Pond 18P: DMH

Inflow Area =	128,888 sf,	0.00% Impervious,	Inflow Depth = 0.56"	for NRCC 2YR 24H event
Inflow =	1.30 cfs @	12.15 hrs, Volume=	6,017 cf	
Outflow =	1.30 cfs @	12.15 hrs, Volume=	6,017 cf,	Atten= 0%, Lag= 0.0 min
Primary =	1.30 cfs @	12.15 hrs, Volume=	6,017 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 162.01' @ 12.15 hrs
Flood Elev= 165.39'

Device	Routing	Invert	Outlet Devices
#1	Primary	161.50'	**18.0" Round Culvert** L= 92.0' Ke= 0.500 Inlet / Outlet Invert= 161.50' / 159.50' S= 0.0217 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf

Primary OutFlow Max=1.30 cfs @ 12.15 hrs HW=162.01' TW=160.05' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.30 cfs @ 2.44 fps)

Summary for Pond 20P: DMH

Inflow Area =	102,433 sf, 12.46% Impervious,	Inflow Depth = 0.76"	for NRCC 2YR 24H event
Inflow =	1.82 cfs @ 12.09 hrs, Volume=	6,463 cf	
Outflow =	1.82 cfs @ 12.09 hrs, Volume=	6,463 cf,	Atten= 0%, Lag= 0.0 min
Primary =	1.82 cfs @ 12.09 hrs, Volume=	6,463 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 152.56' @ 12.09 hrs
Flood Elev= 158.03'

Device	Routing	Invert	Outlet Devices
#1	Primary	152.00'	**24.0" Round Culvert** L= 56.0' Ke= 0.500 Inlet / Outlet Invert= 152.00' / 150.40' S= 0.0286 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=1.82 cfs @ 12.09 hrs HW=152.56' TW=151.28' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.82 cfs @ 2.54 fps)

Summary for Pond 21P: DMH

Inflow Area =	25,304 sf, 16.82% Impervious,	Inflow Depth = 0.83"	for NRCC 2YR 24H event
Inflow =	0.52 cfs @ 12.09 hrs, Volume=	1,752 cf	
Outflow =	0.52 cfs @ 12.09 hrs, Volume=	1,752 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.52 cfs @ 12.09 hrs, Volume=	1,752 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 155.30' @ 12.09 hrs
Flood Elev= 157.94'

Device	Routing	Invert	Outlet Devices
#1	Primary	154.94'	**12.0" Round Culvert** L= 62.0' Ke= 0.500 Inlet / Outlet Invert= 154.94' / 152.40' S= 0.0410 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.52 cfs @ 12.09 hrs HW=155.30' TW=152.56' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.52 cfs @ 2.04 fps)

Summary for Pond 22P: DMH

Inflow Area = 77,129 sf, 11.04% Impervious, Inflow Depth = 0.73" for NRCC 2YR 24H event
Inflow = 1.30 cfs @ 12.10 hrs, Volume= 4,711 cf
Outflow = 1.30 cfs @ 12.10 hrs, Volume= 4,711 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.30 cfs @ 12.10 hrs, Volume= 4,711 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 156.01' @ 12.10 hrs
Flood Elev= 158.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	155.50'	**18.0" Round Culvert** L= 56.0' Ke= 0.500 Inlet / Outlet Invert= 155.50' / 155.00' S= 0.0089 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf

Primary OutFlow Max=1.30 cfs @ 12.10 hrs HW=156.01' TW=152.56' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 1.30 cfs @ 2.44 fps)

Summary for Pond 23P: OIL/WATER SEPARATOR

Inflow Area = 10,110 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 0.78 cfs @ 12.07 hrs, Volume= 2,576 cf
Outflow = 0.77 cfs @ 12.08 hrs, Volume= 2,575 cf, Atten= 2%, Lag= 0.6 min
Primary = 0.77 cfs @ 12.08 hrs, Volume= 2,575 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 151.35' @ 12.10 hrs
Flood Elev= 159.18'

Device	Routing	Invert	Outlet Devices
#1	Primary	141.80'	**12.0" Round Culvert** L= 182.0' Ke= 0.500 Inlet / Outlet Invert= 141.80' / 140.10' S= 0.0093 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.70 cfs @ 12.08 hrs HW=151.35' TW=151.28' (Dynamic Tailwater)
↑—**1=Culvert** (Outlet Controls 0.70 cfs @ 0.90 fps)

Summary for Pond 24P: DMH

Inflow Area = 10,110 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 0.77 cfs @ 12.07 hrs, Volume= 2,576 cf
Outflow = 0.78 cfs @ 12.07 hrs, Volume= 2,576 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.78 cfs @ 12.07 hrs, Volume= 2,576 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 151.39' @ 12.10 hrs
Flood Elev= 159.61'

Device	Routing	Invert	Outlet Devices
#1	Primary	150.20'	**12.0" Round Culvert** L= 1.0' Ke= 0.500

Inlet / Outlet Invert= 150.20' / 150.10' S= 0.1000 '/' Cc= 0.900
n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.45 cfs @ 12.07 hrs HW=151.34' TW=151.32' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.45 cfs @ 0.57 fps)

Summary for Pond 25P: 24" Petro-Barrier

Inflow Area = 1,770 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 0.13 cfs @ 12.07 hrs, Volume= 451 cf
Outflow = 0.13 cfs @ 12.07 hrs, Volume= 451 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 12.07 hrs, Volume= 451 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 151.42' @ 12.10 hrs
Flood Elev= 159.89'

Device	Routing	Invert	Outlet Devices
#1	Primary	150.89'	**6.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 150.89' / 150.30' S= 0.0102 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.05 cfs @ 12.07 hrs HW=151.34' TW=151.34' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.05 cfs @ 0.32 fps)

Summary for Pond 26P: 24" Petro-Barrier

Inflow Area = 1,770 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 0.13 cfs @ 12.07 hrs, Volume= 451 cf
Outflow = 0.13 cfs @ 12.07 hrs, Volume= 451 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 12.07 hrs, Volume= 451 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.20' @ 12.07 hrs
Flood Elev= 161.98'

Device	Routing	Invert	Outlet Devices
#1	Primary	152.98'	**6.0" Round Culvert** L= 17.0' Ke= 0.500 Inlet / Outlet Invert= 152.98' / 152.00' S= 0.0576 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.13 cfs @ 12.07 hrs HW=153.20' TW=151.34' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.13 cfs @ 1.60 fps)

Summary for Pond 27P: DMH

Inflow Area = 6,570 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 0.50 cfs @ 12.07 hrs, Volume= 1,674 cf
Outflow = 0.50 cfs @ 12.07 hrs, Volume= 1,674 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.50 cfs @ 12.07 hrs, Volume= 1,674 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 154.25' @ 12.07 hrs
Flood Elev= 162.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	153.90'	**12.0" Round Culvert** L= 224.0' Ke= 0.500 Inlet / Outlet Invert= 153.90' / 152.00' S= 0.0085 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.50 cfs @ 12.07 hrs HW=154.25' TW=151.34' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.50 cfs @ 2.02 fps)

Summary for Pond 28P: DMH

Inflow Area = 6,570 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 0.50 cfs @ 12.07 hrs, Volume= 1,674 cf
Outflow = 0.50 cfs @ 12.07 hrs, Volume= 1,674 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.50 cfs @ 12.07 hrs, Volume= 1,674 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 154.76' @ 12.07 hrs
Flood Elev= 163.41'

Device	Routing	Invert	Outlet Devices
#1	Primary	154.40'	**12.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 154.40' / 154.00' S= 0.0080 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.50 cfs @ 12.07 hrs HW=154.76' TW=154.25' (Dynamic Tailwater)
↑—**1=Culvert** (Barrel Controls 0.50 cfs @ 2.95 fps)

Summary for Pond 29P: 24" Petro-Barrier

Inflow Area = 1,770 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 0.13 cfs @ 12.07 hrs, Volume= 451 cf
Outflow = 0.13 cfs @ 12.07 hrs, Volume= 451 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.13 cfs @ 12.07 hrs, Volume= 451 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 155.17' @ 12.07 hrs
Flood Elev= 163.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	154.95'	**6.0" Round Culvert** L= 7.0' Ke= 0.500 Inlet / Outlet Invert= 154.95' / 154.50' S= 0.0643 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.13 cfs @ 12.07 hrs HW=155.17' TW=154.76' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.13 cfs @ 1.60 fps)

Summary for Pond 30P: DMH

Inflow Area = 4,800 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 0.36 cfs @ 12.07 hrs, Volume= 1,223 cf
Outflow = 0.36 cfs @ 12.07 hrs, Volume= 1,223 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.36 cfs @ 12.07 hrs, Volume= 1,223 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 160.70' @ 12.07 hrs
Flood Elev= 165.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	160.40'	**12.0" Round Culvert** L= 98.0' Ke= 0.500 Inlet / Outlet Invert= 160.40' / 159.50' S= 0.0092 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.36 cfs @ 12.07 hrs HW=160.70' TW=154.76' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.36 cfs @ 1.86 fps)

Summary for Pond 31P: DMH

Inflow Area = 4,800 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 0.36 cfs @ 12.07 hrs, Volume= 1,223 cf
Outflow = 0.36 cfs @ 12.07 hrs, Volume= 1,223 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.36 cfs @ 12.07 hrs, Volume= 1,223 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 162.21' @ 12.07 hrs
Flood Elev= 168.53'

Device	Routing	Invert	Outlet Devices
#1	Primary	161.90'	**12.0" Round Culvert** L= 232.0' Ke= 0.500 Inlet / Outlet Invert= 161.90' / 160.50' S= 0.0060 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.36 cfs @ 12.07 hrs HW=162.21' TW=160.70' (Dynamic Tailwater)
└─**1=Culvert** (Barrel Controls 0.36 cfs @ 2.68 fps)

Summary for Pond 32P: 24" Petro-Barrier

Inflow Area = 1,600 sf,100.00% Impervious, Inflow Depth = 3.06" for NRCC 2YR 24H event
Inflow = 0.12 cfs @ 12.07 hrs, Volume= 408 cf
Outflow = 0.12 cfs @ 12.07 hrs, Volume= 408 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.12 cfs @ 12.07 hrs, Volume= 408 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 162.65' @ 12.07 hrs
Flood Elev= 170.69'

Device	Routing	Invert	Outlet Devices
#1	Primary	162.44'	**6.0" Round Culvert** L= 10.0' Ke= 0.500

Inlet / Outlet Invert= 162.44' / 162.20' S= 0.0240 '/' Cc= 0.900
n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.12 cfs @ 12.07 hrs HW=162.65' TW=162.21' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.12 cfs @ 1.56 fps)

Summary for Pond 33P: DMH

Inflow Area =	3,200 sf,100.00% Impervious,	Inflow Depth = 3.06"	for NRCC 2YR 24H event	
Inflow =	0.24 cfs @	12.07 hrs, Volume=	815 cf	
Outflow =	0.24 cfs @	12.07 hrs, Volume=	815 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.24 cfs @	12.07 hrs, Volume=	815 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 163.44' @ 12.07 hrs
Flood Elev= 170.43'

Device	Routing	Invert	Outlet Devices
#1	Primary	163.20'	**12.0" Round Culvert** L= 159.0' Ke= 0.500 Inlet / Outlet Invert= 163.20' / 162.00' S= 0.0075 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.24 cfs @ 12.07 hrs HW=163.44' TW=162.21' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.24 cfs @ 1.67 fps)

Summary for Pond 34P: 24" Petro-Barrier

Inflow Area =	1,600 sf,100.00% Impervious,	Inflow Depth = 3.06"	for NRCC 2YR 24H event	
Inflow =	0.12 cfs @	12.07 hrs, Volume=	408 cf	
Outflow =	0.12 cfs @	12.07 hrs, Volume=	408 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.12 cfs @	12.07 hrs, Volume=	408 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 163.64' @ 12.07 hrs
Flood Elev= 171.68'

Device	Routing	Invert	Outlet Devices
#1	Primary	163.43'	**6.0" Round Culvert** L= 8.0' Ke= 0.500 Inlet / Outlet Invert= 163.43' / 163.30' S= 0.0162 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.12 cfs @ 12.07 hrs HW=163.64' TW=163.44' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.12 cfs @ 1.56 fps)

Summary for Pond 35P: 24" Petro-Barrier

Inflow Area =	1,600 sf,100.00% Impervious,	Inflow Depth = 3.06"	for NRCC 2YR 24H event	
Inflow =	0.12 cfs @	12.07 hrs, Volume=	408 cf	
Outflow =	0.12 cfs @	12.07 hrs, Volume=	408 cf,	Atten= 0%, Lag= 0.0 min
Primary =	0.12 cfs @	12.07 hrs, Volume=	408 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 164.60' @ 12.07 hrs
Flood Elev= 172.64'

Device	Routing	Invert	Outlet Devices
#1	Primary	164.39'	**6.0" Round Culvert** L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 164.39' / 164.00' S= 0.0103 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.12 cfs @ 12.07 hrs HW=164.60' TW=163.44' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.12 cfs @ 1.56 fps)

Summary for Pond 40P: DMH

Inflow Area = 105,170 sf, 0.00% Impervious, Inflow Depth = 0.32" for NRCC 2YR 24H event
Inflow = 0.64 cfs @ 12.08 hrs, Volume= 2,784 cf
Outflow = 0.64 cfs @ 12.08 hrs, Volume= 2,784 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.64 cfs @ 12.08 hrs, Volume= 2,784 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 158.22' @ 12.09 hrs
Flood Elev= 160.03'

Device	Routing	Invert	Outlet Devices
#1	Primary	158.00'	**24.0" W x 12.0" H Box Culvert** L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.00' / 157.70' S= 0.0300 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 2.00 sf

Primary OutFlow Max=0.63 cfs @ 12.08 hrs HW=158.22' TW=158.07' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.63 cfs @ 1.44 fps)

Summary for Pond 41P: CULVERT

Inflow Area = 87,839 sf, 0.00% Impervious, Inflow Depth = 0.12" for NRCC 2YR 24H event
Inflow = 0.07 cfs @ 12.53 hrs, Volume= 850 cf
Outflow = 0.07 cfs @ 12.53 hrs, Volume= 850 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.07 cfs @ 12.53 hrs, Volume= 850 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.05' @ 12.53 hrs
Flood Elev= 161.08'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.00'	**24.0" W x 12.0" H Box Culvert** L= 55.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.00' / 158.00' S= 0.0182 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 2.00 sf

Primary OutFlow Max=0.07 cfs @ 12.53 hrs HW=159.05' TW=158.10' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.07 cfs @ 0.70 fps)

Summary for Link 1L: OVERFLOW

Inflow Area = 782,870 sf, 7.42% Impervious, Inflow Depth = 0.00" for NRCC 2YR 24H event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link 10L: OFF-SITE

Inflow Area = 258,650 sf, 0.00% Impervious, Inflow Depth = 0.00" for NRCC 2YR 24H event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment 1S: AREA OUTSIDE Runoff Area=258,650 sf 0.00% Impervious Runoff Depth=0.62"
Tc=5.0 min CN=32 Runoff=1.49 cfs 13,345 cf

Subcatchment 2S: AREA OUTSIDE Runoff Area=285,632 sf 0.00% Impervious Runoff Depth=0.54"
Flow Length=491' Tc=12.3 min CN=31 Runoff=1.19 cfs 12,860 cf

Subcatchment 3S: S SWALE 1 Runoff Area=21,901 sf 0.00% Impervious Runoff Depth=3.03"
Flow Length=378' Slope=0.0200 '/' Tc=6.2 min CN=56 Runoff=1.72 cfs 5,536 cf

Subcatchment 4S: S SWALE 2 Runoff Area=37,407 sf 0.00% Impervious Runoff Depth=1.44"
Tc=5.0 min CN=41 Runoff=1.13 cfs 4,479 cf

Subcatchment 5S: S SWALE 3 Runoff Area=28,531 sf 0.00% Impervious Runoff Depth=2.16"
Flow Length=644' Slope=0.0200 '/' Tc=9.3 min CN=48 Runoff=1.32 cfs 5,131 cf

Subcatchment 6S: ACCESS RAMP Runoff Area=17,331 sf 0.00% Impervious Runoff Depth=5.58"
Tc=5.0 min CN=78 Runoff=2.67 cfs 8,053 cf

Subcatchment 7S: S SWALE 4 Runoff Area=20,291 sf 0.00% Impervious Runoff Depth=3.83"
Flow Length=644' Slope=0.0200 '/' Tc=9.3 min CN=63 Runoff=1.85 cfs 6,470 cf

Subcatchment 8S: N SWALE 1 Runoff Area=15,778 sf 0.00% Impervious Runoff Depth=5.81"
Flow Length=378' Slope=0.0200 '/' Tc=6.2 min CN=80 Runoff=2.41 cfs 7,643 cf

Subcatchment 9S: N SWALE 2 Runoff Area=14,101 sf 0.00% Impervious Runoff Depth=6.17"
Flow Length=378' Slope=0.0200 '/' Tc=6.2 min CN=83 Runoff=2.26 cfs 7,249 cf

Subcatchment 10S: N SWALE 3 Runoff Area=12,739 sf 0.00% Impervious Runoff Depth=6.17"
Flow Length=378' Slope=0.0200 '/' Tc=6.2 min CN=83 Runoff=2.04 cfs 6,548 cf

Subcatchment 11S: NW PERF. DRAIN Runoff Area=45,853 sf 0.00% Impervious Runoff Depth=3.83"
Flow Length=660' Slope=0.0200 '/' Tc=6.0 min CN=63 Runoff=4.70 cfs 14,622 cf

Subcatchment 12S: CENTRAL PERF. DRAIN Runoff Area=6,658 sf 0.00% Impervious Runoff Depth=3.83"
Tc=5.0 min CN=63 Runoff=0.71 cfs 2,123 cf

Subcatchment 13S: GIS BUILDINGS Runoff Area=21,900 sf 100.00% Impervious Runoff Depth=7.96"
Tc=5.0 min CN=98 Runoff=4.19 cfs 14,527 cf

Subcatchment 14S: GIS BLDGS PERF Runoff Area=74,801 sf 0.00% Impervious Runoff Depth=3.83"
Flow Length=570' Slope=0.0200 '/' Tc=8.4 min CN=63 Runoff=7.05 cfs 23,852 cf

Subcatchment 15S: CENTRAL PERF. DRAIN Runoff Area=54,087 sf 0.00% Impervious Runoff Depth=3.83"
Flow Length=570' Slope=0.0200 '/' Tc=8.4 min CN=63 Runoff=5.10 cfs 17,247 cf

Subcatchment 16S: N PERF. DRAIN Runoff Area=35,583 sf 0.57% Impervious Runoff Depth=3.83"
Tc=5.0 min CN=63 Runoff=3.78 cfs 11,347 cf

Subcatchment 17S: SE PERF. DRAIN 1 Runoff Area=41,546 sf 20.00% Impervious Runoff Depth=4.64"
Flow Length=425' Slope=0.0200 '/' Tc=5.9 min CN=70 Runoff=5.21 cfs 16,053 cf

Subcatchment 18S: SE PERF. DRAIN 2 Runoff Area=25,304 sf 16.82% Impervious Runoff Depth=4.52"
Tc=5.0 min CN=69 Runoff=3.19 cfs 9,531 cf

Subcatchment 20S: SR4 Runoff Area=1,745 sf 100.00% Impervious Runoff Depth=7.96"
Tc=5.0 min CN=98 Runoff=0.33 cfs 1,158 cf

Subcatchment 21S: XFMR 1 Runoff Area=2,694 sf 100.00% Impervious Runoff Depth=7.96"
Tc=5.0 min CN=98 Runoff=0.52 cfs 1,787 cf

Subcatchment 22S: SR5 Runoff Area=1,745 sf 100.00% Impervious Runoff Depth=7.96"
Tc=5.0 min CN=98 Runoff=0.33 cfs 1,158 cf

Subcatchment 23S: XFMR 2 Runoff Area=2,694 sf 100.00% Impervious Runoff Depth=7.96"
Tc=5.0 min CN=98 Runoff=0.52 cfs 1,787 cf

Subcatchment 24S: XFMR 3 Runoff Area=2,694 sf 100.00% Impervious Runoff Depth=7.96"
Tc=5.0 min CN=98 Runoff=0.52 cfs 1,787 cf

Subcatchment 25S: SR6 Runoff Area=1,745 sf 100.00% Impervious Runoff Depth=7.96"
Tc=5.0 min CN=98 Runoff=0.33 cfs 1,158 cf

Subcatchment 26S: SR1 Runoff Area=1,600 sf 100.00% Impervious Runoff Depth=7.96"
Tc=5.0 min CN=98 Runoff=0.31 cfs 1,061 cf

Subcatchment 27S: SR2 Runoff Area=1,600 sf 100.00% Impervious Runoff Depth=7.96"
Tc=5.0 min CN=98 Runoff=0.31 cfs 1,061 cf

Subcatchment 28S: SR3 Runoff Area=1,600 sf 100.00% Impervious Runoff Depth=7.96"
Tc=5.0 min CN=98 Runoff=0.31 cfs 1,061 cf

Subcatchment 29S: STATCOM 1 Runoff Area=1,770 sf 100.00% Impervious Runoff Depth=7.96"
Tc=5.0 min CN=98 Runoff=0.34 cfs 1,174 cf

Subcatchment 30S: STATCOM 2 Runoff Area=1,770 sf 100.00% Impervious Runoff Depth=7.96"
Tc=5.0 min CN=98 Runoff=0.34 cfs 1,174 cf

Subcatchment 31S: STATCOM 3 Runoff Area=1,770 sf 100.00% Impervious Runoff Depth=7.96"
Tc=5.0 min CN=98 Runoff=0.34 cfs 1,174 cf

Reach 1R: S SWALE PART 1 Avg. Flow Depth=0.50' Max Vel=2.21 fps Inflow=1.72 cfs 5,536 cf
n=0.030 L=309.0' S=0.0137 '/' Capacity=10.56 cfs Outflow=1.63 cfs 5,536 cf

Reach 2R: S SWALE PART 2 Avg. Flow Depth=0.56' Max Vel=2.85 fps Inflow=2.72 cfs 10,015 cf
n=0.030 L=257.3' S=0.0195 '/' Capacity=12.62 cfs Outflow=2.65 cfs 10,015 cf

Reach 3R: S SWALE PART 3 Avg. Flow Depth=0.68' Max Vel=2.77 fps Inflow=3.97 cfs 15,146 cf
n=0.030 L=329.0' S=0.0142 '/' Capacity=10.77 cfs Outflow=3.83 cfs 15,146 cf

Reach 4R: S SWALE PART 4 Avg. Flow Depth=0.98' Max Vel=2.54 fps Inflow=7.57 cfs 29,670 cf
n=0.030 L=367.8' S=0.0073 '/' Capacity=9.98 cfs Outflow=7.30 cfs 29,670 cf

Reach 5R: DRAINAGE CHANNEL Avg. Flow Depth=0.40' Max Vel=5.61 fps Inflow=45.25 cfs 159,166 cf
n=0.078 L=175.0' S=0.3086 '/' Capacity=198.63 cfs Outflow=45.12 cfs 159,166 cf

Reach 11R: N SWALE PART 1 Avg. Flow Depth=0.55' Max Vel=2.49 fps Inflow=2.41 cfs 7,643 cf
n=0.030 L=447.0' S=0.0153 '/' Capacity=11.19 cfs Outflow=2.23 cfs 7,643 cf

Reach 12R: N SWALE PART 2 Avg. Flow Depth=0.70' Max Vel=2.80 fps Inflow=4.40 cfs 14,891 cf
n=0.030 L=431.0' S=0.0137 '/' Capacity=10.59 cfs Outflow=4.17 cfs 14,891 cf

Reach 13R: N SWALE PART 3 Avg. Flow Depth=0.81' Max Vel=2.98 fps Inflow=6.03 cfs 21,440 cf
n=0.030 L=386.0' S=0.0131 '/' Capacity=10.33 cfs Outflow=5.82 cfs 21,440 cf

Pond 1P: DETENTION AREA - Peak Elev=90.51' Storage=106,144 cf Inflow=45.16 cfs 172,026 cf
Discarded=2.11 cfs 172,026 cf Primary=0.00 cfs 0 cf Outflow=2.11 cfs 172,026 cf

Pond 2P: SEDIMENT FOREBAY Peak Elev=150.39' Storage=9,783 cf Inflow=13.08 cfs 51,110 cf
Discarded=0.14 cfs 16,787 cf Primary=12.80 cfs 34,324 cf Outflow=12.94 cfs 51,111 cf

Pond 3P: DMHs w/ Vortex Unit Peak Elev=150.69' Inflow=37.29 cfs 124,842 cf
36.0" Round Culvert n=0.011 L=25.0' S=0.1200 '/' Outflow=37.29 cfs 124,842 cf

Pond 4P: DMH Peak Elev=152.99' Inflow=37.29 cfs 124,842 cf
36.0" Round Culvert n=0.011 L=36.0' S=0.0639 '/' Outflow=37.29 cfs 124,842 cf

Pond 5P: DMH Peak Elev=158.79' Inflow=23.40 cfs 81,205 cf
24.0" Round Culvert n=0.011 L=263.0' S=0.0186 '/' Outflow=23.40 cfs 81,205 cf

Pond 6P: OIL/WATER SEPARATOR Peak Elev=158.82' Inflow=2.55 cfs 8,834 cf
24.0" Round Culvert n=0.012 L=27.0' S=0.0148 '/' Outflow=2.55 cfs 8,834 cf

Pond 7P: DMH Peak Elev=159.15' Inflow=2.55 cfs 8,834 cf
12.0" Round Culvert n=0.011 L=40.0' S=0.0100 '/' Outflow=2.55 cfs 8,834 cf

Pond 8P: DMH Peak Elev=159.41' Inflow=1.70 cfs 5,889 cf
12.0" Round Culvert n=0.011 L=154.0' S=0.0065 '/' Outflow=1.70 cfs 5,889 cf

Pond 9P: DMH Peak Elev=159.85' Inflow=0.85 cfs 2,945 cf
12.0" Round Culvert n=0.011 L=141.0' S=0.0092 '/' Outflow=0.85 cfs 2,945 cf

Pond 10P: 24" Petro-Barrier Peak Elev=162.81' Inflow=0.33 cfs 1,158 cf
6.0" Round Culvert n=0.010 L=30.0' S=0.0143 '/' Outflow=0.33 cfs 1,158 cf

Pond 11P: 24" Petro-Barrier Peak Elev=160.17' Inflow=0.52 cfs 1,787 cf
6.0" Round Culvert n=0.010 L=18.0' S=0.0122 '/' Outflow=0.52 cfs 1,787 cf

Pond 12P: 24" Petro-Barrier Peak Elev=161.08' Inflow=0.33 cfs 1,158 cf
6.0" Round Culvert n=0.010 L=32.0' S=0.0094 '/' Outflow=0.33 cfs 1,158 cf

Pond 13P: 24" Petro-Barrier Peak Elev=159.60' Inflow=0.52 cfs 1,787 cf
6.0" Round Culvert n=0.010 L=20.0' S=0.0115 '/' Outflow=0.52 cfs 1,787 cf

Pond 14P: 24" Petro-Barrier Peak Elev=159.36' Inflow=0.52 cfs 1,787 cf
6.0" Round Culvert n=0.010 L=21.0' S=0.0133 '/' Outflow=0.52 cfs 1,787 cf

Pond 15P: 24" Petro-Barrier Peak Elev=159.25' Inflow=0.33 cfs 1,158 cf
6.0" Round Culvert n=0.010 L=34.0' S=0.0076 '/' Outflow=0.33 cfs 1,158 cf

Pond 16P: DMH Peak Elev=161.54' Inflow=5.40 cfs 16,745 cf
12.0" Round Culvert n=0.011 L=17.0' S=0.0294 '/' Outflow=5.40 cfs 16,745 cf

Pond 17P: DMH Peak Elev=161.48' Inflow=15.74 cfs 55,627 cf
24.0" Round Culvert n=0.011 L=88.2' S=0.0442 '/' Outflow=15.74 cfs 55,627 cf

Pond 18P: DMH Peak Elev=164.29' Inflow=12.14 cfs 41,100 cf
18.0" Round Culvert n=0.011 L=92.0' S=0.0217 '/' Outflow=12.14 cfs 41,100 cf

Pond 20P: DMH Peak Elev=153.81' Inflow=12.15 cfs 36,931 cf
24.0" Round Culvert n=0.011 L=56.0' S=0.0286 '/' Outflow=12.15 cfs 36,931 cf

Pond 21P: DMH Peak Elev=156.15' Inflow=3.19 cfs 9,531 cf
12.0" Round Culvert n=0.011 L=62.0' S=0.0410 '/' Outflow=3.19 cfs 9,531 cf

Pond 22P: DMH Peak Elev=157.36' Inflow=8.97 cfs 27,399 cf
18.0" Round Culvert n=0.011 L=56.0' S=0.0089 '/' Outflow=8.97 cfs 27,399 cf

Pond 23P: OIL/WATER SEPARATOR Peak Elev=153.49' Inflow=1.94 cfs 6,706 cf
12.0" Round Culvert n=0.011 L=182.0' S=0.0093 '/' Outflow=1.98 cfs 6,706 cf

Pond 24P: DMH Peak Elev=153.71' Inflow=1.94 cfs 6,706 cf
12.0" Round Culvert n=0.011 L=1.0' S=0.1000 '/' Outflow=1.94 cfs 6,706 cf

Pond 25P: 24" Petro-Barrier Peak Elev=153.87' Inflow=0.34 cfs 1,174 cf
6.0" Round Culvert n=0.010 L=58.0' S=0.0102 '/' Outflow=0.34 cfs 1,174 cf

Pond 26P: 24" Petro-Barrier Peak Elev=153.82' Inflow=0.34 cfs 1,174 cf
6.0" Round Culvert n=0.010 L=17.0' S=0.0576 '/' Outflow=0.34 cfs 1,174 cf

Pond 27P: DMH Peak Elev=154.58' Inflow=1.26 cfs 4,358 cf
12.0" Round Culvert n=0.011 L=224.0' S=0.0085 '/' Outflow=1.26 cfs 4,358 cf

Pond 28P: DMH Peak Elev=155.03' Inflow=1.26 cfs 4,358 cf
12.0" Round Culvert n=0.011 L=50.0' S=0.0080 '/' Outflow=1.26 cfs 4,358 cf

Pond 29P: 24" Petro-Barrier Peak Elev=155.33' Inflow=0.34 cfs 1,174 cf
6.0" Round Culvert n=0.010 L=7.0' S=0.0643 '/' Outflow=0.34 cfs 1,174 cf

Pond 30P: DMH Peak Elev=160.89' Inflow=0.92 cfs 3,184 cf
12.0" Round Culvert n=0.011 L=98.0' S=0.0092 '/' Outflow=0.92 cfs 3,184 cf

Pond 31P: DMH Peak Elev=162.40' Inflow=0.92 cfs 3,184 cf
12.0" Round Culvert n=0.011 L=232.0' S=0.0060 '/' Outflow=0.92 cfs 3,184 cf

Pond 32P: 24" Petro-Barrier Peak Elev=162.80' Inflow=0.31 cfs 1,061 cf
6.0" Round Culvert n=0.010 L=10.0' S=0.0240 '/' Outflow=0.31 cfs 1,061 cf

Pond 33P: DMH Peak Elev=163.59' Inflow=0.61 cfs 2,123 cf
12.0" Round Culvert n=0.011 L=159.0' S=0.0075 '/' Outflow=0.61 cfs 2,123 cf

Pond 34P: 24" Petro-Barrier Peak Elev=163.80' Inflow=0.31 cfs 1,061 cf
6.0" Round Culvert n=0.010 L=8.0' S=0.0162 '/' Outflow=0.31 cfs 1,061 cf

Pond 35P: 24" Petro-Barrier Peak Elev=164.75' Inflow=0.31 cfs 1,061 cf
6.0" Round Culvert n=0.010 L=38.0' S=0.0103 '/' Outflow=0.31 cfs 1,061 cf

Pond 40P: DMH Peak Elev=159.08' Inflow=5.72 cfs 23,199 cf
24.0" x 12.0" Box Culvert n=0.011 L=10.0' S=0.0300 '/' Outflow=5.72 cfs 23,199 cf

Pond 41P: CULVERT Peak Elev=159.71' Inflow=3.83 cfs 15,146 cf
24.0" x 12.0" Box Culvert n=0.011 L=55.0' S=0.0182 '/' Outflow=3.83 cfs 15,146 cf

Link 1L: OVERFLOW Inflow=0.00 cfs 0 cf
Primary=0.00 cfs 0 cf

Link 10L: OFF-SITE Inflow=1.49 cfs 13,345 cf
Primary=1.49 cfs 13,345 cf

Total Runoff Area = 1,041,520 sf Runoff Volume = 202,157 cf Average Runoff Depth = 2.33"
94.42% Pervious = 983,426 sf 5.58% Impervious = 58,094 sf

Summary for Subcatchment 1S: AREA OUTSIDE SUBSTATION - NOT TO POND

Runoff = 1.49 cfs @ 12.32 hrs, Volume= 13,345 cf, Depth= 0.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
179,269	30	Woods, Good, HSG A
72,994	30	Meadow, non-grazed, HSG A
6,387	96	Gravel surface, HSG A
258,650	32	Weighted Average
258,650		100.00% Pervious Area

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

Summary for Subcatchment 2S: AREA OUTSIDE SUBSTATION - TO POND

Runoff = 1.19 cfs @ 12.47 hrs, Volume= 12,860 cf, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
206,991	30	Woods, Good, HSG A
72,294	30	Meadow, non-grazed, HSG A
6,347	96	Gravel surface, HSG A
285,632	31	Weighted Average
285,632		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	50	0.5000	0.25		**Sheet Flow, Sheet** Woods: Light underbrush n= 0.400 P2= 3.29"
8.9	441	0.1100	0.83		**Shallow Concentrated Flow, Shallow Conc** Forest w/Heavy Litter Kv= 2.5 fps
12.3	491	Total			

Summary for Subcatchment 3S: S SWALE 1

Runoff = 1.72 cfs @ 12.10 hrs, Volume= 5,536 cf, Depth= 3.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

	Area (sf)	CN	Description
*	3,599	63	Crushed Stone Surface, HSG A
	6,746	96	Gravel surface, HSG A
	7,202	30	Woods, Good, HSG A
	4,354	30	Meadow, non-grazed, HSG A
	21,901	56	Weighted Average
	21,901		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.9	328	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
6.2	378	Total			

Summary for Subcatchment 4S: S SWALE 2

Runoff = 1.13 cfs @ 12.10 hrs, Volume= 4,479 cf, Depth= 1.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

	Area (sf)	CN	Description
	5,160	96	Gravel surface, HSG A
*	2,578	63	Crushed Stone Surface, HSG A
	20,025	30	Woods, Good, HSG A
	9,644	30	Meadow, non-grazed, HSG A
	37,407	41	Weighted Average
	37,407		100.00% Pervious Area

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

Summary for Subcatchment 5S: S SWALE 3

Runoff = 1.32 cfs @ 12.14 hrs, Volume= 5,131 cf, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

	Area (sf)	CN	Description
*	3,335	63	Crushed Stone Surface, HSG A
	7,061	30	Woods, Good, HSG A
	6,315	96	Gravel surface, HSG A
	11,820	30	Meadow, non-grazed, HSG A
	28,531	48	Weighted Average
	28,531		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
7.0	594	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
9.3	644	Total			

Summary for Subcatchment 6S: ACCESS RAMP

Runoff = 2.67 cfs @ 12.07 hrs, Volume= 8,053 cf, Depth= 5.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
12,617	96	Gravel surface, HSG A
1,094	30	Woods, Good, HSG A
3,620	30	Meadow, non-grazed, HSG A
17,331	78	Weighted Average
17,331		100.00% Pervious Area

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

Summary for Subcatchment 7S: S SWALE 4

Runoff = 1.85 cfs @ 12.13 hrs, Volume= 6,470 cf, Depth= 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

	Area (sf)	CN	Description
*	6,230	63	Crushed Stone Surface, HSG A
	7,051	96	Gravel surface, HSG A
	7,010	30	Meadow, non-grazed, HSG A
	20,291	63	Weighted Average
	20,291		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
7.0	594	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
9.3	644	Total			

Summary for Subcatchment 8S: N SWALE 1

Runoff = 2.41 cfs @ 12.09 hrs, Volume= 7,643 cf, Depth= 5.81"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

	Area (sf)	CN	Description
*	4,949	63	Crushed Stone Surface, HSG A
	9,543	96	Gravel surface, HSG A
	1,286	30	Meadow, non-grazed, HSG A
	15,778	80	Weighted Average
	15,778		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.9	328	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
6.2	378	Total			

Summary for Subcatchment 9S: N SWALE 2

Runoff = 2.26 cfs @ 12.09 hrs, Volume= 7,249 cf, Depth= 6.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

	Area (sf)	CN	Description
*	5,475	63	Crushed Stone Surface, HSG A
	8,626	96	Gravel surface, HSG A
	14,101	83	Weighted Average
	14,101		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.9	328	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
6.2	378	Total			

Summary for Subcatchment 10S: N SWALE 3

Runoff = 2.04 cfs @ 12.09 hrs, Volume= 6,548 cf, Depth= 6.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

	Area (sf)	CN	Description
*	4,958	63	Crushed Stone Surface, HSG A
	7,781	96	Gravel surface, HSG A
	12,739	83	Weighted Average
	12,739		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.9	328	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
6.2	378	Total			

Summary for Subcatchment 11S: NW PERF. DRAIN

Runoff = 4.70 cfs @ 12.09 hrs, Volume= 14,622 cf, Depth= 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

	Area (sf)	CN	Description
*	45,853	63	Crushed Stone Surface, HSG A
	45,853		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.0	255	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
0.7	355	0.0200	8.34	6.55	**Pipe Channel, Perf Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
6.0	660	Total			

Summary for Subcatchment 12S: CENTRAL PERF. DRAIN 2

Runoff = 0.71 cfs @ 12.08 hrs, Volume= 2,123 cf, Depth= 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

	Area (sf)	CN	Description
*	6,658	63	Crushed Stone Surface, HSG A
	6,658		100.00% Pervious Area

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

Summary for Subcatchment 13S: GIS BUILDINGS

Runoff = 4.19 cfs @ 12.07 hrs, Volume= 14,527 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

	Area (sf)	CN	Description
	21,900	98	Roofs, HSG A
	21,900		100.00% Impervious Area

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

Summary for Subcatchment 14S: GIS BLDGS PERF DRAIN

Runoff = 7.05 cfs @ 12.12 hrs, Volume= 23,852 cf, Depth= 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

	Area (sf)	CN	Description
*	74,801	63	Crushed Stone Surface, HSG A
	74,801		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
6.1	520	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
8.4	570	Total			

Summary for Subcatchment 15S: CENTRAL PERF. DRAIN 1

Runoff = 5.10 cfs @ 12.12 hrs, Volume= 17,247 cf, Depth= 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

	Area (sf)	CN	Description
*	54,087	63	Crushed Stone Surface, HSG A
	54,087		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
6.1	520	0.0200	1.41		**Shallow Concentrated Flow, Shallow Conc** Nearly Bare & Untilled Kv= 10.0 fps
8.4	570	Total			

Summary for Subcatchment 16S: N PERF. DRAIN

Runoff = 3.78 cfs @ 12.08 hrs, Volume= 11,347 cf, Depth= 3.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

	Area (sf)	CN	Description
*	35,381	63	Crushed Stone Surface, HSG A
	202	98	Roofs, HSG A
	35,583	63	Weighted Average
	35,381		99.43% Pervious Area
	202		0.57% Impervious Area

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

Summary for Subcatchment 17S: SE PERF. DRAIN 1

Runoff = 5.21 cfs @ 12.09 hrs, Volume= 16,053 cf, Depth= 4.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

	Area (sf)	CN	Description
	8,310	98	Roofs, HSG A
*	33,236	63	Crushed Stone Surface, HSG A
	41,546	70	Weighted Average
	33,236		80.00% Pervious Area
	8,310		20.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	50	0.0200	0.36		**Sheet Flow, Sheet** Fallow n= 0.050 P2= 3.29"
3.5	300	0.0200	1.41		**Shallow Concentrated Flow, Shallow** Nearly Bare & Untilled Kv= 10.0 fps
0.1	75	0.0200	8.34	6.55	**Pipe Channel, Perf. Pipe** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
5.9	425	Total			

Summary for Subcatchment 18S: SE PERF. DRAIN 2

Runoff = 3.19 cfs @ 12.07 hrs, Volume= 9,531 cf, Depth= 4.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

	Area (sf)	CN	Description
	4,255	98	Roofs, HSG A
*	21,049	63	Crushed Stone Surface, HSG A
	25,304	69	Weighted Average
	21,049		83.18% Pervious Area
	4,255		16.82% Impervious Area

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

Summary for Subcatchment 20S: SR4

Runoff = 0.33 cfs @ 12.07 hrs, Volume= 1,158 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
1,745	98	Concrete Containment
1,745		100.00% Impervious Area

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

Summary for Subcatchment 21S: XFMR 1

Runoff = 0.52 cfs @ 12.07 hrs, Volume= 1,787 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
2,694	98	Concrete Containment
2,694		100.00% Impervious Area

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

Summary for Subcatchment 22S: SR5

Runoff = 0.33 cfs @ 12.07 hrs, Volume= 1,158 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
1,745	98	Concrete Containment
1,745		100.00% Impervious Area

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

Summary for Subcatchment 23S: XFMR 2

Runoff = 0.52 cfs @ 12.07 hrs, Volume= 1,787 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
2,694	98	Concrete Containment
2,694		100.00% Impervious Area

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

Summary for Subcatchment 24S: XFMR 3

Runoff = 0.52 cfs @ 12.07 hrs, Volume= 1,787 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
2,694	98	Concrete Containment
2,694		100.00% Impervious Area

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

Summary for Subcatchment 25S: SR6

Runoff = 0.33 cfs @ 12.07 hrs, Volume= 1,158 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
1,745	98	Concrete Containment
1,745		100.00% Impervious Area

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

Summary for Subcatchment 26S: SR1

Runoff = 0.31 cfs @ 12.07 hrs, Volume= 1,061 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
1,600	98	Concrete Containment
1,600		100.00% Impervious Area

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

Summary for Subcatchment 27S: SR2

Runoff = 0.31 cfs @ 12.07 hrs, Volume= 1,061 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
1,600	98	Concrete Containment
1,600		100.00% Impervious Area

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

Summary for Subcatchment 28S: SR3

Runoff = 0.31 cfs @ 12.07 hrs, Volume= 1,061 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
1,600	98	Concrete Containment
1,600		100.00% Impervious Area

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

Summary for Subcatchment 29S: STATCOM 1 TRANSFORMER

Runoff = 0.34 cfs @ 12.07 hrs, Volume= 1,174 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
1,770	98	Concrete Containment
1,770		100.00% Impervious Area

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

Summary for Subcatchment 30S: STATCOM 2 TRANSFORMER

Runoff = 0.34 cfs @ 12.07 hrs, Volume= 1,174 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
1,770	98	Concrete Containment
1,770		100.00% Impervious Area

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

Summary for Subcatchment 31S: STATCOM 3 TRANSFORMER

Runoff = 0.34 cfs @ 12.07 hrs, Volume= 1,174 cf, Depth= 7.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr RMAT 50-YR 24H TIER 3 Rainfall=8.20"

Area (sf)	CN	Description
1,770	98	Concrete Containment
1,770		100.00% Impervious Area

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

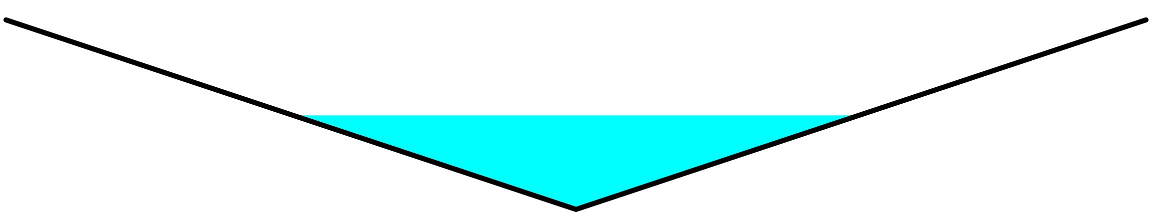
Summary for Reach 1R: S SWALE PART 1

Inflow Area = 21,901 sf, 0.00% Impervious, Inflow Depth = 3.03" for RMAT 50-YR 24H TIER 3 event
Inflow = 1.72 cfs @ 12.10 hrs, Volume= 5,536 cf
Outflow = 1.63 cfs @ 12.13 hrs, Volume= 5,536 cf, Atten= 5%, Lag= 1.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.21 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 0.91 fps, Avg. Travel Time= 5.7 min

Peak Storage= 228 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.50'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 38.49 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 10.56 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 309.0' Slope= 0.0137 '/'
Inlet Invert= 174.13', Outlet Invert= 169.91'



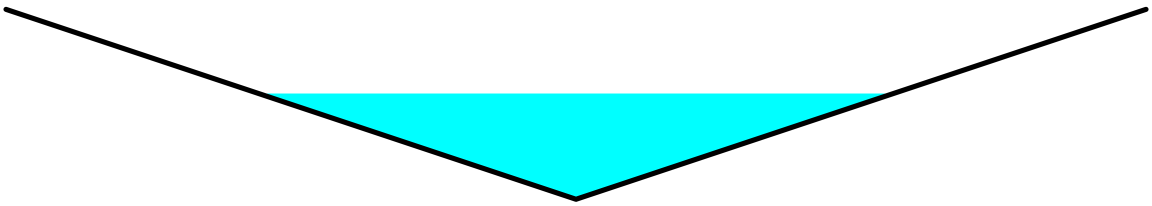
Summary for Reach 2R: S SWALE PART 2

Inflow Area = 59,308 sf, 0.00% Impervious, Inflow Depth = 2.03" for RMAT 50-YR 24H TIER 3 event
Inflow = 2.72 cfs @ 12.11 hrs, Volume= 10,015 cf
Outflow = 2.65 cfs @ 12.13 hrs, Volume= 10,015 cf, Atten= 2%, Lag= 1.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.85 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 1.19 fps, Avg. Travel Time= 3.6 min

Peak Storage= 239 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.56'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 46.01 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 12.62 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 257.3' Slope= 0.0195 '/'
Inlet Invert= 169.90', Outlet Invert= 164.88'



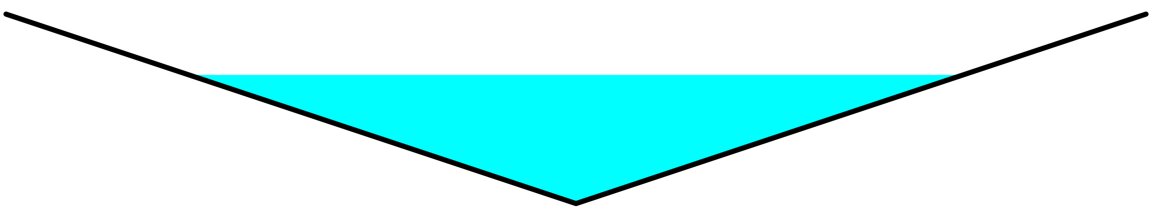
Summary for Reach 3R: S SWALE PART 3

Inflow Area =	87,839 sf,	0.00% Impervious,	Inflow Depth = 2.07"	for RMAT 50-YR 24H TIER 3 event	
Inflow =	3.97 cfs @	12.14 hrs,	Volume=	15,146 cf	
Outflow =	3.83 cfs @	12.16 hrs,	Volume=	15,146 cf,	Atten= 3%, Lag= 1.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.77 fps, Min. Travel Time= 2.0 min
Avg. Velocity = 1.12 fps, Avg. Travel Time= 4.9 min

Peak Storage= 455 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.68'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 39.24 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 10.77 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 329.0' Slope= 0.0142 '/'
Inlet Invert= 164.80', Outlet Invert= 160.13'



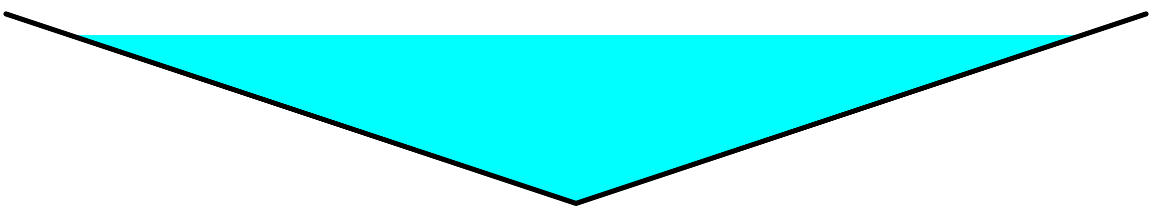
Summary for Reach 4R: S SWALE PART 4

Inflow Area = 125,461 sf, 0.00% Impervious, Inflow Depth = 2.84" for RMAT 50-YR 24H TIER 3 event
Inflow = 7.57 cfs @ 12.13 hrs, Volume= 29,670 cf
Outflow = 7.30 cfs @ 12.16 hrs, Volume= 29,670 cf, Atten= 4%, Lag= 1.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.54 fps, Min. Travel Time= 2.4 min
Avg. Velocity = 0.90 fps, Avg. Travel Time= 6.8 min

Peak Storage= 1,055 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.98'
Defined Flood Depth= 2.00' Flow Area= 9.5 sf, Capacity= 31.59 cfs
Bank-Full Depth= 1.10' Flow Area= 3.6 sf, Capacity= 9.98 cfs

0.00' x 1.10' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.60'
Length= 367.8' Slope= 0.0073 '/'
Inlet Invert= 157.70', Outlet Invert= 155.00'



Summary for Reach 5R: DRAINAGE CHANNEL

Inflow Area = 497,238 sf, 11.68% Impervious, Inflow Depth = 3.84" for RMAT 50-YR 24H TIER 3 event
Inflow = 45.25 cfs @ 12.13 hrs, Volume= 159,166 cf
Outflow = 45.12 cfs @ 12.13 hrs, Volume= 159,166 cf, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.61 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.19 fps, Avg. Travel Time= 2.5 min

Peak Storage= 1,407 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.40'
Defined Flood Depth= 1.00' Flow Area= 20.0 sf, Capacity= 198.63 cfs
Bank-Full Depth= 1.00' Flow Area= 20.0 sf, Capacity= 198.63 cfs

20.00' x 1.00' deep channel, n= 0.078 Riprap, 12-inch
Length= 175.0' Slope= 0.3086 '/'
Inlet Invert= 145.00', Outlet Invert= 91.00'

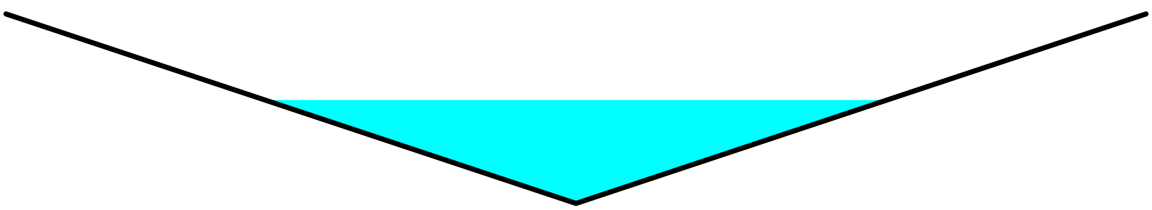
Summary for Reach 11R: N SWALE PART 1

Inflow Area = 15,778 sf, 0.00% Impervious, Inflow Depth = 5.81" for RMAT 50-YR 24H TIER 3 event
Inflow = 2.41 cfs @ 12.09 hrs, Volume= 7,643 cf
Outflow = 2.23 cfs @ 12.12 hrs, Volume= 7,643 cf, Atten= 8%, Lag= 2.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.49 fps, Min. Travel Time= 3.0 min
Avg. Velocity = 0.92 fps, Avg. Travel Time= 8.1 min

Peak Storage= 400 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.55'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 40.78 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 11.19 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 447.0' Slope= 0.0153 '/'
Inlet Invert= 174.03', Outlet Invert= 167.18'



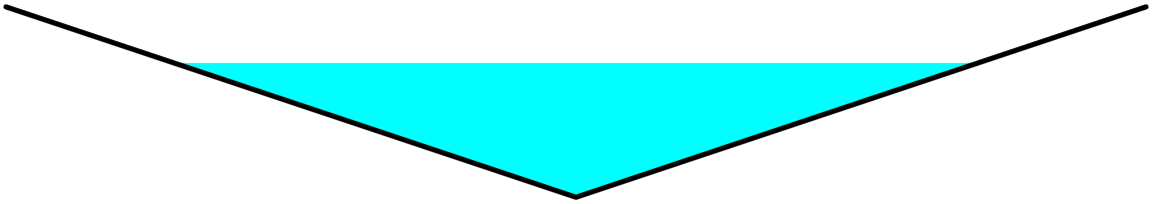
Summary for Reach 12R: N SWALE PART 2

Inflow Area = 29,879 sf, 0.00% Impervious, Inflow Depth = 5.98" for RMAT 50-YR 24H TIER 3 event
Inflow = 4.40 cfs @ 12.10 hrs, Volume= 14,891 cf
Outflow = 4.17 cfs @ 12.13 hrs, Volume= 14,891 cf, Atten= 5%, Lag= 1.9 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.80 fps, Min. Travel Time= 2.6 min
Avg. Velocity = 0.99 fps, Avg. Travel Time= 7.3 min

Peak Storage= 643 cf @ 12.13 hrs
Average Depth at Peak Storage= 0.70'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 38.60 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 10.59 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 431.0' Slope= 0.0137 '/'
Inlet Invert= 167.10', Outlet Invert= 161.18'



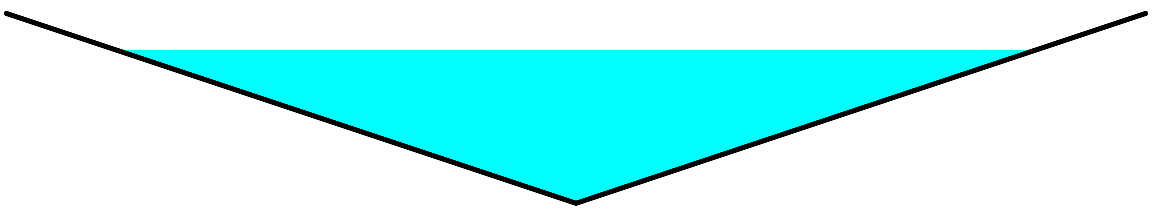
Summary for Reach 13R: N SWALE PART 3

Inflow Area = 42,618 sf, 0.00% Impervious, Inflow Depth = 6.04" for RMAT 50-YR 24H TIER 3 event
Inflow = 6.03 cfs @ 12.12 hrs, Volume= 21,440 cf
Outflow = 5.82 cfs @ 12.14 hrs, Volume= 21,440 cf, Atten= 3%, Lag= 1.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.98 fps, Min. Travel Time= 2.2 min
Avg. Velocity = 1.03 fps, Avg. Travel Time= 6.2 min

Peak Storage= 753 cf @ 12.14 hrs
Average Depth at Peak Storage= 0.81'
Defined Flood Depth= 2.00' Flow Area= 9.0 sf, Capacity= 37.64 cfs
Bank-Full Depth= 1.00' Flow Area= 3.0 sf, Capacity= 10.33 cfs

0.00' x 1.00' deep channel, n= 0.030 Earth, cobble bottom, clean sides
Side Slope Z-value= 3.0 '/' Top Width= 6.00'
Length= 386.0' Slope= 0.0131 '/'
Inlet Invert= 161.10', Outlet Invert= 156.06'



Summary for Pond 1P: DETENTION AREA - LOCALIZED DEPRESSION NE

Inflow Area = 782,870 sf, 7.42% Impervious, Inflow Depth = 2.64" for RMAT 50-YR 24H TIER 3 event
Inflow = 45.16 cfs @ 12.13 hrs, Volume= 172,026 cf
Outflow = 2.11 cfs @ 16.12 hrs, Volume= 172,026 cf, Atten= 95%, Lag= 239.4 min
Discarded = 2.11 cfs @ 16.12 hrs, Volume= 172,026 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 90.51' @ 16.12 hrs Surf.Area= 37,761 sf Storage= 106,144 cf

Plug-Flow detention time= 687.7 min calculated for 172,002 cf (100% of inflow)
Center-of-Mass det. time= 687.9 min (1,519.8 - 831.9)

Volume	Invert	Avail.Storage	Storage Description
#1	83.00'	125,742 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
83.00	827	135.0	0	0	827
84.00	2,756	217.0	1,698	1,698	3,131
85.00	5,016	298.0	3,830	5,528	6,460
86.00	8,057	383.0	6,477	12,004	11,079
87.00	12,347	488.0	10,126	22,130	18,370
88.00	17,968	589.0	15,070	37,200	27,043
89.00	25,096	690.0	21,433	58,633	37,342
90.00	33,858	865.0	29,368	88,001	59,011
91.00	41,761	936.1	37,740	125,742	69,242

Device	Routing	Invert	Outlet Devices
#1	Discarded	83.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	90.60'	**50.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Discarded OutFlow Max=2.11 cfs @ 16.12 hrs HW=90.51' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 2.11 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=83.00' TW=0.00' (Dynamic Tailwater)
↑—**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Pond 2P: SEDIMENT FOREBAY

Inflow Area = 168,079 sf, 0.00% Impervious, Inflow Depth = 3.65" for RMAT 50-YR 24H TIER 3 event
Inflow = 13.08 cfs @ 12.15 hrs, Volume= 51,110 cf
Outflow = 12.94 cfs @ 12.17 hrs, Volume= 51,111 cf, Atten= 1%, Lag= 1.1 min
Discarded = 0.14 cfs @ 12.17 hrs, Volume= 16,787 cf
Primary = 12.80 cfs @ 12.17 hrs, Volume= 34,324 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 150.39' @ 12.17 hrs Surf.Area= 2,463 sf Storage= 9,783 cf
Flood Elev= 151.00' Surf.Area= 2,531 sf Storage= 11,301 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 235.1 min (1,070.4 - 835.4)

Volume	Invert	Avail.Storage	Storage Description
#1	146.00'	22,348 cf	**Custom Stage Data (Conic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
146.00	2,000	0	0	2,000
155.00	3,000	22,348	22,348	3,876

Device	Routing	Invert	Outlet Devices
#1	Discarded	146.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	150.00'	**20.0' long x 2.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
2.50 3.00 3.50
Coef. (English) 2.54 2.61 2.61 2.60 2.66 2.70 2.77 2.89 2.88
2.85 3.07 3.20 3.32

Discarded OutFlow Max=0.14 cfs @ 12.17 hrs HW=150.39' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=12.79 cfs @ 12.17 hrs HW=150.39' TW=145.38' (Dynamic Tailwater)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 12.79 cfs @ 1.63 fps)

Summary for Pond 3P: DMHs w/ Vortex Unit

Inflow Area = 329,159 sf, 17.65% Impervious, Inflow Depth = 4.55" for RMAT 50-YR 24H TIER 3 event
Inflow = 37.29 cfs @ 12.09 hrs, Volume= 124,842 cf
Outflow = 37.29 cfs @ 12.09 hrs, Volume= 124,842 cf, Atten= 0%, Lag= 0.0 min
Primary = 37.29 cfs @ 12.09 hrs, Volume= 124,842 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 150.69' @ 12.09 hrs
Flood Elev= 151.05'

Device	Routing	Invert	Outlet Devices
#1	Primary	148.00'	**36.0" Round Culvert** L= 25.0' Ke= 0.500 Inlet / Outlet Invert= 148.00' / 145.00' S= 0.1200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=37.29 cfs @ 12.09 hrs HW=150.69' TW=145.36' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 37.29 cfs @ 5.58 fps)

Summary for Pond 4P: DMH

Inflow Area = 329,159 sf, 17.65% Impervious, Inflow Depth = 4.55" for RMAT 50-YR 24H TIER 3 event
Inflow = 37.29 cfs @ 12.09 hrs, Volume= 124,842 cf
Outflow = 37.29 cfs @ 12.09 hrs, Volume= 124,842 cf, Atten= 0%, Lag= 0.0 min
Primary = 37.29 cfs @ 12.09 hrs, Volume= 124,842 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 152.99' @ 12.09 hrs
Flood Elev= 158.10'

Device	Routing	Invert	Outlet Devices
#1	Primary	150.30'	**36.0" Round Culvert** L= 36.0' Ke= 0.500 Inlet / Outlet Invert= 150.30' / 148.00' S= 0.0639 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 7.07 sf

Primary OutFlow Max=37.29 cfs @ 12.09 hrs HW=152.99' TW=150.69' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 37.29 cfs @ 5.58 fps)

Summary for Pond 5P: DMH

Inflow Area = 216,616 sf, 16.26% Impervious, Inflow Depth = 4.50" for RMAT 50-YR 24H TIER 3 event
Inflow = 23.40 cfs @ 12.10 hrs, Volume= 81,205 cf
Outflow = 23.40 cfs @ 12.10 hrs, Volume= 81,205 cf, Atten= 0%, Lag= 0.0 min
Primary = 23.40 cfs @ 12.10 hrs, Volume= 81,205 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 158.79' @ 12.10 hrs
Flood Elev= 161.58'

Device	Routing	Invert	Outlet Devices
#1	Primary	155.40'	**24.0" Round Culvert** L= 263.0' Ke= 0.500 Inlet / Outlet Invert= 155.40' / 150.50' S= 0.0186 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=23.38 cfs @ 12.10 hrs HW=158.79' TW=152.97' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 23.38 cfs @ 7.44 fps)

Summary for Pond 6P: OIL/WATER SEPARATOR

Inflow Area = 13,317 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 2.55 cfs @ 12.07 hrs, Volume= 8,834 cf
Outflow = 2.55 cfs @ 12.07 hrs, Volume= 8,834 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.55 cfs @ 12.07 hrs, Volume= 8,834 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 158.82' @ 12.11 hrs
Flood Elev= 162.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	155.90'	**24.0" Round Culvert** L= 27.0' Ke= 0.500 Inlet / Outlet Invert= 155.90' / 155.50' S= 0.0148 '/' Cc= 0.900 n= 0.012, Flow Area= 3.14 sf

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=158.42' TW=158.57' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)

Summary for Pond 7P: DMH

Inflow Area = 13,317 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 2.55 cfs @ 12.07 hrs, Volume= 8,834 cf
Outflow = 2.55 cfs @ 12.07 hrs, Volume= 8,834 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.55 cfs @ 12.07 hrs, Volume= 8,834 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.15' @ 12.11 hrs
Flood Elev= 162.77'

Device	Routing	Invert	Outlet Devices
#1	Primary	156.40'	**12.0" Round Culvert** L= 40.0' Ke= 0.500

Inlet / Outlet Invert= 156.40' / 156.00' S= 0.0100 '/' Cc= 0.900
n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.86 cfs @ 12.07 hrs HW=158.66' TW=158.42' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.86 cfs @ 2.36 fps)

Summary for Pond 8P: DMH

Inflow Area = 8,878 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 1.70 cfs @ 12.07 hrs, Volume= 5,889 cf
Outflow = 1.70 cfs @ 12.07 hrs, Volume= 5,889 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.70 cfs @ 12.07 hrs, Volume= 5,889 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.41' @ 12.12 hrs
Flood Elev= 164.88'

Device	Routing	Invert	Outlet Devices
#1	Primary	157.50'	**12.0" Round Culvert** L= 154.0' Ke= 0.500 Inlet / Outlet Invert= 157.50' / 156.50' S= 0.0065 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.90 cfs @ 12.07 hrs HW=158.75' TW=158.66' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.90 cfs @ 1.18 fps)

Summary for Pond 9P: DMH

Inflow Area = 4,439 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.85 cfs @ 12.07 hrs, Volume= 2,945 cf
Outflow = 0.85 cfs @ 12.07 hrs, Volume= 2,945 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.85 cfs @ 12.07 hrs, Volume= 2,945 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.85' @ 12.12 hrs
Flood Elev= 166.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.30'	**12.0" Round Culvert** L= 141.0' Ke= 0.500 Inlet / Outlet Invert= 159.30' / 158.00' S= 0.0092 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.83 cfs @ 12.07 hrs HW=159.77' TW=158.75' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.83 cfs @ 3.33 fps)

Summary for Pond 10P: 24" Petro-Barrier

Inflow Area = 1,745 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.33 cfs @ 12.07 hrs, Volume= 1,158 cf
Outflow = 0.33 cfs @ 12.07 hrs, Volume= 1,158 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.33 cfs @ 12.07 hrs, Volume= 1,158 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 162.81' @ 12.07 hrs
Flood Elev= 169.43'

Device	Routing	Invert	Outlet Devices
#1	Primary	162.43'	**6.0" Round Culvert** L= 30.0' Ke= 0.500 Inlet / Outlet Invert= 162.43' / 162.00' S= 0.0143 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.33 cfs @ 12.07 hrs HW=162.81' TW=159.77' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.33 cfs @ 2.09 fps)

Summary for Pond 11P: 24" Petro-Barrier

Inflow Area = 2,694 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.52 cfs @ 12.07 hrs, Volume= 1,787 cf
Outflow = 0.52 cfs @ 12.07 hrs, Volume= 1,787 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.52 cfs @ 12.07 hrs, Volume= 1,787 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 160.17' @ 12.07 hrs
Flood Elev= 168.62'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.62'	**6.0" Round Culvert** L= 18.0' Ke= 0.500 Inlet / Outlet Invert= 159.62' / 159.40' S= 0.0122 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.52 cfs @ 12.07 hrs HW=160.17' TW=159.77' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.52 cfs @ 2.63 fps)

Summary for Pond 12P: 24" Petro-Barrier

Inflow Area = 1,745 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.33 cfs @ 12.07 hrs, Volume= 1,158 cf
Outflow = 0.33 cfs @ 12.07 hrs, Volume= 1,158 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.33 cfs @ 12.07 hrs, Volume= 1,158 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 161.08' @ 12.07 hrs
Flood Elev= 167.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	160.70'	**6.0" Round Culvert** L= 32.0' Ke= 0.500 Inlet / Outlet Invert= 160.70' / 160.40' S= 0.0094 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.33 cfs @ 12.07 hrs HW=161.08' TW=158.75' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.33 cfs @ 2.09 fps)

Summary for Pond 13P: 24" Petro-Barrier

Inflow Area = 2,694 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.52 cfs @ 12.07 hrs, Volume= 1,787 cf
Outflow = 0.52 cfs @ 12.07 hrs, Volume= 1,787 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.52 cfs @ 12.07 hrs, Volume= 1,787 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.60' @ 12.12 hrs
Flood Elev= 166.83'

Device	Routing	Invert	Outlet Devices
#1	Primary	157.83'	**6.0" Round Culvert** L= 20.0' Ke= 0.500 Inlet / Outlet Invert= 157.83' / 157.60' S= 0.0115 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.33 cfs @ 12.07 hrs HW=158.87' TW=158.75' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.33 cfs @ 1.66 fps)

Summary for Pond 14P: 24" Petro-Barrier

Inflow Area = 2,694 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.52 cfs @ 12.07 hrs, Volume= 1,787 cf
Outflow = 0.52 cfs @ 12.07 hrs, Volume= 1,787 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.52 cfs @ 12.07 hrs, Volume= 1,787 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.36' @ 12.12 hrs
Flood Elev= 165.88'

Device	Routing	Invert	Outlet Devices
#1	Primary	156.88'	**6.0" Round Culvert** L= 21.0' Ke= 0.500 Inlet / Outlet Invert= 156.88' / 156.60' S= 0.0133 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.23 cfs @ 12.07 hrs HW=158.72' TW=158.66' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.23 cfs @ 1.17 fps)

Summary for Pond 15P: 24" Petro-Barrier

Inflow Area = 1,745 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.33 cfs @ 12.07 hrs, Volume= 1,158 cf
Outflow = 0.33 cfs @ 12.07 hrs, Volume= 1,158 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.33 cfs @ 12.07 hrs, Volume= 1,158 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.25' @ 12.12 hrs
Flood Elev= 164.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	157.66'	**6.0" Round Culvert** L= 34.0' Ke= 0.500

Inlet / Outlet Invert= 157.66' / 157.40' S= 0.0076 '/' Cc= 0.900
n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.00 cfs @ 12.07 hrs HW=158.56' TW=158.66' (Dynamic Tailwater)
↑—**1=Culvert** (Controls 0.00 cfs)

Summary for Pond 16P: DMH

Inflow Area = 52,511 sf, 0.00% Impervious, Inflow Depth = 3.83" for RMAT 50-YR 24H TIER 3 event
Inflow = 5.40 cfs @ 12.09 hrs, Volume= 16,745 cf
Outflow = 5.40 cfs @ 12.09 hrs, Volume= 16,745 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.40 cfs @ 12.09 hrs, Volume= 16,745 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 161.54' @ 12.09 hrs
Flood Elev= 162.19'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.00'	**12.0" Round Culvert** L= 17.0' Ke= 0.500 Inlet / Outlet Invert= 159.00' / 158.50' S= 0.0294 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=5.39 cfs @ 12.09 hrs HW=161.53' TW=158.77' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 5.39 cfs @ 6.87 fps)

Summary for Pond 17P: DMH

Inflow Area = 150,788 sf, 14.52% Impervious, Inflow Depth = 4.43" for RMAT 50-YR 24H TIER 3 event
Inflow = 15.74 cfs @ 12.11 hrs, Volume= 55,627 cf
Outflow = 15.74 cfs @ 12.11 hrs, Volume= 55,627 cf, Atten= 0%, Lag= 0.0 min
Primary = 15.74 cfs @ 12.11 hrs, Volume= 55,627 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 161.48' @ 12.11 hrs
Flood Elev= 163.59'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.40'	**24.0" Round Culvert** L= 88.2' Ke= 0.500 Inlet / Outlet Invert= 159.40' / 155.50' S= 0.0442 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=15.72 cfs @ 12.11 hrs HW=161.48' TW=158.76' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 15.72 cfs @ 5.01 fps)

Summary for Pond 18P: DMH

Inflow Area = 128,888 sf, 0.00% Impervious, Inflow Depth = 3.83" for RMAT 50-YR 24H TIER 3 event
Inflow = 12.14 cfs @ 12.12 hrs, Volume= 41,100 cf
Outflow = 12.14 cfs @ 12.12 hrs, Volume= 41,100 cf, Atten= 0%, Lag= 0.0 min
Primary = 12.14 cfs @ 12.12 hrs, Volume= 41,100 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 164.29' @ 12.12 hrs
Flood Elev= 165.39'

Device	Routing	Invert	Outlet Devices
#1	Primary	161.50'	**18.0" Round Culvert** L= 92.0' Ke= 0.500 Inlet / Outlet Invert= 161.50' / 159.50' S= 0.0217 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf

Primary OutFlow Max=12.13 cfs @ 12.12 hrs HW=164.28' TW=161.46' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 12.13 cfs @ 6.86 fps)

Summary for Pond 20P: DMH

Inflow Area = 102,433 sf, 12.46% Impervious, Inflow Depth = 4.33" for RMAT 50-YR 24H TIER 3 event
Inflow = 12.15 cfs @ 12.08 hrs, Volume= 36,931 cf
Outflow = 12.15 cfs @ 12.08 hrs, Volume= 36,931 cf, Atten= 0%, Lag= 0.0 min
Primary = 12.15 cfs @ 12.08 hrs, Volume= 36,931 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.81' @ 12.09 hrs
Flood Elev= 158.03'

Device	Routing	Invert	Outlet Devices
#1	Primary	152.00'	**24.0" Round Culvert** L= 56.0' Ke= 0.500 Inlet / Outlet Invert= 152.00' / 150.40' S= 0.0286 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 3.14 sf

Primary OutFlow Max=11.88 cfs @ 12.08 hrs HW=153.80' TW=152.97' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 11.88 cfs @ 5.28 fps)

Summary for Pond 21P: DMH

Inflow Area = 25,304 sf, 16.82% Impervious, Inflow Depth = 4.52" for RMAT 50-YR 24H TIER 3 event
Inflow = 3.19 cfs @ 12.07 hrs, Volume= 9,531 cf
Outflow = 3.19 cfs @ 12.07 hrs, Volume= 9,531 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.19 cfs @ 12.07 hrs, Volume= 9,531 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 156.15' @ 12.07 hrs
Flood Elev= 157.94'

Device	Routing	Invert	Outlet Devices
#1	Primary	154.94'	**12.0" Round Culvert** L= 62.0' Ke= 0.500 Inlet / Outlet Invert= 154.94' / 152.40' S= 0.0410 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=3.19 cfs @ 12.07 hrs HW=156.15' TW=153.77' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 3.19 cfs @ 4.06 fps)

Summary for Pond 22P: DMH

Inflow Area = 77,129 sf, 11.04% Impervious, Inflow Depth = 4.26" for RMAT 50-YR 24H TIER 3 event
Inflow = 8.97 cfs @ 12.08 hrs, Volume= 27,399 cf
Outflow = 8.97 cfs @ 12.08 hrs, Volume= 27,399 cf, Atten= 0%, Lag= 0.0 min
Primary = 8.97 cfs @ 12.08 hrs, Volume= 27,399 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 157.36' @ 12.08 hrs
Flood Elev= 158.66'

Device	Routing	Invert	Outlet Devices
#1	Primary	155.50'	**18.0" Round Culvert** L= 56.0' Ke= 0.500 Inlet / Outlet Invert= 155.50' / 155.00' S= 0.0089 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 1.77 sf

Primary OutFlow Max=8.95 cfs @ 12.08 hrs HW=157.36' TW=153.80' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 8.95 cfs @ 5.07 fps)

Summary for Pond 23P: OIL/WATER SEPARATOR

Inflow Area = 10,110 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 1.94 cfs @ 12.07 hrs, Volume= 6,706 cf
Outflow = 1.98 cfs @ 12.07 hrs, Volume= 6,706 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.98 cfs @ 12.07 hrs, Volume= 6,706 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.49' @ 12.09 hrs
Flood Elev= 159.18'

Device	Routing	Invert	Outlet Devices
#1	Primary	141.80'	**12.0" Round Culvert** L= 182.0' Ke= 0.500 Inlet / Outlet Invert= 141.80' / 140.10' S= 0.0093 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.84 cfs @ 12.07 hrs HW=153.41' TW=152.93' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.84 cfs @ 2.34 fps)

Summary for Pond 24P: DMH

Inflow Area = 10,110 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 1.94 cfs @ 12.07 hrs, Volume= 6,706 cf
Outflow = 1.94 cfs @ 12.07 hrs, Volume= 6,706 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.94 cfs @ 12.07 hrs, Volume= 6,706 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.71' @ 12.10 hrs
Flood Elev= 159.61'

Device	Routing	Invert	Outlet Devices
#1	Primary	150.20'	**12.0" Round Culvert** L= 1.0' Ke= 0.500

Inlet / Outlet Invert= 150.20' / 150.10' S= 0.1000 '/' Cc= 0.900
n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.29 cfs @ 12.07 hrs HW=153.52' TW=153.41' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 1.29 cfs @ 1.65 fps)

Summary for Pond 25P: 24" Petro-Barrier

Inflow Area = 1,770 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.34 cfs @ 12.07 hrs, Volume= 1,174 cf
Outflow = 0.34 cfs @ 12.07 hrs, Volume= 1,174 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.34 cfs @ 12.07 hrs, Volume= 1,174 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.87' @ 12.11 hrs
Flood Elev= 159.89'

Device	Routing	Invert	Outlet Devices
#1	Primary	150.89'	**6.0" Round Culvert** L= 58.0' Ke= 0.500 Inlet / Outlet Invert= 150.89' / 150.30' S= 0.0102 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.23 cfs @ 12.07 hrs HW=153.62' TW=153.52' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.23 cfs @ 1.19 fps)

Summary for Pond 26P: 24" Petro-Barrier

Inflow Area = 1,770 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.34 cfs @ 12.07 hrs, Volume= 1,174 cf
Outflow = 0.34 cfs @ 12.07 hrs, Volume= 1,174 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.34 cfs @ 12.07 hrs, Volume= 1,174 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 153.82' @ 12.11 hrs
Flood Elev= 161.98'

Device	Routing	Invert	Outlet Devices
#1	Primary	152.98'	**6.0" Round Culvert** L= 17.0' Ke= 0.500 Inlet / Outlet Invert= 152.98' / 152.00' S= 0.0576 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.15 cfs @ 12.07 hrs HW=153.55' TW=153.52' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.15 cfs @ 0.79 fps)

Summary for Pond 27P: DMH

Inflow Area = 6,570 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 1.26 cfs @ 12.07 hrs, Volume= 4,358 cf
Outflow = 1.26 cfs @ 12.07 hrs, Volume= 4,358 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.26 cfs @ 12.07 hrs, Volume= 4,358 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 154.58' @ 12.09 hrs
Flood Elev= 162.35'

Device	Routing	Invert	Outlet Devices
#1	Primary	153.90'	**12.0" Round Culvert** L= 224.0' Ke= 0.500 Inlet / Outlet Invert= 153.90' / 152.00' S= 0.0085 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.20 cfs @ 12.07 hrs HW=154.55' TW=153.52' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.20 cfs @ 3.15 fps)

Summary for Pond 28P: DMH

Inflow Area = 6,570 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 1.26 cfs @ 12.07 hrs, Volume= 4,358 cf
Outflow = 1.26 cfs @ 12.07 hrs, Volume= 4,358 cf, Atten= 0%, Lag= 0.0 min
Primary = 1.26 cfs @ 12.07 hrs, Volume= 4,358 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 155.03' @ 12.08 hrs
Flood Elev= 163.41'

Device	Routing	Invert	Outlet Devices
#1	Primary	154.40'	**12.0" Round Culvert** L= 50.0' Ke= 0.500 Inlet / Outlet Invert= 154.40' / 154.00' S= 0.0080 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.22 cfs @ 12.07 hrs HW=155.02' TW=154.55' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 1.22 cfs @ 3.37 fps)

Summary for Pond 29P: 24" Petro-Barrier

Inflow Area = 1,770 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.34 cfs @ 12.07 hrs, Volume= 1,174 cf
Outflow = 0.34 cfs @ 12.07 hrs, Volume= 1,174 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.34 cfs @ 12.07 hrs, Volume= 1,174 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 155.33' @ 12.07 hrs
Flood Elev= 163.95'

Device	Routing	Invert	Outlet Devices
#1	Primary	154.95'	**6.0" Round Culvert** L= 7.0' Ke= 0.500 Inlet / Outlet Invert= 154.95' / 154.50' S= 0.0643 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.34 cfs @ 12.07 hrs HW=155.33' TW=155.02' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.34 cfs @ 2.10 fps)

Summary for Pond 30P: DMH

Inflow Area = 4,800 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.92 cfs @ 12.07 hrs, Volume= 3,184 cf
Outflow = 0.92 cfs @ 12.07 hrs, Volume= 3,184 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.92 cfs @ 12.07 hrs, Volume= 3,184 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 160.89' @ 12.07 hrs
Flood Elev= 165.34'

Device	Routing	Invert	Outlet Devices
#1	Primary	160.40'	**12.0" Round Culvert** L= 98.0' Ke= 0.500 Inlet / Outlet Invert= 160.40' / 159.50' S= 0.0092 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.92 cfs @ 12.07 hrs HW=160.89' TW=155.02' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.92 cfs @ 2.39 fps)

Summary for Pond 31P: DMH

Inflow Area = 4,800 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.92 cfs @ 12.07 hrs, Volume= 3,184 cf
Outflow = 0.92 cfs @ 12.07 hrs, Volume= 3,184 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.92 cfs @ 12.07 hrs, Volume= 3,184 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 162.40' @ 12.07 hrs
Flood Elev= 168.53'

Device	Routing	Invert	Outlet Devices
#1	Primary	161.90'	**12.0" Round Culvert** L= 232.0' Ke= 0.500 Inlet / Outlet Invert= 161.90' / 160.50' S= 0.0060 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.92 cfs @ 12.07 hrs HW=162.40' TW=160.89' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.92 cfs @ 3.41 fps)

Summary for Pond 32P: 24" Petro-Barrier

Inflow Area = 1,600 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.31 cfs @ 12.07 hrs, Volume= 1,061 cf
Outflow = 0.31 cfs @ 12.07 hrs, Volume= 1,061 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.31 cfs @ 12.07 hrs, Volume= 1,061 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 162.80' @ 12.07 hrs
Flood Elev= 170.69'

Device	Routing	Invert	Outlet Devices
#1	Primary	162.44'	**6.0" Round Culvert** L= 10.0' Ke= 0.500

Inlet / Outlet Invert= 162.44' / 162.20' S= 0.0240 '/' Cc= 0.900
n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.31 cfs @ 12.07 hrs HW=162.80' TW=162.40' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.31 cfs @ 2.04 fps)

Summary for Pond 33P: DMH

Inflow Area = 3,200 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.61 cfs @ 12.07 hrs, Volume= 2,123 cf
Outflow = 0.61 cfs @ 12.07 hrs, Volume= 2,123 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.61 cfs @ 12.07 hrs, Volume= 2,123 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 163.59' @ 12.07 hrs
Flood Elev= 170.43'

Device	Routing	Invert	Outlet Devices
#1	Primary	163.20'	**12.0" Round Culvert** L= 159.0' Ke= 0.500 Inlet / Outlet Invert= 163.20' / 162.00' S= 0.0075 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.61 cfs @ 12.07 hrs HW=163.59' TW=162.40' (Dynamic Tailwater)
└─**1=Culvert** (Inlet Controls 0.61 cfs @ 2.14 fps)

Summary for Pond 34P: 24" Petro-Barrier

Inflow Area = 1,600 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.31 cfs @ 12.07 hrs, Volume= 1,061 cf
Outflow = 0.31 cfs @ 12.07 hrs, Volume= 1,061 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.31 cfs @ 12.07 hrs, Volume= 1,061 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 163.80' @ 12.07 hrs
Flood Elev= 171.68'

Device	Routing	Invert	Outlet Devices
#1	Primary	163.43'	**6.0" Round Culvert** L= 8.0' Ke= 0.500 Inlet / Outlet Invert= 163.43' / 163.30' S= 0.0162 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.30 cfs @ 12.07 hrs HW=163.80' TW=163.59' (Dynamic Tailwater)
└─**1=Culvert** (Outlet Controls 0.30 cfs @ 2.70 fps)

Summary for Pond 35P: 24" Petro-Barrier

Inflow Area = 1,600 sf,100.00% Impervious, Inflow Depth = 7.96" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.31 cfs @ 12.07 hrs, Volume= 1,061 cf
Outflow = 0.31 cfs @ 12.07 hrs, Volume= 1,061 cf, Atten= 0%, Lag= 0.0 min
Primary = 0.31 cfs @ 12.07 hrs, Volume= 1,061 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 164.75' @ 12.07 hrs
Flood Elev= 172.64'

Device	Routing	Invert	Outlet Devices
#1	Primary	164.39'	**6.0" Round Culvert** L= 38.0' Ke= 0.500 Inlet / Outlet Invert= 164.39' / 164.00' S= 0.0103 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Primary OutFlow Max=0.31 cfs @ 12.07 hrs HW=164.75' TW=163.59' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 0.31 cfs @ 2.04 fps)

Summary for Pond 40P: DMH

Inflow Area = 105,170 sf, 0.00% Impervious, Inflow Depth = 2.65" for RMAT 50-YR 24H TIER 3 event
Inflow = 5.72 cfs @ 12.13 hrs, Volume= 23,199 cf
Outflow = 5.72 cfs @ 12.13 hrs, Volume= 23,199 cf, Atten= 0%, Lag= 0.0 min
Primary = 5.72 cfs @ 12.13 hrs, Volume= 23,199 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.08' @ 12.14 hrs
Flood Elev= 160.03'

Device	Routing	Invert	Outlet Devices
#1	Primary	158.00'	**24.0" W x 12.0" H Box Culvert** L= 10.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 158.00' / 157.70' S= 0.0300 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 2.00 sf

Primary OutFlow Max=5.66 cfs @ 12.13 hrs HW=159.07' TW=158.66' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 5.66 cfs @ 2.83 fps)

Summary for Pond 41P: CULVERT

Inflow Area = 87,839 sf, 0.00% Impervious, Inflow Depth = 2.07" for RMAT 50-YR 24H TIER 3 event
Inflow = 3.83 cfs @ 12.16 hrs, Volume= 15,146 cf
Outflow = 3.83 cfs @ 12.16 hrs, Volume= 15,146 cf, Atten= 0%, Lag= 0.0 min
Primary = 3.83 cfs @ 12.16 hrs, Volume= 15,146 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 159.71' @ 12.16 hrs
Flood Elev= 161.08'

Device	Routing	Invert	Outlet Devices
#1	Primary	159.00'	**24.0" W x 12.0" H Box Culvert** L= 55.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 159.00' / 158.00' S= 0.0182 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 2.00 sf

Primary OutFlow Max=3.83 cfs @ 12.16 hrs HW=159.71' TW=159.06' (Dynamic Tailwater)
↑—**1=Culvert** (Inlet Controls 3.83 cfs @ 2.70 fps)

Summary for Link 1L: OVERFLOW

Inflow Area = 782,870 sf, 7.42% Impervious, Inflow Depth = 0.00" for RMAT 50-YR 24H TIER 3 event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Summary for Link 10L: OFF-SITE

Inflow Area = 258,650 sf, 0.00% Impervious, Inflow Depth = 0.62" for RMAT 50-YR 24H TIER 3 event
Inflow = 1.49 cfs @ 12.32 hrs, Volume= 13,345 cf
Primary = 1.49 cfs @ 12.32 hrs, Volume= 13,345 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Section 3

Erosion & Sediment Control Plan

Erosion & Sedimentation Control Plan for the Stormwater Management Plan for 275/345KV Substation for New England Wind 2 Connector Project

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February 10, 2023

TABLE OF CONTENTS

1.0 – Plan Objectives

- To protect abutting properties, public ways and drainage infrastructure from construction related pollutant impacts generated from land disturbance and construction activities;
- Control existing, and potential erosion, sediment transport and pollutant impact events by installing and maintaining construction related Best Management Practices (BMP's) to reduce and/or prevent the discharge of stormwater pollutants into groundwater of the Commonwealth of Massachusetts;
- To protect surface stormwater quality, ground water quality, and minimize off-site sediment transport during construction;
- To prevent local and off-site flooding by controlling peak rates and volumes of stormwater runoff during construction; and
- To eliminate illicit discharges to stormwater drainage systems that may cause pollution during construction.

2.0 – Introduction

This Erosion and Sedimentation Control Plan (The "Plan") has been devised for the construction of a new substation consisting of gravel roadways, crushed stone surfacing, buildings, and electrical equipment for the proposed 275/245KV Substation for the New England Wind 2 Connector project.

The purpose of the Plan is to protect the surrounding environment from sediment-laden stormwater during construction of the electrical equipment and supporting infrastructure. The stormwater will be treated before release or infiltration, and surfaces stabilized to minimize erosive events by implementing, installing and maintaining construction related Best Management Practices (BMP's). These BMPs will reduce and/or prevent the discharge of stormwater pollutants into groundwater resources of the Commonwealth of Massachusetts. The BMP's are described in the MassDEP Stormwater Policy Manual as developed by the Massachusetts Department for Environmental Protection (MassDEP) and it is our belief that short-term construction related pollution prevention generated from this Site can be achieved.

3.0 - Current Site Conditions

The proposed project site is comprised of four adjacent properties in Barnstable, Massachusetts. Property areas, from west to east, are 5.4 acres, 7.3 acres, 7.5 acres and 3.4 acres. All 4 properties are currently entirely forested, with the exception of a small 'panhandle' spur in the north of the center property that is partially occupied by a clear-cut electrical easement. The proposed substation will occupy a portion of the areas of the properties, primarily in the south and center. An existing access road, leading from Oak Street to the fire tower at Clay Hill, passes the southern boundary of the three easternmost properties and will be connected to the proposed substation.

An Existing Conditions Tributary Area Plan is attached to the Stormwater Management Report. SCS Method[1] CN and time of concentration values were calculated to determine the peak runoff rates and volumes for each existing sub-catchment area.

The highest elevation at the Site is approximately 195' above mean sea level (msl) in the south of the site, while the lowest elevation is approximately 83' in the north-center of the site. Generally, much of the site topography slopes from the south to the low point in the north, although smaller sub-catchments are present along the boundaries of the site (see the Existing Conditions Plan, attached to the Stormwater Management Report, for more details).

4.0 - Project Description

4.1 - Proposed Project

The proposed project includes the construction of a new substation with electrical equipment, buildings, crushed stone surfaced area, gravel ring road and access road, and a paved driveway apron. The proposed project will also require significant re-grading and retaining structures in order to maintain a grade of no greater than 2 percent within the substation yard. The primary purpose of this project is to build a substation that will allow transmission of electrical energy while allowing safe and secure access to the site by authorized personnel.

The new electrical equipment area, and interior roads will be graded such that stormwater is directed to perforated drains beneath crushed rock surfacing on the site, and then contained on site in a detention/infiltration basin. For a complete description of the stormwater management and drainage facilities, refer to the Stormwater Management Plan.

The lot which is to be developed is already well vegetated with native species, however a landscape buffer will be maintained on the boundaries to the extent feasible so that some native woodland is preserved around the site.

All areas disturbed by construction activity shall be stabilized, and either paved, or covered with crushed stone, or planted and maintained. During site work construction, there will be a soil stockpile area and one temporary sediment basin at the northern end of the Site. The specific location, size, and design of these areas will be submitted as part of final Site design plans at a later date.

[1] Soil Conservation Service hydrologic method TR-55 was used to develop the Curve Number (CN) and Time of Concentration (Tc) values used for hydrologic analysis of pre-and post-development stormwater runoff values.

5.0 - Erosion & Sedimentation Control Plan

The contractor shall implement an Erosion and Sedimentation Control Plan that protects the surrounding environment from sediment laden stormwater runoff generated during construction activities and from other pollutants generated from construction activities such as litter and dust. Construction sequencing is part of managing a site as is implementing BMP's that assist in controlling construction related stormwater and pollutants.

5.1 - Major Construction Sequence for Site Work

The following sequence has been developed to contain all potential sedimentation and erosion incidents that could occur during the construction of the project. The contractor however is responsible to manage the site effectively to control offsite sediment transport which may not be included in this plan. The sequence will coordinate the work within the erosion barrier and coordinate other sedimentation control features to reduce the stress upon a silt fence or other deployed sediment barrier as well as limit off-site sediment transport or entry of construction related sediment to any catch basin located at the Site. The sequencing is as follows:

- Clear and grub such that a construction safety fence can be immediately installed around the property, to limit access and protect the public.
- Place an erosion control or sediment control barrier (straw wattle) at the limit of work where possible
- Carry out re-grading and expansion works to the Clay Hill fire tower access road, which is to be used for construction and permanent access to the proposed substation.
- Have a water truck on-site and use as necessary to minimize fugitive dust during excavation, demolition of existing pavement surfaces and general construction processes.
- Clear and grub, and remove top soils, and excavate as necessary to create the temporary sedimentation basin (at northern end of the Site) as intended to manage stormwater during the construction. Please note the location and design of this temporary basin will be determined during the final design phase of the project.
- Grade the gravel subbase for areas where a finished crushed stone surface will be placed (i.e. for the electrical equipment yard). Install retaining walls on the northern and southern ends (including partial sides) of the Site.
- Finalize grading of the site's sand & gravel sub-base surface, which will become the sub-base elevations of the substation.
- Install the footings and foundations for the proposed electrical equipment, containment areas, building, etc.
- Install all drainage features including the infiltration basin, deep sump catch basins, a vortex water quality unit, and two oil-water separators.

- Construct the proposed ring road and associated parking areas.
- Finalize grading within the confines of the substation yard, including the double washed crushed stone surface
- Clean up the Site, remove silt sacks, clean catch basin(s), and remove siltation barriers, construction entrance apron, and construction limit fencing.

The contractor has several procedures to perform in order to maintain the site. They include but are not limited to:

- Replace erosion control barriers at limit of work as needed. Barrier to be inspected on a weekly basis.
- Empty silt sacks that have been installed at any relevant catch basins after each rain event. Catch basins and manholes are to be cleaned once sediment occupies 1/2 the sump available. Structures are to be inspected on a weekly basis.
- Stone apron used for construction egress is to be replaced as sediment builds up; and this apron is to be inspected on a daily basis.
- All stockpiled soils (topsoil, special structural fill, etc.) are to be covered to minimize fugitive dust.
- All exposed slopes are to be stabilized with erosion control netting and/or temporary plantings.
- Maintain a covered dumpster on site to minimize windblown debris from littering neighborhood and resource areas.
- Have a water truck onsite for use during the demolition portion of the project and during rough grading to provide water to minimize fugitive dust.

5.2 - Best Management Practices

The contractor shall employ various types of structural and non-structural methodologies to minimize offsite pollution from construction activities. The following is a list of some BMP's that can be utilized; however, it is the contractor's responsibility to implement their strategies to minimize offsite sediment transport and fugitive dust and trash:

5.2.1 - Dumpster

The contractor shall have a dumpster on-site for the disposal of construction debris. The contractor shall cover the dumpster as needed to prevent wind-blown debris from becoming litter in the environment.

5.2.2 - Erosion Control Barrier

An erosion control barrier, as detailed on the project plans, shall be installed at the downgradient Limits of Work and used around the site as needed. In addition, a barrier of the same type shall be used around soil stockpiles and localized excavations on site. The barrier needs to be effective in controlling sediment transport and shall not be allowed to become strained or stressed as the project moves forward. The contractor shall inspect the barrier weekly or after a large storm event to identify any stressed areas and replace the barrier as needed. The barrier can be one or many of several types. Staked haybales, straw wattles, or geotextile fabric or a geotextile erosion control sock are typically acceptable types of barriers; and these shall be backed up by silt fence material placed on the interior side of the proposed construction fence. The contractor shall inspect erosion control barriers daily and repair the barriers as needed.

5.2.3 - Dust Control

The use of a water truck or other method to spray water over the site shall be implemented during the dry season to minimize blown dust. The water shall not be excessively spread so erosive forces occur. The contractor shall sweep new pavement once installed and cover stockpiled soils as needed to minimize dust.

5.2.4 - Disturbed Surface Maintenance

The contractor shall stabilize the ground surface as needed to prevent erosion. Stabilization of surfaces includes the placement of pavement, crushed stone in yard areas, rip rap, erosion control netting, wood bark or haymulch, and the establishment of vegetated surfaces. Upon the completion of construction of a phase, all surfaces should be stabilized even though it is apparent that future construction efforts will cause their disturbance. Vegetated cover should be established during the proper growing season and should be enhanced by soil adjustment for proper pH, nutrients and moisture content. Surfaces that are disturbed by erosion processes or vandalism should be stabilized as soon as possible. Areas where construction activities have permanently or temporarily ceased should be stabilized within 14 days from the date of last construction activity, except when construction activity will resume within 21 days (e.g., the total time that construction activity is temporarily ceased is less than 21 days). Haybale dikes or silt fences should be set where required to trap products of erosion and should be maintained on a continuing basis during the construction process. Wheel ruts should be filled in and graded to prevent concentration of stormwater runoff. Vehicle tracks leading downhill should be blocked during periods of intense precipitation by haybales, dikes or silt fences which should be constructed to entrap the sediment.

5.2.5 - Temporary Stormwater Controls

Generally, if possible, the contractor shall rough grade the site so as to not concentrate the stormwater runoff and cause erosive forces. The contractor shall use a level spreader or other temporary stormwater control device to treat construction site runoff for suspended solids. Once final installation of the stormwater BMPs occurs, which should be after base course paving is completed, they will need to be cleaned of all construction sediment before hydraulically connecting them to each other. The use of silt sacks on deep sump catch basins will help minimize the cleaning of the sump. Temporary sediment basins installed to assist in capturing construction site runoff will need to be cleaned of all sediment by over-excavation before they are backfilled and properly compacted back to proposed finished grades. If any infiltration basin area or other future construction zones are to be used as temporary stormwater management basins, then these areas shall be re-excavated prior to final construction to a depth necessary to completely remove any accumulated sediments and silts or impacts on existing soil that might have resulted from such accumulations during construction.

Section 4

Operations and Maintenance Plan for Proposed Stormwater BMPs

(to be submitted during final design)

Section 5

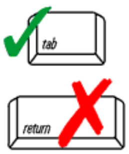
Massachusetts Checklist for Stormwater Report

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.

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[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.

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

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): ____________________

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 (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.

☐ 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 (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

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 (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)

☐ 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

☐ 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 (continued)

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

☐ 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 (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.

Section 6

Nitrogen Loading Calculation

Nitrogen Loading Calculation

December 16, 2022

Based on Cape Cod Commission Technical Bulletin 91-001 (April 1992)

Total Developed Area: 423,714 ft^2
Impervious Surfaces: Roof 34,667 ft^2, Concrete Containment 23,427 ft^2, Other Impervious areas 62,463 ft^2
Pervious Surfaces: 303,157 ft^2.
Wastewater Flows: N/A

Wastewater – 0 L/d

Lawns – 0 L/d

Impervious Surfaces –

Roof area, concrete containments, and other impervious areas

$$120{,}557 \text{ ft}^2 \text{ x} \left[\frac{40\ in}{yr}\right]\left[\frac{ft}{12\ in}\right]\left[\frac{28.32\ L}{ft^3}\right]\left[\frac{1\ yr}{365\ d}\right] = 31{,}179.7 \text{ L/d x} \left[\frac{0.75\ mg}{L}\right] = 23{,}384.8 \text{ mg/d}$$

Pervious Surfaces –

$$303{,}157 \text{ ft}^2 \text{ x} \left[\frac{18\ in}{yr}\right]\left[\frac{ft}{12\ in}\right]\left[\frac{28.32\ L}{ft^3}\right]\left[\frac{1\ yr}{365\ d}\right] = 35{,}282.5 \text{ L/d}$$

Summary

$$\frac{23{,}384.8\ mg}{31{,}179.7 + 35{,}282.5\ L} = \underline{0.35 \text{ ppm}}$$

APPENDED DRAWING SHEETS

SHEET 1	COVER SHEET
SHEET 2	GENERAL NOTES
SHEET 3	EXISTING CONDITIONS
SHEET 4	EXISTING SUBCATCHMENT AREAS
SHEET 5	PROPOSED EQUIPMENT LAYOUT
SHEETS 6-7	ACCESS ROAD LAYOUT & 345KV DUCT BANK LAYOUT
SHEET 8	PROPOSED GRADING AND DRAINAGE
SHEET 9	PROPOSED SUBCATCHMENT AREAS
SHEET 10	TYPICAL DETAIL SHEET

Attachment 4

Magnetic Field Analysis Report

Magnetic Field Modeling Analysis for the New England Wind 2 Connector Project

Prepared for

Epsilon Associates, Inc.
3 Mill & Main Place, Suite 250
Maynard, Massachusetts 01754

and

Commonwealth Wind
2701 Northwest Vaughn Street, Suite 300
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January 17, 2023

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Abbreviations

1W×4D	1-Wide-By-4-Deep
12W×1D	12-Wide-By-1-Deep
2W×4D	2-Wide-By-4-Deep
3W×4D	3-Wide-By-4-Deep
A	Ampere
AC	Alternating Current
BOEM	Bureau of Ocean Energy Management
CDEGS	Current Distribution, Electromagnetic Fields, Grounding and Soil Structure Analysis
cm	Centimeter
CPUE	Catch per Unit Effort
CSC	Cross Sound Cable
DC	Direct Current
EMF	Electric and Magnetic Field
ft	Feet
ft bgs	Feet Below Ground Surface
G	Gauss
GCC	Ground Continuity Conductor
HDD	Horizontal Directional Drilling
HVAC	High-Voltage Alternating Current
HVDC	High-Voltage Direct Current
Hz	Hertz
ICNIRP	International Commission on Non-Ionizing Radiation Protection
in	Inch
ISO-NE	ISO New England
kV	Kilovolt
kV/m	Kilovolt per Meter
m	Meter
MF	Magnetic Field
mG	Milligauss
MRI	Magnetic Resonance Imaging
MW	Megawatt
NE	New England
OECC	Offshore Export Cable Corridor
OSW	Offshore Wind Project
RMS	Root Mean Square
ROW	Right-of-Way
SEER	Synthesis of Environmental Effects Research
TJB	Transition Joint Bay
V	Volt
V/m	Volt per Meter
WHO	World Health Organization
XLPE	Cross-Linked Polyethylene

1 Introduction and Summary

Commonwealth Wind, LLC, a wholly owned subsidiary of Avangrid Renewables, LLC (collectively referred to herein as "the Proponent"), proposes to construct, operate, and maintain high-voltage alternating current (HVAC) offshore export cables and onshore underground transmission cables between a proposed offshore Electric Service Platform and a grid interconnection point at the West Barnstable Substation in Barnstable, Massachusetts. The New England Wind 2 Connector Project (NE Wind 2 Connector or "the Project") encompasses the Massachusetts-jurisdictional elements of the Commonwealth Wind Project, which is an offshore wind energy generation facility in federal waters within the southern portion of Bureau of Ocean Energy Management (BOEM) Lease Area OCS-A 0534 (Lease Area) (see Attachment A Project Overview) that will deliver more than 1,200 megawatts (MW) of carbon-free energy to the ISO-New England (ISO-NE) electrical grid.[1] Elements of the Project proposed within state boundaries (*i.e.*, the New England Wind 2 Connector) include portions of the offshore export cables in state waters, all of the onshore export cables, the proposed new onshore substation, the 345-kilovolt (kV) grid interconnection from the new onshore substation to the grid interconnection point at the existing Eversource 345-kV West Barnstable Substation, and some modifications to the 345-kV West Barnstable Substation to accommodate the interconnection from NE Wind 2 Connector.

The offshore export cables – which will consist of three three-core 275-kV submarine cables, each with a capacity of ~400-MW – will be installed within an Offshore Export Cable Corridor (OECC) that travels from the northwestern corner of the Lease Area to the landfall site at Dowses Beach in Barnstable. The OECC is the same one proposed for NE Wind 1 Connector, with two primary differences: (1) the OECC for the NE Wind 2 Connector diverges to the west in Barnstable waters to provide access to the Dowses Beach landfall site; and (2) while the OECC proposed for the NE Wind 1 Connector in the vicinity of Muskeget Channel is the preferred route for the NE Wind 2 Connector, the Proponent has identified a Western Muskeget option that could be used to install one or two of the three offshore export cables associated with NE Wind 2 Connector if warranted by further engineering analysis. The OECC will pass through state waters in the offshore areas of Edgartown, Nantucket, Barnstable, and Mashpee before making landfall in Barnstable. The maximum length of the OECC in state and federal waters is up to 47.2 miles. Of this, the maximum total length of the OECC within Massachusetts state waters is approximately 21.9 miles.

At the Dowses Beach landfall site, the three three-core 275-kV offshore export cables will transition to three sets of single-core 275-kV onshore export cables. The preferred onshore export cable route for the Project is located entirely underground within public roadway layouts or within the existing parking lot area at Dowses Beach and has a total length of approximately 6.7 miles (see the Attachment B map of the onshore Project route). Beginning within the parking lot area at Dowses Beach, the Preferred Route will head west on Dowses Beach Causeway to East Bay Road and will run along existing roadways in Barnstable that include Wianno Avenue, Main Street, Osterville-West Barnstable Road, Old Falmouth Road, Old Stage, Oak Street, and Service Road, until it reaches a staging area for the proposed trenchless crossing of Route 6 into the proposed new substation site. The Project's proposed onshore substation is located on privately owned, undeveloped wooded parcels west of Oak Street near the Oak Street Bridge overpass of Route 6, approximately 0.25 miles west of the interconnection location at the West Barnstable Substation. The new project substation will "step up" the transmission-line voltage from 275 kV to 345

[1] The Park City Wind Project is also located within Lease Area OCS-A 0534, specifically within the north/northeastern portion of the lease area.

kV, and three sets of single-core 345-kV cables will be installed underground to connect the new Project substation to a grid interconnection at the existing West Barnstable Substation interconnection point (*i.e.*, grid interconnection routes).

Epsilon Associates, Inc. (Epsilon) requested that Gradient perform an independent assessment of the electric and magnetic field (EMF) levels associated with the New England Wind 2 Connector Project. This modeling analysis is focused on magnetic fields (MFs) because the electric fields produced by the voltage on the offshore export cables will be contained by the metallic sheathing and/or steel armoring of the cables- *i.e.*, the metallic sheathing and/or steel armoring will completely shield the electric fields arising from the voltage on the cables. Magnetic fields are not completely shielded by either metallic sheathing or steel armoring, although the usage of ferromagnetic steel (*e.g.*, galvanized) steel armoring can serve to partially attenuate the MFs found outside 3-phase 60-hertz (Hz) alternating current (AC) cables (CSA Ocean Sciences Inc. and Exponent, 2019). As discussed in CSA Ocean Sciences Inc. and Exponent (2019), due to their time-varying nature, the MFs associated with 60-Hz AC cables can induce weak electric fields in the immediately surrounding marine environment near cables.[2] These induced electric fields are not modeled by EMF modeling programs such as the FIELDS computer program used in this assessment. However, they are weak in nature and are considered to pose minimal potential risk to marine species relative to the MFs from offshore export cables, especially given that electrosensitive marine species do not appear to have significant problems distinguishing bioelectric fields from the induced electric fields associated with water movement and marine animal movement through the earth's geomagnetic field (Gill and Desender, 2020; CSA Ocean Sciences Inc. and Exponent, 2019). Underground lines produce no aboveground electric fields, so the new onshore export and grid interconnection cables will not produce any aboveground electric fields.

For each of the 275-kV offshore export cables, 275-kV onshore export cables, and 345-kV grid interconnection cables, MF modeling was conservatively performed for representative installation cases assuming maximum wind turbine output (100% capacity). The wind turbine array is expected to operate at an annual-average capacity factor of approximately 50%; thus, much of the time, the actual output and MFs attributable to the Project cables will be correspondingly lower than predicted herein for maximum wind turbine output.

As discussed in more detail in Section 2 of this report, no regulatory thresholds or guidelines for allowable EMF levels in marine environments have been established for HVAC submarine power transmission. The weight of the scientific evidence indicates that 60-Hz AC EMFs are considerably above the typical frequency range of EMFs to which magnetosensitive and electrosensitive marine species are known to detect and respond. In particular, magnetosensitive marine species such as salmon, whales, and sea turtles are specifically tuned to the earth's steady (direct current [DC]) geomagnetic field for navigation/migration purposes, while electrosensitive marine species such as sharks and rays are primarily tuned to electric field frequencies below 10 Hz for helping to locate prey and/or mates (CSA Ocean Sciences Inc. and Exponent, 2019).

With respect to protection of public health, a number of national and world health organizations have developed EMF exposure guidelines or limits designed to be protective against any adverse health effects in humans. The limit values should not be viewed as demarcation lines between "safe" and "dangerous" levels of EMFs, but rather, levels that assure safety with adequate margins to allow for uncertainties in the science. For MF, these health based guidelines range from 1,000 to 10,000 milligauss (mG). For

[2] By Faraday's Law of Induction, a time-varying MF (*i.e.*, changing magnetic flux) will induce a time-varying electric field in a conducting medium, such as seawater. This is the same principle by which coils rotating in a steady MF generate a flow of electricity.

example, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guideline for allowable public exposure to 60-Hz MF is 2,000 mG.

For the 275-kV offshore export cables, MF levels were modeled at the sea floor for a representative submarine installation cross section that assumed a burial depth of 4.9 feet (ft) (1.5 meters [m]) corresponding to the lower limit of the target burial depth of approximately 5 to 8 ft (1.5 to 2.5 m) for the offshore export cables, and the minimum spacing of 164 ft (50 m) between the cables. As shown in Table 1.1, the modeling showed the highest modeled MF levels at the sea floor were approximately 109 mG directly above the offshore export cables, with rapid reductions in MF levels with lateral distance away from the cable centerlines – *e.g.*, there is a >95% reduction in MF levels at a lateral distance of ±25 ft (±7.6 m) from the cable centerlines. MF levels in the water column will be less than the modeled MF levels at the sea floor, with the rate of decrease in MF levels as a function of height above the cables being similar to the rate of fall-off as a function of distance laterally from the cables. Due to the rapid reductions in MF levels with distance away from the cables, there is minimal interaction of MF from adjacent cables at the modeled minimum separation distance of 164 ft (50 m). Based on the localized nature of the MF impacts of the offshore export cables as well as the weight of the scientific evidence that 60-Hz AC EMFs are above the typical frequency range of EMFs to which magnetosensitive and electrosensitive marine species are known to detect and respond, there is no expectation that the modeled MFs from the HVAC offshore export cables will cause significant population-level harms to marine species in the OECCs.

Table 1.1 Modeled Magnetic Fields at the Sea Floor for Buried Submarine 275-kV Offshore Export Cables[a]

Cross Section	Predicted Resultant Magnetic Field (mG)		
	Maximum Directly Above Cable Centerline(s)	±10 ft (±3 m) from Outer Cables[b]	±25 ft (±7.6 m) from Outer Cables[b]
Buried Submarine Cables	109.4	24.7	5.0

Notes:
ft = Foot; kV = Kilovolt; m = Meter; mG = Milligauss.
(a) The offshore export cable MF modeling assumes straight-laid phase-conductor cable cores rather than helical or "twisted" phase-conductor cores (the expected cable design). As discussed in Section 3.2, field measurements taken for the Block Island "sea2shore" cable show that a helical design achieves a considerable degree of magnetic field cancellation, hence the modeled MF levels are expected to be overestimates of actual MF levels at maximum wind farm output.
(b) The values provided at lateral distances of 10 and 25 ft are for 10 and 25 ft from the outer cables. Only one value is presented for each lateral distance because the predicted results for the left and right of the cables are identical.

Modeling of the offshore export cables was also performed for cross sections representative of two locations at the Dowses Beach landfall site in Barnstable along the horizontal directional drilling (HDD) paths to be constructed for bringing the cables ashore, including: (1) a middle-of-the beach cross section representative of where the cables will pass under the publicly accessible beach with burial depths to the tops of the cables that range from 24.7 ft to 57.4 ft (7.5 m to 17.5 m) for the three HDD paths; and (2) a parking lot cross section representative of the HDDs beneath the paved parking lot at Dowses Beach, where the offshore export cables have moved closer to the ground surface prior to the transition vaults/joint bays and have depths to the tops of the cables of 5.0 to 6.0 ft (1.5 to 1.8 m) for the three HDD paths. As summarized in Table 1.2, maximum modeled MFs of 5.0 and 1.0 mG were obtained at the ground surface directly above the offshore export cables for the two HDD modeling scenarios for the middle-of-the-beach location. For the parking lot location where the HDD paths are closer to the ground surface, maximum modeled MFs were 41.4 and 32.7 mG at 1 m above the ground surface directly above the offshore export cables for the two HDD modeling scenarios. For the parking lot cross section, modeled MFs were found to drop off very rapidly with lateral distance from the cables, with reductions in MF levels of between 85 to 90% for a lateral distance of 25 feet on either side of the cable centerlines.

All modeled MF levels for the landfall site cross sections were below both the ICNIRP health-based guideline of 2,000 mG for allowable public exposure to 60-Hz AC MFs. This is the case despite modeled MF levels for the 275-kV offshore export cables being overestimates of the expected MF levels for actual Project operations due to several conservative assumptions in the modeling analysis, including the lack of accounting for the expected twisting of the conductors within the cables that will contribute to substantially greater self-cancellation of MF than for straight conductors, and the use of cable currents based on maximum wind farm output (100 percent capacity).

Table 1.2 Modeled Magnetic Fields for the 275-kV Offshore Export Cables Along the Horizontal Directional Drilling (HDD) Paths at the Dowses Beach Landfall Site[a]

Cross Section	Predicted Resultant Magnetic Field (mG)		
	Maximum Directly Above Cable Centerline(s)	±10 ft (±3 m) from Reference Point[c]	±25 ft (±7.6 m) from Reference Point[c]
Landfall, Middle of Dowses Beach[b]			
HDD1	5.0	4.3	2.5
HDD2/HDD3	1.0	1.0	0.9
Landfall, Parking Lot Behind Dowses Beach[b]			
HDD1	41.4	17.9	4.5
HDD2/HDD3	32.7	16.1	4.7

Notes:
ft = Foot; m = Meter; mG = Milligauss.
(a) The offshore export cable MF modeling assumes straight-laid phase-conductor cable cores rather than helical or "twisted" phase-conductor cores (the expected cable design). As discussed in Section 3.2, field measurements taken for the Block Island "sea2shore" cable show that a helical design achieves a considerable degree of magnetic field cancellation, hence the modeled MF levels are expected to be overestimates of actual MF levels at maximum wind farm output.
(b) Magnetic fields are modeled at the ground surface for the middle-of-beach cross section, and at 3.28 ft (1 m) above ground surface for the parking lot cross section.
(c) For HDD1, the values provided at lateral distances of 10 and 25 ft are with respect to the centerline of the cable. For HDD2 and HDD3, the values provided at lateral distances of 10 and 25 ft are for 10 and 25 ft from the outer cable. Only one value is presented for each lateral distance because the predicted results for the left and right of the cables are identical.

For the 275-kV onshore export cables, MF levels were calculated 1 meter above the ground surface for several underground circuit cross sections representative of different portions of the Project onshore transmission route, including both the typical and deep installation cases for the underground 3-wide-by-4-deep (3W×4D) duct banks to be used for the majority of the onshore transmission route, the microtunnels to be used for the Route 6 crossing, the transition joint bays to be located beneath the Dowses Beach parking lot, and the splice vaults to be located in groups every 1,500 to 3,000 feet (approximately 460 to 915 meters) or more along the onshore transmission route. In addition, MF levels were calculated 1 meter above the ground surface for both the typical and deep installation cases for the underground 3W×4D duct banks to be used for the 345-kV grid interconnection cables to be installed between the new onshore substation and the grid interconnection point at the existing Eversource 345-kV West Barnstable Substation.

As described in this report and shown in Table 1.3, all modeled MF levels for the 275-kV onshore export cables and the 345-kV grid interconnection cables are below the ICNIRP health-based guideline of 2,000 mG for allowable public exposure to 60-Hz AC MFs. The results in Table 1.3 for modeled MF levels at different distances (±10 ft and ±25 ft) from the centerlines of the underground duct banks, transition joint bays, and splice vaults, and from the outer microtunnel for the Route 6 crossing, illustrate the significant reductions in MF with increasing lateral distance from the cables.

Table 1.3 Modeled Magnetic Fields at 3.28 ft (1 m) Above Ground Surface for Underground Onshore Export and Grid Interconnection Cable Installation Scenarios

Installation Scenario	Predicted Resultant Magnetic Field (mG)		
	Maximum Above Reference Point[a]	±10 ft (±3 m) from Reference Point[a]	±25 ft (±7.6 m) from Reference Point[a]
275-kV Onshore Export Cables			
3W×4D Duct Bank, Typical Installation	77.2	50.1 / 50.1	14.3 / 14.3
3W×4D Duct Bank, Deep Installation	83.4	59.8 / 59.8	21.8 / 21.8
Route 6 Crossing, 6-ft Microtunnel	38.8	30.2 / 18.8	13.9 / 5.2
Transition Joint Bay	96.9	50.2 / 49.1	14.1 / 13.8
Splice Vaults, Cross Section A	232.8	110.8 / 105.5	29.9 / 31.8
Splice Vaults, Cross Section B	121.3	68.7 / 28.2	11.6 / 4.2
Splice Vaults, Cross Section C	253.6	121.9 / 116.1	29.1 / 31.0
345-kV Grid Interconnection Cables			
3W×4D Duct Bank, Typical Installation	58.7	38.1 / 38.1	10.9 / 10.9
3W×4D Duct Bank, Deep Installation	75.7	53.8 / 53.8	19.6 / 19.6

Notes:
3W×4D = 3-Wide-By-4-Deep; ft = Foot; kV = Kilovolt; m = Meter; mG = Milligauss.
(a) The two values presented correspond to the model-predicted fields at the given lateral distances to the left and right of the reference point, respectively, where the reference point for the duct bank, transition joint bay, and splice vault installation scenarios is the duct bank, transition joint bay, or splice vault centerline. For the Route 6 crossing microtunnel installation scenario, the values presented at lateral distances of 10 and 25 ft are for 10 and 25 ft from the outer microtunnel.

MF modeling performed by Stantec for one additional installation case for the 275-kV onshore export cables, namely an underground 12-wide-by-1-deep (12W×1D) duct bank with copper plate shielding proposed for use for the Phinney's Bay culvert crossing on Dowses Beach Causeway in Barnstable, showed that the proposed use of copper plate shielding minimized aboveground MF levels from this shallow duct bank, with a maximum modeled MF level of 63.0 mG directly above the duct bank.

Similar to the MF modeling for the offshore export cables, the MF modeling for both the underground onshore export and grid interconnection cable installation cases is expected to overpredict the magnitude of aboveground MF levels associated with the installed onshore export and grid interconnection cables. This is because minimum expected burial depths were assumed, and the currents used for the cables assume maximum wind turbine output (100 percent capacity). In addition, as discussed earlier, the MF modeling analyses did not account for the phase conductors' main currents inducing currents on ground continuity conductors in the duct banks. Any induced currents on ground conductors would be expected to produce an MF that would tend to oppose (partially cancel) the MF arising from the phase conductor currents.

Section 2 of this report describes the nature of EMFs and provides background on human and marine organism exposures to EMF and published exposure guidelines. Section 3 describes the MF modeling analysis for the offshore export cables, while Section 4 describes the MF modeling analysis for the onshore export and grid interconnection cables. Section 5 summarizes the conclusions, and the Reference list provides the scientific references cited in this report.

2 Nature of Electric and Magnetic Fields

All matter contains electrically charged particles. Most objects are electrically neutral because positive and negative charges are present in equal numbers. When the balance of electric charges is altered, we experience electrical effects. Common examples are the static electricity attraction between a comb and our hair, or a static electricity spark after walking on a synthetic rug in the wintertime. Electrical effects occur both in nature and through our society's use of electric power (generation, transmission, and consumption).

2.1 Units for EMFs Are Kilovolts Per Meter (kV/m) and Milligauss (mG)

The electrical tension on utility power lines is expressed in volts or kilovolts (1 kV = 1,000 V). Voltage is the "pressure" of the electricity and can be envisioned as analogous to the pressure of water in a plumbing system. The existence of a voltage difference between overhead power lines and ground results in an "electric field," usually expressed in units of kV/m. The size of the electric field depends on the line voltage, the separation between lines and the ground surface, and other factors.

Power lines also carry an electric current that creates a "magnetic field." The units for electric current are amperes (A), which a measure of the "flow" of electricity. Electric current is analogous to the flow of water in a plumbing system. The magnetic field produced by an electric current is usually expressed in units of gauss (G) or mG (1 G = 1,000 mG).[3] The size of the magnetic field depends on the electric current in the line conductors, the distance to the current-carrying conductor, and other factors.

2.2 Human Exposure to EMF

2.2.1 There Are Many Natural and Man-Made Sources of EMFs

Everyone experiences a variety of natural and man-made EMFs. EMF levels can be steady or slowly varying (often called "direct current," or "DC fields"); or EMF levels can vary in time (often called "alternating current" or "AC fields"). When the time variation corresponds to that of standard North American power line currents (*i.e.*, 60 cycles per second), the fields are called "60-Hz AC," or power-frequency, EMF.

Man-made magnetic fields are common in everyday life. For example, many childhood toys contain magnets. Such permanent magnets generate strong, steady (DC) magnetic fields. Typical toy magnets (*e.g.*, "refrigerator door" magnets) have fields of 100,000-500,000 mG. On a larger scale, earth's core also creates a steady DC magnetic field that can be easily demonstrated with a compass needle. Along the southern New England coast, the earth's DC geomagnetic field has a magnitude on the order of 500 mG (CSA Ocean Sciences Inc. and Exponent, 2019) (less than 1% of the levels generated by "refrigerator door" magnets).

In North America, electric power transmission lines, distribution lines, and electric wiring in buildings carry AC currents and voltages that change size and direction at a frequency of 60 Hz. These 60-Hz

[3] Another unit for magnetic field levels is the microtesla (μT) (1 μT = 10 mG; and 1 Tesla = 10,000 Gauss).

currents and voltages create 60-Hz AC EMFs nearby. The size of the magnetic field is proportional to the line current, while the size of the electric field is proportional to the line voltage. The EMFs associated with electrical wires and electrical equipment decrease rapidly with increasing distance away from the electrical wires and/or equipment. Specifically, EMFs from three-phased, balanced conductors decrease in proportion to the square of the distance from the conductors (*i.e.*, $1/d^2$) (IEEE, 2014).

When EMF derives from different wires or conductors that are in close proximity, or adjacent to one another, the level of the net EMF produced will be somewhere in the range between the sum of EMF from the individual sources and the difference of the EMF from the individual sources. EMF may partially add, or partially cancel, but generally, because adjacent phase conductors are often carrying current in opposite directions for typical 3-phase lines, the EMF produced tends to cancel.

EMFs in the home arise from electric appliances, indoor wiring, grounding currents on pipes and ground wires, and outdoor distribution or transmission circuits. Inside residences, typical baseline 60-Hz MF (away from appliances) range from 0.5-5.0 mG.

Higher 60-Hz MF levels are found near operating appliances. For example, can openers, mixers, blenders, refrigerators, fluorescent lamps, electric ranges, clothes washers, toasters, portable heaters, vacuum cleaners, electric tools, and many other appliances generate MF levels in the range of 40-300 mG at distances of 1 foot (NIEHS, 2002). MF levels from personal care appliances held within half a foot (*e.g.*, shavers, hair dryers, massagers) can produce average fields of 600-700 mG. At school and in the workplace, lights, motors, copy machines, vending machines, video-display terminals, pencil sharpeners, electric tools, electric heaters, and building wiring are all sources of 60-Hz MF.

Magnetic resonance imaging (MRI) is a diagnostic procedure that puts humans in much larger, but steady, DC MFs (*e.g.*, levels of 20,000,000 mG). The scanning MF superimposed on the large steady DC field (which is the source of the characteristic audio noise of MRI scans) exposes the body to time-varying MF similar to time-varying power-frequency MF.

2.2.2 Health and Safety Guidelines for 60-Hz AC EMFs

Although the US has no federal standards limiting either residential or occupational exposure to 60-Hz AC EMF, Table 2.1 shows exposure guidelines for 60-Hz AC fields from national and world health and safety organizations that are designed to protect workers and the general public against any adverse health effects. The limit values should not be viewed as demarcation lines between safe and dangerous levels of EMFs, but rather, levels that assure safety with an adequate margin to allow for uncertainties in the science. As part of its International EMF Project, the World Health Organization (WHO) has conducted comprehensive reviews of EMF health-effects research and existing standards and guidelines. The WHO website for the International EMF Project (WHO, 2022) notes, "[T]he main conclusion from the WHO reviews is that EMF exposures below the limits recommended in the ICNIRP international guidelines do not appear to have any known consequence on health."

Table 2.1 60-Hz AC EMF Guidelines Established by International Health and Safety Organizations

Organization	Electric Field	Magnetic Field
American Conference of Governmental and Industrial Hygienists (ACGIH) (occupational)	25 kV/m[a]	10,000 mG[a] 1,000 mG [b]
International Commission on Non-Ionizing Radiation Protection (ICNIRP) (general public)	4.2 kV/m[c]	2,000 mG[c]
International Commission on Non-Ionizing Radiation Protection (ICNIRP) (occupational)	8.3 kV/m[c]	10,000 mG[c]
Institute of Electrical and Electronics Engineers (IEEE) Standard C95.1™-2019 (general public)	5.0 kV/m[d]	9,040 mG[d]
Institute of Electrical and Electronics Engineers (IEEE) Standard C95.1™-2019 (occupational)	20.0 kV/m[d]	27,100 mG[d]

Notes:

AC = Alternating Current; EMF = Electric and Magnetic Field; Hz = Hertz; kV/m = Kilovolts Per Meter; mG = Milligauss.

(a) The ACGIH guidelines for whole-body exposure for the general worker (ACGIH, 2022).

(b) The ACGIH guidelines for workers with cardiac pacemakers (ACGIH, 2022).

(c) Source: ICNIRP (2010).

(d) Source: IEEE (2019).

2.3 Marine Organism Exposures to EMF

Naturally occurring EMFs are ubiquitous in coastal environments. Most prominently, the earth's steady geomagnetic field, which is associated with current flows in the earth's liquid core as well as metallic crustal elements, is the largest source of steady MFs for both marine and terrestrial environments (Normandeau Associates, Inc., *et al*., 2011). The intensity of the background geomagnetic field at the earth's surface varies between about 300 mG near the equator to the highest values of ~700 mG near the south and north poles. Along the southern New England coast, the earth's MF has a magnitude on the order of 500 mG (CSA Ocean Sciences Inc. and Exponent, 2019).

Naturally occurring steady (DC) EMFs are also ubiquitous in coastal environments due to other sources besides earth's geomagnetic field. Other natural electric fields are associated with the movement of ocean currents and marine organisms through earth's geomagnetic field and those directly produced by marine organisms. The movement of ocean currents and marine organisms through earth's geomagnetic field produces weak DC EFs (CSA Ocean Sciences Inc. and Exponent, 2019). Marine organisms produce bioelectric fields, such as from heartbeats and gill movement, close to their body surfaces; in addition, electric fish species, such as the electric eel, can generate strong EFs for defense purposes. The bioelectric fields produced by all marine organisms (*e.g.*, from heartbeats, gill movement) can be as high as 0.5 volts per meter (V/m), but typically diminish to negligible levels within 4-8 inches (10-20 centimeters) from the source organism (CSA Ocean Sciences Inc. and Exponent, 2019). While these bioelectric fields can include AC fields that change direction several times per second, they are generally for frequencies of less than 10 Hz (*e.g.*, EFs from a heartbeat of 120 beats per minute would have a frequency of 2 Hz) and thus are considerably below the frequencies of the 60 Hz AC EFs that are characteristic of US power generation and transmission (CSA Ocean Sciences Inc. and Exponent, 2019).

There are already present a variety of submarine transmission cables along the Eastern seaboard. Examples of AC cables include the Nantucket I and II electrical distribution cables and four electrical distribution cables feeding Martha's Vineyard, the 34.5-kV inter-array cables and 34.5-kV offshore export cable that were installed prior to 2016 as part of the Block Island Wind Farm, and the 34.5-kV sea2shore cable connecting Block Island to the mainland. Examples of DC cables include the 330-MW bipolar Cross Sound Cable (CSC) that transects Long Island Sound between New Haven, CT, and Shoreham, NY; and the 660-MW Neptune cable that runs between Sayreville, NJ, and Long Island, NY. It bears mentioning that more than 100 offshore wind farms have been constructed in Europe, with both HVAC and high-voltage direct current (HVDC) offshore export cables (CSA Ocean Sciences Inc. and Exponent, 2019).

Other manmade sources of perturbations to earth's steady DC geomagnetic field in coastal environments include shore-based structures such as docks, jetties, and bridges; sunken ships; pipelines; and ferromagnetic mineral deposits (Normandeau Associates, Inc., *et al*., 2011; CSA Ocean Sciences Inc. and Exponent, 2019). Normandeau Associates, Inc., *et al*.. (2011) reported that MF impacts nearby to these sources can be on the order of tens of mG, while CSA Ocean Sciences Inc. and Exponent (2019) observed that undersea sources of DC MFs including steel ships and bridges can create DC MFs up to 100 times greater than MFs from DC submarine cables.

No regulatory thresholds or guidelines for allowable EMF levels in marine environments have been established for either HVAC or HVDC submarine power transmission.

2.3.1 Marine Organism Sensitivity to 60-Hz AC EMFs

For HVAC transmission, the weight of the scientific evidence indicates that 60-Hz AC EMFs are considerably above the typical frequency range of EMFs to which magnetosensitive and electrosensitive marine species are known to detect and respond. In particular, magnetosensitive marine species such as salmon, whales, and sea turtles are specifically tuned to the earth's steady (DC) geomagnetic field for navigation/migration purposes, while electrosensitive marine species such as sharks and rays primarily respond to electric field frequencies below 10 Hz for helping to locate prey and/or mates (CSA Ocean Sciences Inc. and Exponent, 2019).

Importantly, a seven-year study reported the first findings in the United States of the response of demersal fish (*i.e*., fish living close to the sea floor) and invertebrates to construction and operation of an offshore wind (OSW) project (Wilber *et al*., 2022). Published in March 2022, this study analyzed catch data from monthly demersal trawl surveys conducted by local fisherman and scientists during construction and operation of the Block Island Wind Farm, a pilot-scale 30 MW project that is North America's first offshore wind farm. This study did not identify harmful impacts of EMF from the project's 60-Hz AC submarine export cables or other offshore electrical infrastructure on local demersal fish and invertebrates, and instead reported evidence of increased populations of several fish species near the wind farm during the operation time period relative to the reference areas. Statistically significant interactions in catch per unit effort (CPUE) due to operation of the wind farm were not observed for any of the fish species that were frequently caught in the surveys in the project and reference areas, including black sea bass (*Centropristis striata*), little skate (*Leucoraja erinacea*), summer flounder (*Paralichthys dentatus*), windowpane (*Scophthalmus aquosus*), winter flounder (*Pseudopleuronectes americanus*), winter skate (*Leucoraja ocellata*), and longfin squid (*Loligo pealeii*). These findings are consistent with those for European offshore wind farm projects. In a report to BOEM, CSA Ocean Sciences Inc. and Exponent (2019) provided the following summary of findings from fish surveys conducted in Europe in areas with offshore wind development:

> "Offshore wind energy projects, along with associated undersea power cables, have operated in coastal environments of Europe for more than a decade. During this time, many surveys have been conducted to determine if fish populations have declined following offshore wind energy project installation. The surveys have overwhelmingly shown that offshore wind energy projects and undersea power cables have no effect on fish populations [72,80,81,82]. Fish assessed as part of these surveys include flounder

> and other flatfish, herring, cod, and mackerel. These are similar to species harvested along the U.S. Atlantic coast."

Earlier this year, as part of the U.S. Offshore Wind Synthesis of Environmental Effects Research (SEER) effort, researchers at the U.S. Department of Energy's Wind Energy Technologies Office, National Renewable Energy Laboratory, and Pacific Northwest National Laboratory published a Brief titled "Electromagnetic Field Effects on Marine Life" (SEER, 2022). This Brief was reviewed by external subject matter experts (Dr. Andrew Gill of the Centre for Environment, Fisheries, and Aquaculture Science; and Dr. Zoe Hutchison of the University of St. Andrews) and the SEER Science and Technical Advisory Committee. The Brief included the following summary of the overall state of the knowledge:

> "Overall, there is no conclusive evidence that EMFs from a subsea cable creates any negative environmental effect on individuals or populations. To date, no impacts interpreted as substantially negative have been observed on electrosensitive or magnetosensitive species after exposure to EMFs from a subsea cable. Behavioral responses to subsea cables have been observed in some species, but a reaction to EMFs does not necessarily translate into negative impacts. Continued research and monitoring are required to understand the ecological context within which short-term effects are observed and if species experience long-term or cumulative effects resulting from underwater exposure to EMFs." (SEER, 2022)

The Brief further concluded, "Overall, the effects of EMFs have been considered minor-to-negligible and a less significant issue than other environmental effects at OSW farms" (SEER, 2022). It discussed how such factors as cable burial depth, cable shielding, and the limited range of EMFs result in "a highly localized environmental condition that does not affect the entire habitat range for an animal" (SEER, 2022).

3 MF Modeling for Offshore Export Cables

3.1 Software Program Used for Modeling MF Levels for Offshore Export Cable Installation Cross Sections

The FIELDS computer program, designed by Southern California Edison, was utilized to calculate MF strengths from the proposed offshore export cables. This program operates using Maxwell's equations, which accurately apply the laws of physics as related to electricity and magnetism (EPRI, 1982, 1993). Modeled fields using this program are both precise and accurate for the input data utilized. Results of the model have been checked extensively against each other and against other software (*e.g.*, CORONA, from the Bonneville Power Administration, US Department of Energy) to ensure that the implementation of the laws of physics are consistent. In these validation tests, program results for MF levels were found to be in very good agreement with each other (Mamishev and Russell, 1995).

Modeled 60-Hz AC magnetic field levels from FIELDS are reported as root mean square (RMS) values of the resultant fields, generally referred to as $B_{Resultant}$ or B_{Res}, and sometimes as $B_{Product}$ or B_{Prod}. We have reported B_{Res} values to be consistent with the magnetic field levels that will be reported by instruments relying on three fixed orthogonal coils (*e.g.*, fixed-coil instruments like the EMDEX II), where the electronics calculate the sum of the squares of magnetic fields detected by each orthogonal coil separately. However, it is important to note that B_{Res} will always be larger than the real "maximum" rotating magnetic field (*i.e.*, the RMS value of the semi-major axis magnitude of the field ellipse; known as $B_{Maximum}$ or B_{Max}) when modeling (or measuring) elliptically or circularly polarized fields. In other words, B_{Res} is a conservative overestimate of magnetic field values, in particular for elliptically or circularly polarized magnetic fields typical of phase conductors in a "delta" configuration (IEEE, 2021).

3.2 Offshore Export Cable Specifications

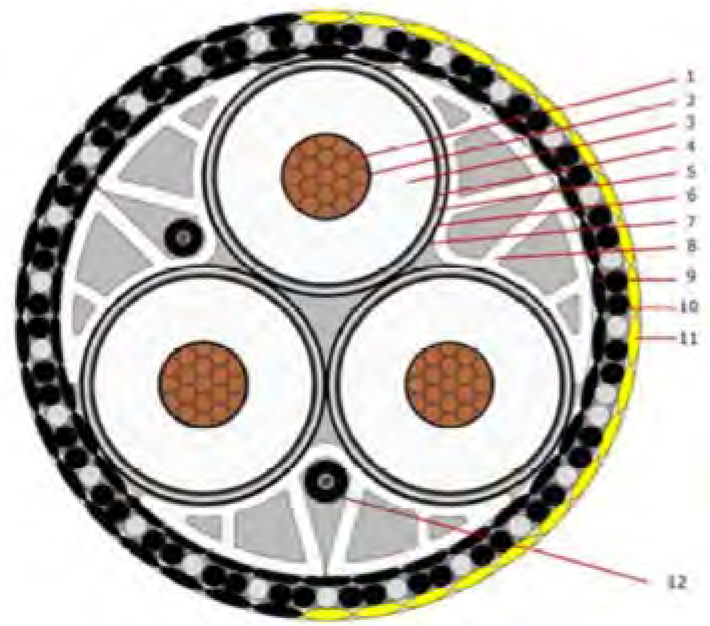
Three three-core 275-kV offshore export cables will be used to deliver power from the Project’s offshore wind energy generation facility to the landfall site at Dowses Beach in Barnstable. Each offshore export cable will be a three-core armored submarine cable, and Table 3.1 provides a summary of the cable specifications and currents used in the MF modeling analysis. As illustrated by Figure 3.1, which provides an example schematic of the type of offshore export cable proposed for Project usage, each offshore export cable will consist of three cores for power transmission and one or more fiber optic cables for communication, temperature measurement, and protection of the high-voltage system. Each cable will typically include three copper or aluminum conductors, with each conductor encapsulated by solid cross-linked polyethylene (XLPE) insulation. Water-blocking sheathing will be used to prevent water infiltration. The three insulated conductors will be twisted with a synthetic filler between the conductors, and the twisted or bundled conductors will then be wrapped in stainless steel wire and polyethylene rod armoring and finally encased in a tough outer sheath.

Identical, balanced phase conductor loadings of 1,077 A were assumed for all three offshore export cables. These are maximum loadings for the offshore export cables provided by the Proponent that are conservative values assuming maximum wind turbine output corresponding to 100% capacity. The wind turbine array is expected to operate at an annual-average capacity factor of approximately 50%; thus, for much of the time, the actual power output to the offshore export cables will be correspondingly lower than the maximum output loading levels used in this report. The currents include the charging currents for the Project onshore and offshore export system. See Table 3.1, Note a below for an explanation of charging currents.

Table 3.1 275-kV Offshore Export Cable Specifications and Currents Used in the MF Modeling Analysis

Parameter	Specification Value
Constructional Data	
Conductor diameter	47.8 mm
Conductor spacing (center to center)	111.4 mm
Outer diameter of single core	110.5 mm
Armor type	Stainless steel wires and PE rod
Armor thickness	7.0 mm
Outer diameter of cable	274.0 mm
Electrical Data	
Current type and frequency	Alternating current 60 Hz
Operating Voltage	275 kV
Per Cable Load[a]	1,077 A

Notes:
A = Ampere; Hz = Hertz; kV = Kilovolt; MF = Magnetic Field; mm = Millimeter; PE = Polyethylene.
(a) Includes the impacts of charging currents – i.e., the additional electric current that occurs as the cables proceed from the offshore substation toward the Project onshore substation, because the cable conductors act to some degree like a capacitor that needs to be charged and discharged in addition to delivering actual electrical power to the onshore substation.



No.	Description	Details
1	Conductor	Copper circular stranded, compacted, longitudinally water blocked, Semi conductive Water Swellable Tape on top of conductor
2	Conductor screen	Extruded bonded semi conductive compound
3	Insulation	XLPE (cross linked Polyethylene)
4	Insulation screen	Extruded bonded semi conductive compound
5	Water Blocking	Semi conductive Water Swellable Tape
6	Metal sheath	Lead alloy sheath
7	Inner sheath	Extruded Semi conductive Polyethylene on each phase
8	Fillers	Plastic fillers
9	Armour bedding	Polypropylene Yarns
10	Armouring	One layer mixed: 33% Stainless steel wires and 67% PE rod
11	Serving	Polypropylene Yarns
12	OF cable	2 x Optical Fibres Cable with 48 fibres

Figure 3.1 Example 275-kV Offshore Export Cable Cross Section Illustration. OF = Optical Fibre; PE = Polyethylene. From the cable datasheet provided in Appendix C.

While not shown in Figure 3.1, the three cores within the cables are to be helically wound, where the phase conductors would have a "twisted" design rather than being straight and parallel over long distances. This twisting of the conductors is expected to contribute to substantially greater self-cancellation of MF than predicted from the modeling analysis that assumes continuously straight conductors, although less than the cancellation associated with the triangular geometry of the conductors (CSA Ocean Sciences Inc. and Exponent, 2019). This additional self-cancellation from the twisting of the phase conductors is not typically reflected in MF modeling analyses of submarine cables due to the complexity of modeling it. It has been estimated for the 30-MW 60-Hz AC "sea2shore" cable, which was commissioned in 2016 to connect the Block Island wind energy project with the Rhode Island mainland grid, that the helical twisting of the three-phase cable reduced MF levels by at least 10-fold as compared to an untwisted three-phase cable (CSA Ocean Sciences Inc. and Exponent, 2019; Hutchison *et al.*, 2018).[4]

Although stainless steel armoring is more commonly used, the usage of ferromagnetic metal armoring such as galvanized steel armoring in the cables would also serve to partially attenuate the MFs reaching the sea bed environment as a result of both ferromagnetic shielding and opposing eddy currents that are induced in the armor (CSA Ocean Sciences Inc. and Exponent, 2019). This shielding factor is difficult to calculate due to the discontinuous nature of the wire armoring, although it will provide less shielding than a solid ferromagnetic pipe covering (for which a shielding factor of 10 is generally assumed; EPRI, 1993; EPRI and HVTRC, 1994). Studies provide support for a shielding factor of approximately two from ferromagnetic metal armoring of submarine cables (Lucca, 2013; CSA Ocean Sciences Inc. and Exponent, 2019).

3.3 Modeled Offshore Export Cable Cross Sections

MF modeling was performed for a representative submarine cable cross section consisting of the three three-core 275-kV offshore export cables buried to a depth of 4.9 ft (1.5 m) beneath the seabed and spaced 164 ft (50 m) apart. A burial depth of 4.9 ft (1.5 m) corresponding to the lower limit of the target burial depth of approximately 5 to 8 ft (1.5 to 2.5 m) was used. The offshore export cables within the OECC will typically be separated by approximately 164 to 328 ft (50 to 100 m), and the minimum cable spacing of 164 ft (50 m) was used in the MF modeling to capture any interaction of MF fields from adjacent cables at this minimum separation distance.

Modeling of the offshore export cables was also performed for cross sections representative of two locations along the three HDD paths to be constructed for bringing the cables ashore at the Dowses Beach landfall site in Barnstable, including: (1) a middle-of-the beach cross section representative of where the cables will pass under the publicly accessible beach with burial depths to the tops of the cables that range from 24.7 ft to 57.4 ft (7.5 m to 17.5 m) for the three HDD paths; and (2) a parking lot cross section representative of the cables beneath the paved parking lot at Dowses Beach, where they have moved closer to the ground surface prior to the transition vaults and the depths to the tops of the cables are 5.0 to 6.0 ft (1.5 to 1.8 m) for the three HDD paths. Separate modeling cases were performed for the southernmost HDD path (referred to as HDD1), which will come ashore in the southern portion of Dowses Beach with a minimum separation distance of 328 ft (100 m) from the other HDD paths; and for the other two HDD paths (referred to as HDD2 and HDD3), which will make landfall along the northern portion of Dowses Beach in closer proximity to each other.[5]

Table 3.2 summarizes the modeling parameters provided by the Proponent for each of the offshore export cable cross sections. For the representative buried submarine cable cross section, MFs were predicted at the sea floor surface for profiles perpendicular to the cables, consistent with other submarine cable MF modeling analyses (Normandeau Associates, Inc., *et al*., 2011). As discussed previously, MF levels in the water column above the sea floor will be substantially less than the modeled MF levels at the sea floor surface. The rate of MF level decrease as a function of height above the cable will be the same as the rate of fall-off as a function of distance laterally from the cable, *i.e.*, decreasing proportional to the square of

[4] As sponsored by the BOEM, the Hutchison *et al.* (2018) research study compared modeled MF levels with field measurements of actual MF levels in the proximity of the 30-MW 60-Hz AC "sea2shore" cable. The authors found measured MF levels to be substantially lower than the modeled values, which did not take into account the three-conductor twisted design: "The magnetic field produced by the AC sea2shore cable (range of 0.05-0.3 μT) was ~10 times lower than modeled values commissioned by the grid operator, indicating that the three-conductor twisted design achieves significant self-cancellation" (Hutchison *et al.*, 2018).
[5] The MF modeling was conducted at the minimum separation distance of 65.6 ft (20 m) for the HDD2 and HDD3 offshore export cables to capture any interaction of MFs between adjacent cables.

the distance from the cable. For the middle-of-the-beach cross section at the Dowses Beach landfall site, MF levels were conservatively modeled at the ground (beach) surface, assuming that a beachgoer could be sitting or lying flat on the sand above an HDD path. Per standard industry practices (IEEE Power Engineering Society, 1995a,b), MFs were predicted at a height of 3.28 ft (1 m) above the ground surface for the parking lot cross section to represent the MF exposure of an upright person.

Table 3.2 Summary of Modeling Parameters for the 275-kV Offshore Export Cable Installation Scenarios

Cross Section	Cable Burial Depth	No. Cables	Cable Separation	Per Cable Load[a]
Buried Submarine	4.9 ft (1.5 m)	3	164 ft (50 m)	1,077 A
Landfall, Middle of Dowses Beach				
HDD1	24.7 ft (7.5 m)	1	NA	1,077 A
HDD2/HDD3	57.4 ft (17.5 m) / 57.2 ft (17.4 m)	2	65.6 ft (20 m)	1,077 A
Landfall, Parking Lot Behind Dowses Beach				
HDD1	5.0 ft (1.5 m)	1	NA	1,077 A
HDD2/HDD3	6.0 ft (1.8 m)	2	65.6 ft (20 m)	1,077 A

Notes:
A = Amperes; ft = Foot; HDD = Horizontal Directional Drilling; kV = Kilovolt; m = Meter; NA = Not Applicable.
(a) Includes the impacts of charging currents – i.e., the additional electric current that occurs as the offshore export cables proceed from the offshore substation toward the proposed onshore substation, because the cable conductors act to some degree like a capacitor that need to be charged and discharged in addition to delivering actual electrical power to the onshore substation.

3.4 MF Modeling Results for Offshore Export Cable Installation Scenarios

3.4.1 Representative Buried Submarine Cable Cross Section

Table 3.3 summarizes the modeled 60-Hz AC MF levels for the representative buried submarine cable cross section for the offshore export cables, and Figure 3.2 shows the AC MF magnitudes as a function of distance from the centerline of the cables. The modeling shows that the highest modeled AC MF levels of approximately 109 mG occur directly on the sea bed above the offshore export cables. Consistent with the compact bundling of the conductors within the three-core offshore export cables, Table 3.3 and Figure 3.2 show that MF levels diminish very rapidly with lateral distance away from the cable centerlines – *e.g.*, there is a >95% reduction in MF levels at a lateral distance of ±25 ft (±7.6 m) from the cable centerlines. MF levels in the water column will be less than the modeled MF levels at the sea floor, with the rate of decrease in MF levels as a function of height above the cables being similar to the rate of fall-off as a function of distance laterally from the cables. Due to the rapid reductions in MF levels with lateral distance away from the cables, there is minimal interaction of MF from adjacent cables at the modeled minimum separation distance of 164 ft (50 m).

As discussed in Section 2.3, no regulatory thresholds or guidelines for allowable EMF levels in marine environments have been established for HVAC submarine power transmission. Based on the localized nature of the MF impacts of the buried submarine cables as well as the weight of the scientific evidence that 60-Hz AC EMFs are above the typical frequency range of EMFs to which magnetosensitive and electrosensitive marine species are known to detect and respond, there is no expectation that the modeled MFs from the HVAC offshore export cables will cause significant population-level harms to marine species in the OECCs.

Table 3.3 Modeled Magnetic Fields at the Sea Floor for Buried Submarine 275-kV Offshore Export Cables[a]

Cross Section	Predicted Resultant Magnetic Field (mG)		
	Maximum Directly Above Cable Centerline(s)	±10 ft (±3 m) from Outer Cables[b]	±25 ft (±7.6 m) from Outer Cables[b]
Buried Submarine Cables	109.4	24.7	5.0

Notes:
ft = Foot; kV = Kilovolt; m = Meter; mG = Milligauss.
(a) The offshore export cable MF modeling assumes straight-laid phase-conductor cable cores rather than helical or "twisted" phase-conductor cores (the expected cable design). As discussed in Section 3.2, field measurements taken for the Block Island "sea2shore" cable show that a helical design achieves a considerable degree of magnetic field cancellation, hence the modeled MF levels are expected to be overestimates of actual MF levels at maximum wind farm output.
(b) The values provided at lateral distances of 10 and 25 ft are for 10 and 25 ft from the outer cables. Only one value is presented for each lateral distance because the predicted results for the left and right of the cables are identical.

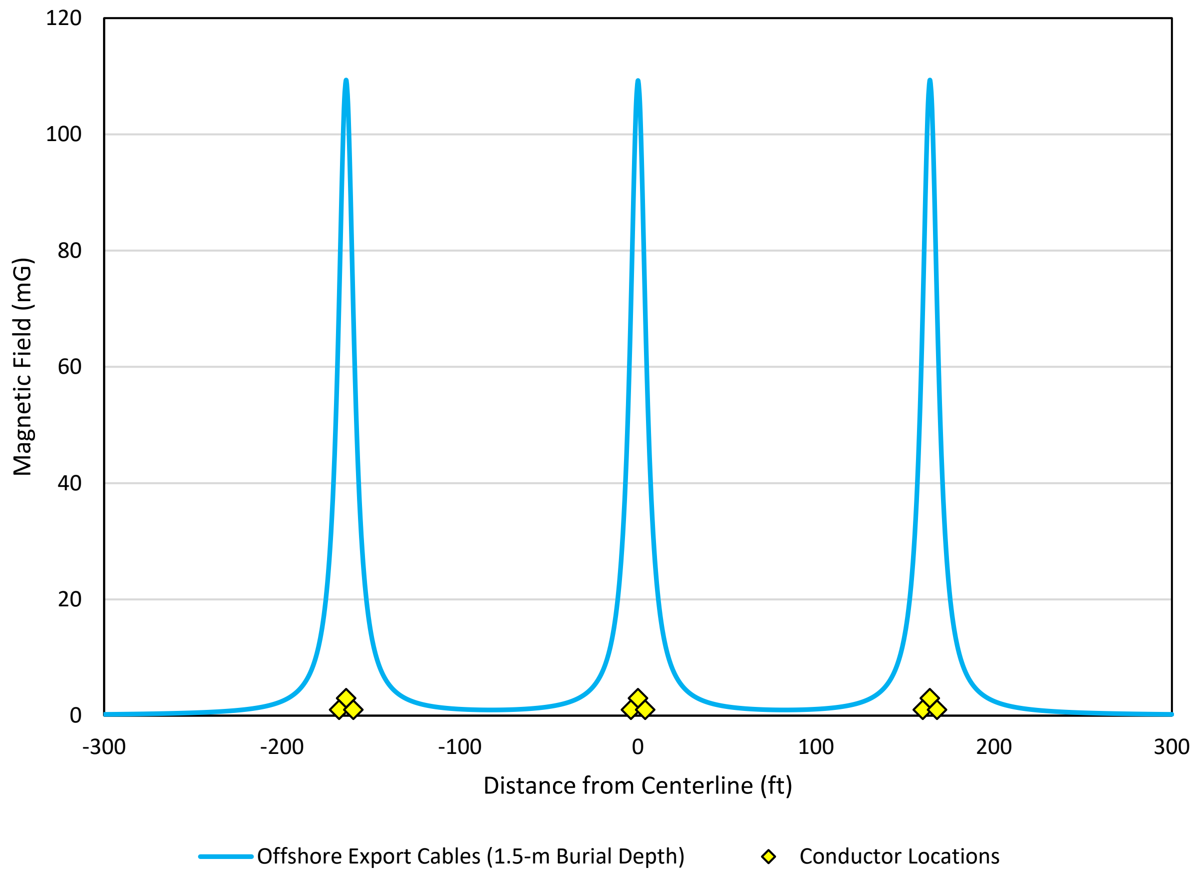


Figure 3.2 Magnetic Field Modeling Results at the Sea Floor for the Representative Buried Submarine Cross Section of the 275-kV Offshore Export Cables. ft = Feet; kV = Kilovolt; m = Meters; mG = Milligauss. Modeling results are based on 164-ft (50-m) cable spacing and a cable burial depth of 4.9 ft (1.5 m). The conductor locations (yellow diamonds) on the graphs are not to scale and are provided only to show relative locations.

3.4.2 Dowses Beach Landfall Site Cross Sections

Results of the MF modeling for the representative middle-of-beach and parking lot cross sections at the Dowses Beach landfall site are summarized in Table 3.4 and Figures 3.3 and 3.4 below. At the middle-of-the-beach location, maximum modeled MFs are 5.0 and 1.0 mG at the ground surface directly above the offshore export cables for the HDD1 and HDD2/HDD3 modeling cases, respectively. At the parking lot location, maximum modeled MFs are 41.4 and 32.7 mG 1 m above the ground surface directly above the offshore export cables for the HDD1 and HDD2/HDD3 modeling cases, respectively. These levels are well below the ICNIRP guideline of 2,000 mG for allowable public exposure to 60-Hz AC MFs (ICNIRP, 2010).

Modeled MF levels for the 275-kV offshore export cables are overestimates of the expected MF levels for actual Project operations due to several conservative assumptions in the modeling analysis, including the lack of accounting for the expected twisting of the conductors within the cables that will contribute to substantially greater self-cancellation of MF than for straight conductors, the use of cable currents based on maximum wind farm output (100 percent capacity), and no allowance for MF shielding by potential use of ferromagnetic armoring wires.

Table 3.4 Modeled Magnetic Fields for the 275-kV Offshore Export Cables Along the Horizontal Directional Drilling Paths at the Dowses Beach Landfall Site[a]

Cross Section	Predicted Resultant Magnetic Field (mG)		
	Maximum Directly Above Cable Centerline(s)	±10 ft (±3 m) from Reference Point[c]	±25 ft (±7.6 m) from Reference Point[c]
Landfall, Middle of Dowses Beach[b]			
HDD1	5.0	4.3	2.5
HDD2/HDD3	1.0	1.0	0.9
Landfall, Parking Lot Behind Dowses Beach[b]			
HDD1	41.4	17.9	4.5
HDD2/HDD3	32.7	16.1	4.7

Notes:

ft = Foot; HDD = Horizontal Directional Drilling; kV = Kilovolt; m = Meter; mG = Milligauss.

(a) The offshore export cable MF modeling assumes straight-laid phase-conductor cable cores rather than helical or "twisted" phase-conductor cores (the expected cable design). As discussed in Section 3.2, field measurements taken for the Block Island "sea2shore" cable show that a helical design achieves a considerable degree of magnetic field cancellation, hence the modeled MF levels are expected to be overestimates of actual MF levels at maximum wind farm output.

(b) Magnetic fields are modeled at the ground surface for the middle-of-beach cross section, and at 3.28 ft (1 m) above ground surface for the parking lot cross section.

(c) For HDD1, the values provided at lateral distances of 10 and 25 ft are with respect to the centerline of the cable. For HDD2 and HDD3, the values provided at lateral distances of 10 and 25 ft are for 10 and 25 ft from the outer cable. Only one value is presented for each lateral distance because the predicted MF results for the left and right of the cables are identical.

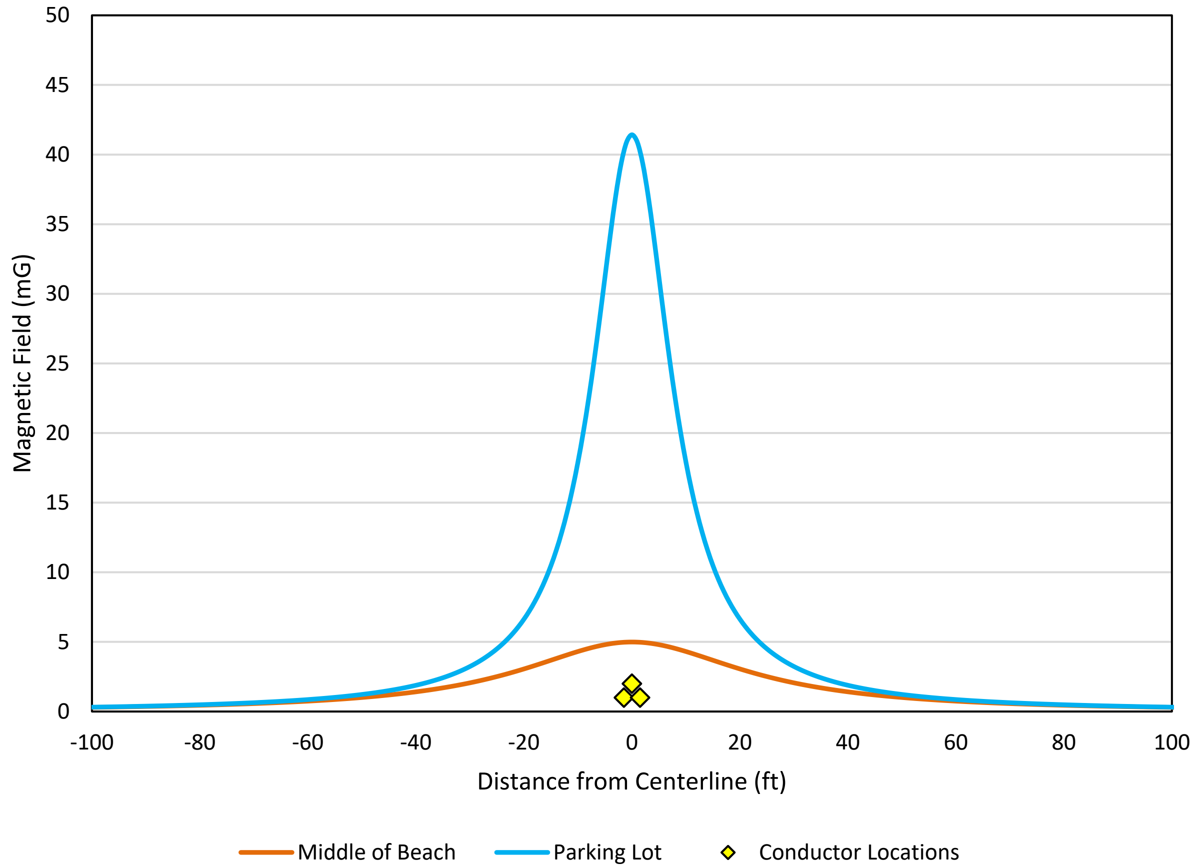


Figure 3.3 Magnetic Field Modeling Results for the 275-kV Offshore Export Cable Within Horizontal Directional Drilling Path 1 (HDD1) at the Dowses Beach Landfall Site. ft = Feet; mG = Milligauss. MF levels are provided for two locations along the HDD1 path (middle of beach – 24.7 ft burial depth, parking lot – 5 ft burial depth). The conductor locations (yellow diamonds) on the graphs are not to scale and are only provided to show relative locations.

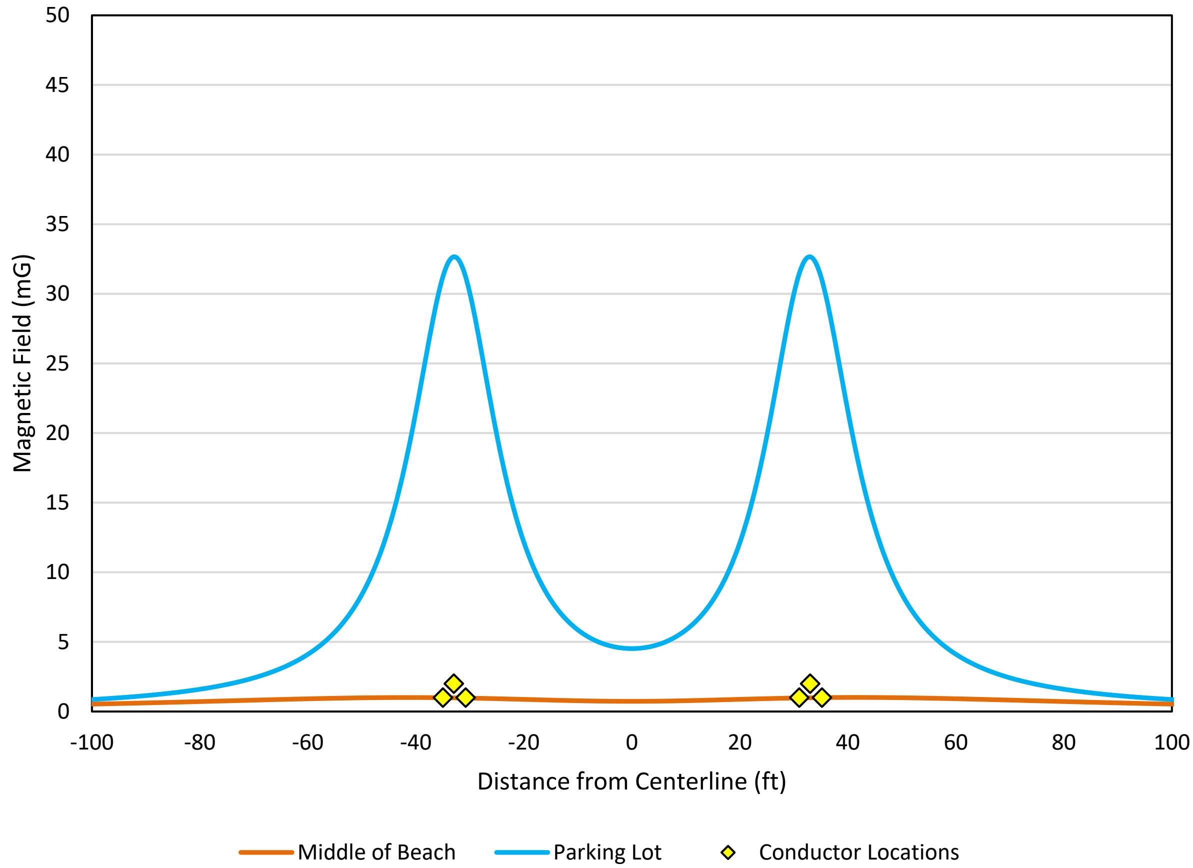


Figure 3.4 Magnetic Field Modeling Results for Two 275-kV Offshore Export Cables Within Horizontal Directional Drilling Paths 2 and 3 (HDD2, HDD3) at the Dowses Beach Landfall Site. ft = Feet; kV = Kilovolt; mG = Milligauss. MF levels are provided for two locations along the HDD2 and HDD3 paths (middle of beach – 57.4 ft (17.5 m) and 57.2 ft (17.4 m) burial depth for HDD2 and HDD3, respectively, and parking lot – 6 ft burial depth for both cables). Cables are assumed to be separated by 65.6 ft (20 m). The conductor locations (yellow diamonds) on the graphs are not to scale and are only provided to show relative locations.

4 MF Modeling for Onshore Export and Grid Interconnection Cables

4.1 Software Program Used for Modeling MF Levels for Onshore Export and Grid Interconnection Cable Installation Scenarios

MF strengths from the proposed onshore export and grid interconnection cables were calculated using the FIELDS computer program, which was previously described in Section 3.1 of this report. Modeled fields using this program are both precise and accurate for the input data utilized. As described previously in Section 3.1, modeled B_{Res} values from FIELDS – which is a conservative metric for modeled magnetic field values, in particular for elliptically or circularly polarized fields– are reported to be consistent with the magnetic field levels that will be reported by instruments relying on three fixed orthogonal coils (*e.g.*, fixed-coil instruments like the EMDEX II).

4.2 Onshore Export and Grid Interconnection Cable Specifications

Table 4.1 provides a summary of key specifications for the 275-kV onshore export cables to be installed in underground duct banks along the Project onshore transmission route between the Dowses Beach landfall site and the onshore substation, and Figure 4.1 provides an example schematic of the cable. The 275-kV single-core onshore export cables will consist of a copper conductor covered by XLPE solid insulation and wrapped in a metallic sheath with non-metallic outer jacket. There will be up to three onshore transmission circuits, with three cables making up a single circuit, for a total of up to nine 275-kV onshore export cables. The circuits are planned to be installed in underground duct banks which will contain 8 inch (20.32 cm) conduits for cables.

Identical, balanced conductor loadings of 1,098 amps were assumed for all onshore export cables. These are maximum loadings for the onshore export cables provided by the Proponent that are conservative values assuming maximum wind turbine output corresponding to 100% capacity. The wind turbine array is expected to operate at an annual-average capacity factor of approximately 50%; thus, for much of the time, the actual power output to the onshore export cables will be correspondingly lower than the maximum output loading levels used in this report. The currents for the onshore export cables include the charging currents for the Project onshore and offshore export system. See Table 4.1 footnote (a) below for an explanation of charging currents.

Table 4.1 275-kV Onshore Export Cable Specifications and Currents Used in the MF Modeling Analysis

Parameter	Specification Value
Constructional Data	
Cable Overall Diameter	138.4 mm
Conductor Diameter	64.5 mm
Conductor Type	Copper
Metal Neutrals and Sheathing	Copper wires and copper or aluminum tape
Electrical Data	
Current type and frequency	Alternating current 60 Hz
Rated voltage	275 kV
Conductor current[a]	1,098 A

Notes:
A = Ampere; Hz = Hertz; kV = Kilovolt; MF = Magnetic Field; mm = Millimeter.
(a) Includes the impacts of charging currents – *i.e.*, the additional electric current that occurs as the export cables proceed from the offshore substation toward the Project onshore substation, because the cable conductors act to some degree like a capacitor that need to be charged and discharged in addition to delivering actual electrical power to the onshore substation.

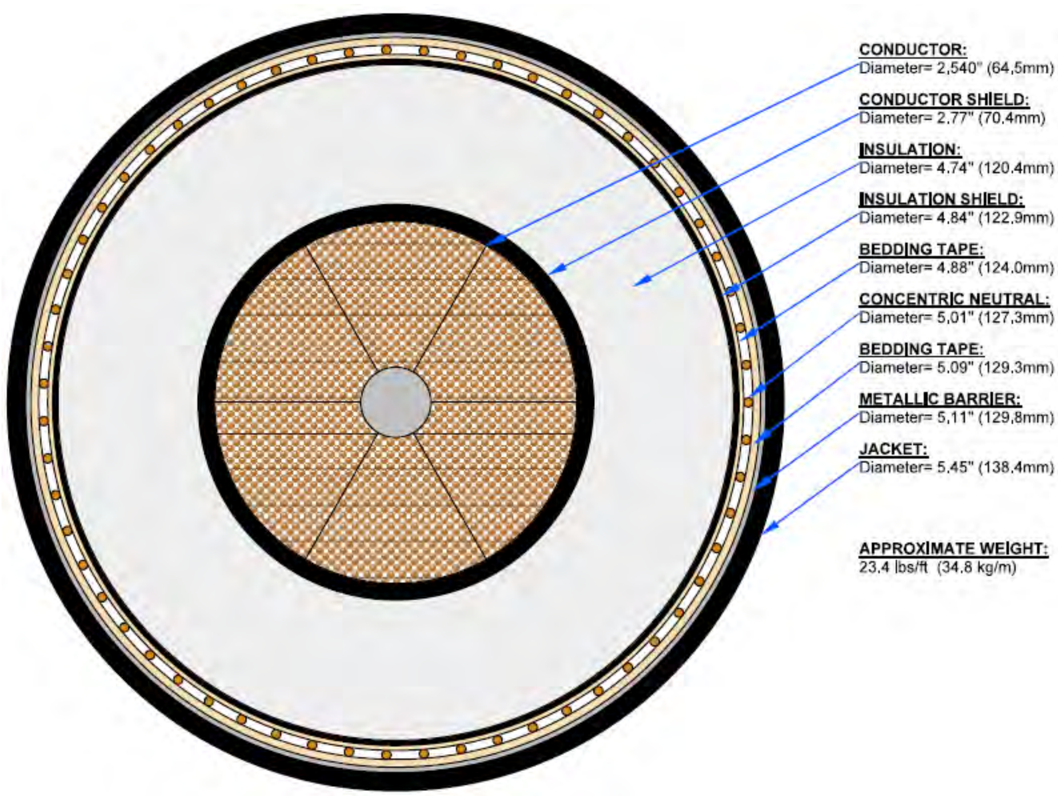


Figure 4.1 Example 275-kV Onshore Export Cable Cross Section Illustration. kg/m = Kilograms per Meter; kV = Kilovolt; lbs/ft = Pounds per Feet; mm = millimeters. From the cable datasheet provided in Appendix D.

Key cable specifications and a sample cable schematic are provided in Table 4.2 and Figure 4.2 for the 345-kV onshore grid interconnection cables to be used for the grid interconnection route between the onshore substation and the grid interconnection point at the existing Eversource 345-kV West Barnstable Substation. The 345-kV single-core grid interconnection cables will consist of a copper or aluminum conductor covered by XLPE solid insulation and wrapped in a metallic sheath with non-metallic outer jacket. There will be up to three grid interconnection circuits, with three cables making up a single circuit, for a total of up to nine 345-kV grid interconnection cables. Similar to the 275-kV onshore export system, the 345-kV grid interconnection circuits are planned to be installed in underground duct banks which will contain 8 in (20.32 cm) conduits for cables.

Identical, balanced conductor loadings of 837 amps were assumed for all 345-kV grid interconnection cables. These are maximum loadings for the grid interconnection cables provided by the Proponent that are conservative values assuming maximum wind turbine output corresponding to 100% capacity. The wind turbine array is expected to operate at an annual-average capacity factor of approximately 50%; thus, for much of the time, the actual power output to the grid interconnection cables will be correspondingly lower than the maximum output loading levels used in this report. Due to the short length of the grid interconnection route (~0.4 to 0.5 miles depending on the route option), charging currents are negligible and not considered for the 345-kV grid interconnection cables.

Table 4.2 345-kV Grid Interconnection Cable Specifications and Currents Used in the MF Modeling Analysis

Cable Specification or Feature	Parameter
Constructional Data	
Cable Overall Diameter	132.4 mm
Conductor Diameter	58.4 mm
Conductor Type	Copper or Aluminum
Metal Neutrals and Sheathing	Copper wires and copper tape
Electrical Data	
Current type and frequency	Alternating current 60 Hz
Rated voltage	345 kV
Conductor current	837 A

Notes:
A = Ampere; Hz = Hertz; kV = Kilovolt; MF = Magnetic Field; mm = Millimeter.

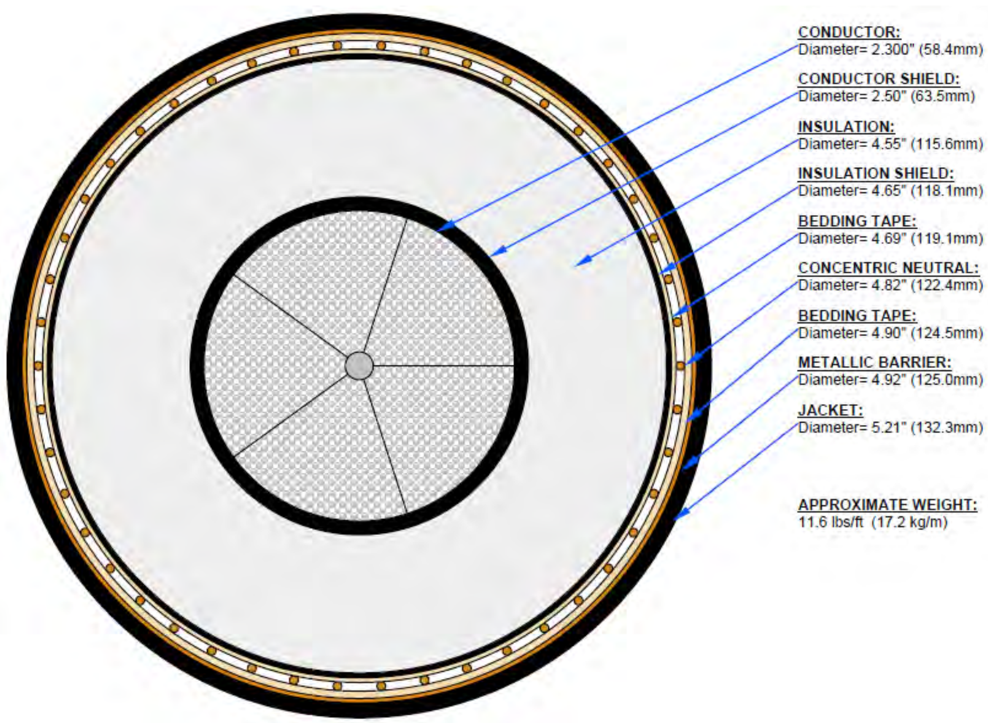


Figure 4.2 Example 345-kV Onshore Grid Interconnection Cable Cross Section Illustration. kg/m = Kilograms per Meter; kV = Kilovolt; lbs/ft = Pounds per Foot; mm = millimeter. From the cable datasheet provided in Appendix E.

4.3 Modeled Underground Onshore Export and Grid Interconnection Cable Installation Scenarios

MF modeling was performed by Gradient for 5 representative onshore export cable installation scenarios and 2 representative grid interconnection cable installation scenarios:

- Three 275-kV onshore export cable circuits arranged in a 3W×4D duct bank, buried 3.5 feet below ground surface (ft bgs) – referred to as the "typical" installation case for the 275-kV onshore export cables;
- Three 275-kV onshore export cable circuits arranged in a 3W×4D duct bank, buried 7.0 ft bgs – referred to as the "deep" installation case for the 275-kV onshore export cables for crossing under utilities and other obstructions;
- Three 275-kV onshore export cable circuits installed in two 72-inch diameter microtunnels (two cables in one microtunnel and one cable in the other), spaced 80 ft apart from each other, for crossing under the Route 6 Highway;
- A single 275-kV onshore export cable circuit installed in a transition joint bay (TJB) to be located beneath the Dowses Beach parking lot;[6]
- A single 275-kV onshore export cable circuit installed in a splice vault and the other two 275-kV onshore export cable circuits installed in either a 2-wide-by-4-deep (2W×4D) bypass duct bank or in individual 1-wide-by-4-deep (1W×4D) bypass duct banks adjacent to the splice vault;

[6] There is a single transition joint bay for each of the three onshore transmission circuits.

- Three 345-kV grid interconnection cable circuits arranged in a 3W×4D duct bank, buried 3.5 ft bgs – referred to as the "typical" installation case for the 345-kV grid interconnection cables;
- Three 345-kV grid interconnection cable circuits arranged in a 3W×4D duct bank, buried 7.0 ft bgs – referred to as the "deep" installation case for the 345-kV grid interconnection cables for crossing under utilities and other obstructions.

Gradient did not perform MF modeling for one additional installation case for the 275-kV onshore export cables, namely an underground 12W×1D duct bank proposed for use within the 24-inches of road surface cover above the Phinney's Bay box culvert on Dowses Beach Causeway. In order to minimize the magnetic fields associated with this shallow duct bank to be installed over the box culvert crossing, Stantec proposed the use of a 40MIL (0.040-inch) copper shield consisting of three conductive copper plates installed over the top and sides of the concrete duct bank. Gradient did not conduct MF modeling for this cross section because the FIELDS program does not have the capability to model the MF mitigation achieved by metallic plating. However, Stantec conducted MF modeling for this installation case using the CDEGS (Current Distribution, Electromagnetic Fields, Grounding and Soil Structure Analysis) software system that can account for the MF mitigation provided by the copper plate shielding proposed for this installation case, and the results for this MF modeling analysis are discussed in Section 4.5.

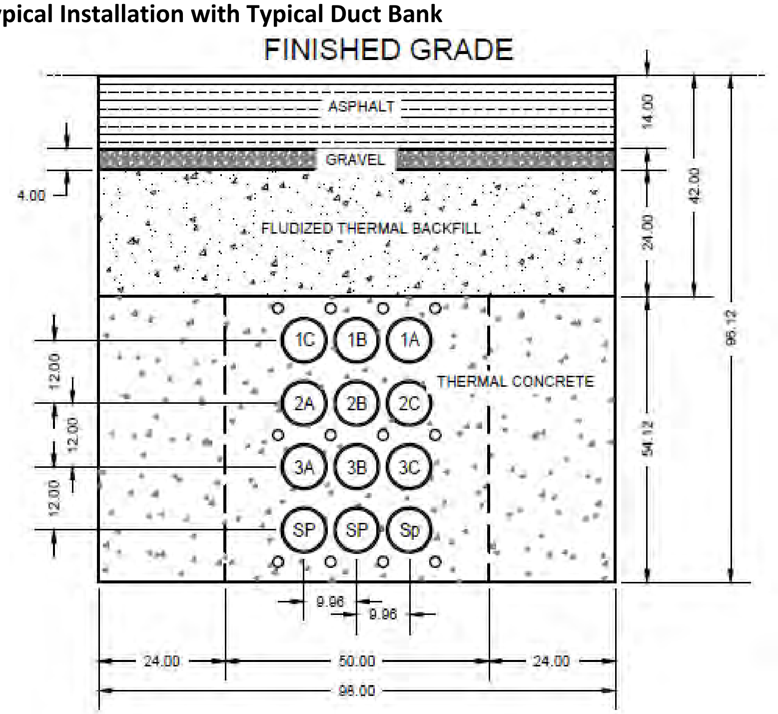
Table 4.3 summarizes the modeling parameters for the underground onshore export and grid interconnection cable installation cases, and Figures 4.3 through 4.7 provide cross section diagrams that show the duct bank configurations and conductor phasing arrangements. Figure 4.3 shows the proposed 3W×4D underground duct banks to be used for both the 275-kV onshore export and the 345-kV grid interconnection cables, with panel (a) showing the duct bank proposed for use for the majority of the Project onshore export and grid interconnection routes where the burial depth is 3.5 ft bgs ("typical installation"), and panel (b) showing the duct bank proposed for use where the Project circuits are to be buried at 7.0 ft bgs to traverse under utilities and other obstructions ("deep installation"). As indicated in these cross section diagrams, the horizontal conduit spacing also differs between the typical and deep installation cases (9.96 inches for the typical installation case *versus* 17.00 inches for the deep installation case). For modeling, each cable was assumed to lie in the bottom of 8-in (20.32-cm) conduits within the underground duct banks.

Table 4.3 Summary of Modeling Parameters for Underground Onshore Export and Grid Interconnection Cable Installation Scenarios

Installation Scenario	Burial Depth[a]	No. of Cable Circuits	Per Cable Load[b]
275-kV Onshore Export Cables			
3W×4D Duct Bank, Typical Installation	3.5 ft (1.1 m)	3	1,098 A
3W×4D Duct Bank, Deep Installation	7.0 ft (2.1 m)	3	1,098 A
Route 6 Crossing, 6-ft Microtunnel	12 ft (3.7 m)[c]	3	1,098 A
Transition Joint Bay	2.5 ft (0.76 m)	1	1,098 A
Splice Vaults	2.5 ft (0.76 m) to inner splice vault wall; 5.5 ft (1.7 m) to top of bypass duct banks	3 (1 in splice vault, and 2 in bypass duct bank[s])	1,098 A
345-kV Grid Interconnection Cables			
3W×4D Duct Bank, Typical Installation	3.5 ft (1.1 m)	3	837 A
3W×4D Duct Bank, Deep Installation	7.0 ft (2.1 m)	3	837 A

Notes:
3W×4D = 3-Wide-By-4-Deep; A = Ampere; ft = Foot; kV = Kilovolt; m = Meter.
(a) Burial depth to top of duct bank, microtunnel, transition joint bay, or splice vault.
(b) For the 275-kV onshore export cables, includes the impacts of charging currents – i.e., the additional electric current that occurs as the export cables proceed from the offshore substation toward the proposed onshore substation, because the cable conductors act to some degree like a capacitor that need to be charged and discharged in addition to delivering actual electrical power to the onshore substation. Charging currents are not considered for the 345-kV grid interconnection cables due to the short length of the grid interconnection route (~0.4 to 0.5 miles depending on the route option).
(c) Corresponds to the estimated burial depth beneath Route 6.

a) Typical Installation with Typical Duct Bank



b) Deep Installation with Typical Duct Bank

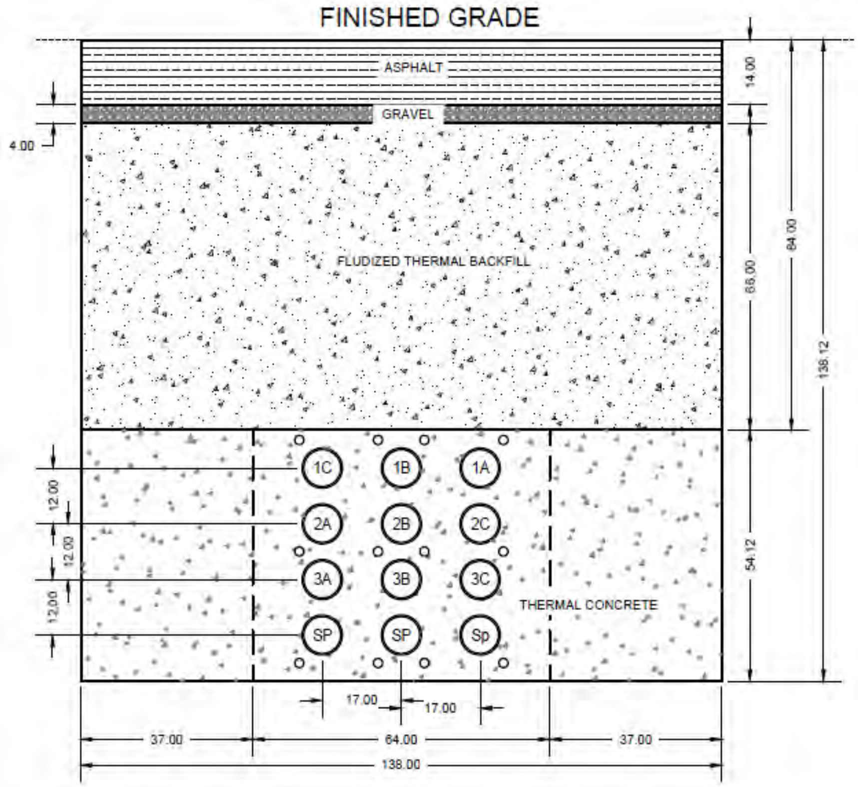


Figure 4.3 Representative Cross Section Drawings for Onshore Export and Grid Interconnection Cable 3W×4D Duct Bank Installation Scenarios. Panel (a) shows the duct bank used for a typical roadway scenario at a burial depth of 3.5 ft bgs, while panel (b) shows the duct bank for a deep installation scenario at a depth of 7.0 ft bgs. SP indicates an empty or spare conduit, while the numbers 1, 2, or 3 indicate the circuit and the letters A, B, or C indicate the conductor phasing.

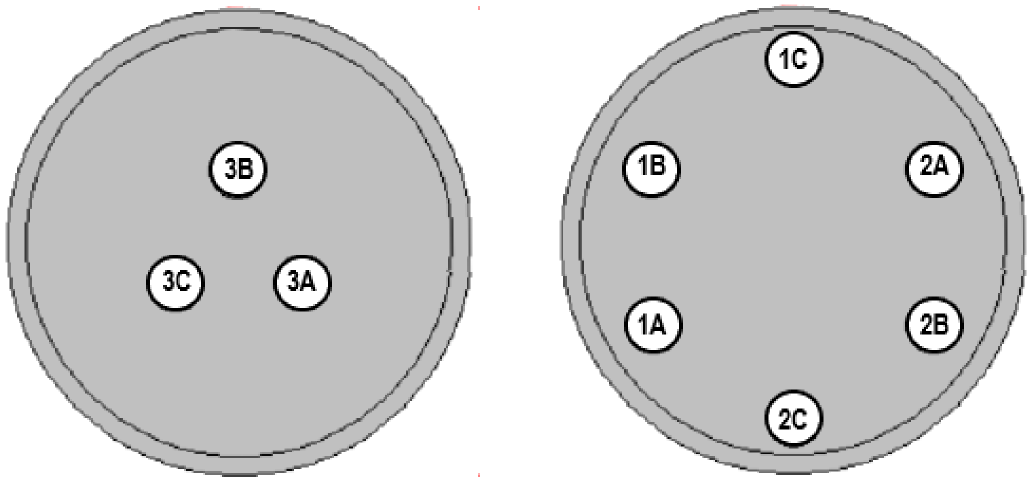


Figure 4.4 Representative Cross Section Drawings of the Microtunnel Conductor Configurations Proposed for the Route 6 Crossing Scenario of the 275-kV Onshore Export Cables. The horizontal separation distance between the two microtunnels is 80 ft (24.4 m). Both microtunnels are assumed to be buried 12 ft (3.7 m) below ground surface corresponding to the estimated burial depth beneath Route 6. The numbers 1, 2, or 3 indicate the circuit and the letters A, B, or C indicate the conductor phasing.

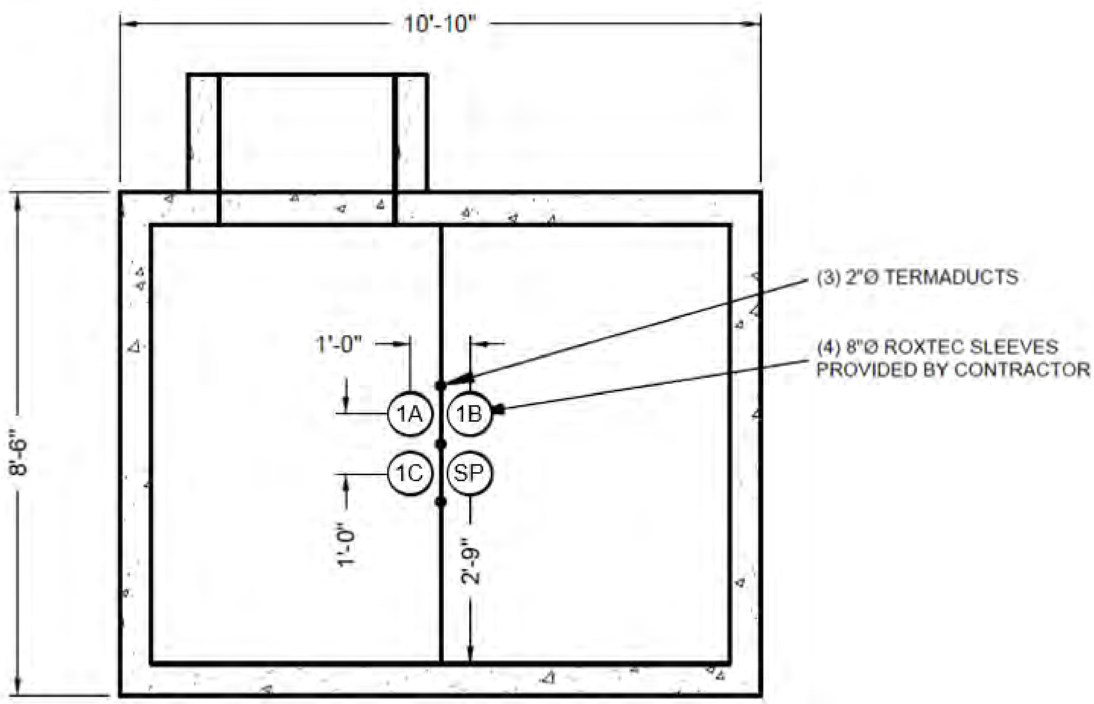
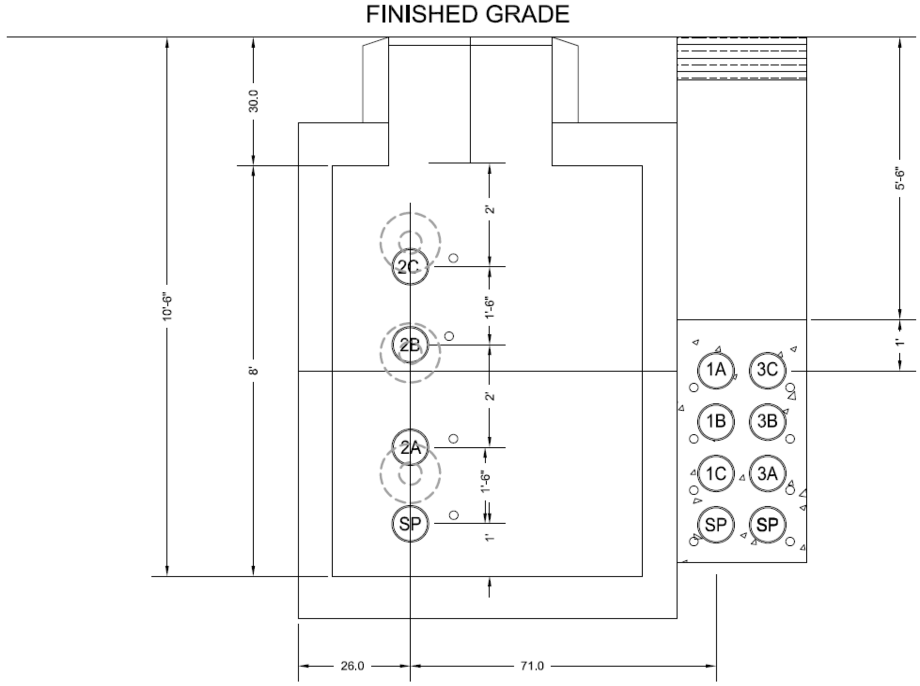
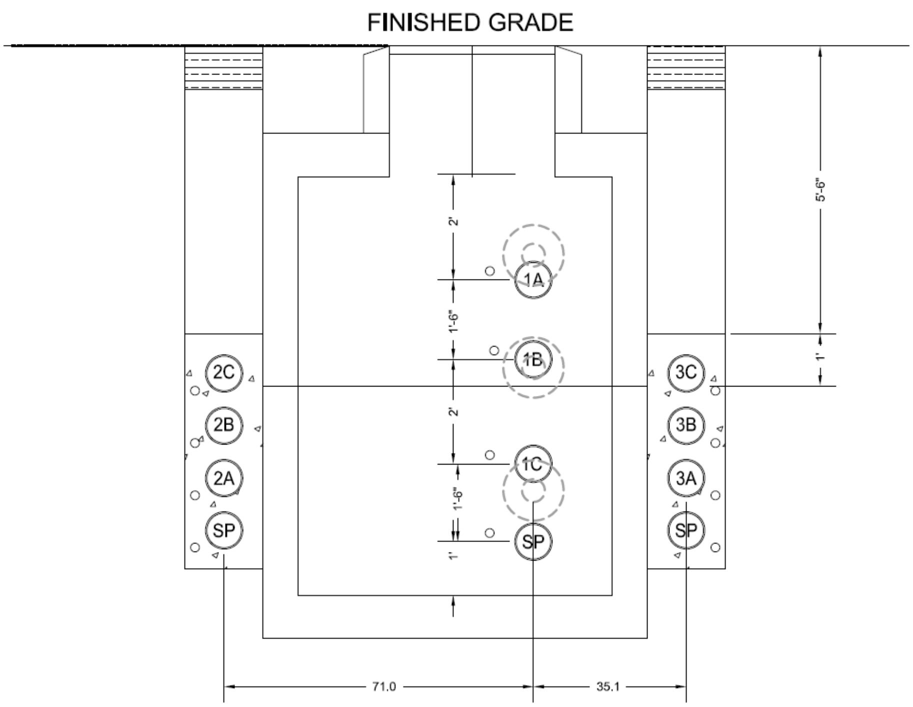


Figure 4.5 Representative Cross Section Drawing of a Single Circuit Transition Joint Bay for the 275-kV Onshore Export Cables in the Dowses Beach Parking Lot. Although the design is for 2.5 to 3.0 ft (0.76 to 0.91 m) of cover on top of the joint bay, modeling assumed the minimum cover of 2.5 ft (0.76 m). The centers of the top conduits are 4 ft (1.2 m) below the top of the joint bay. SP indicates an empty or spare conduit, while the letters A, B, or C indicate the conductor phasing.

a) Splice Vault Cross Section A – Typical Vault Penetrations



b) Splice Vault Cross Section B – Typical Vault Penetrations



c) Splice Vault Cross Section C – Typical Vault Penetrations

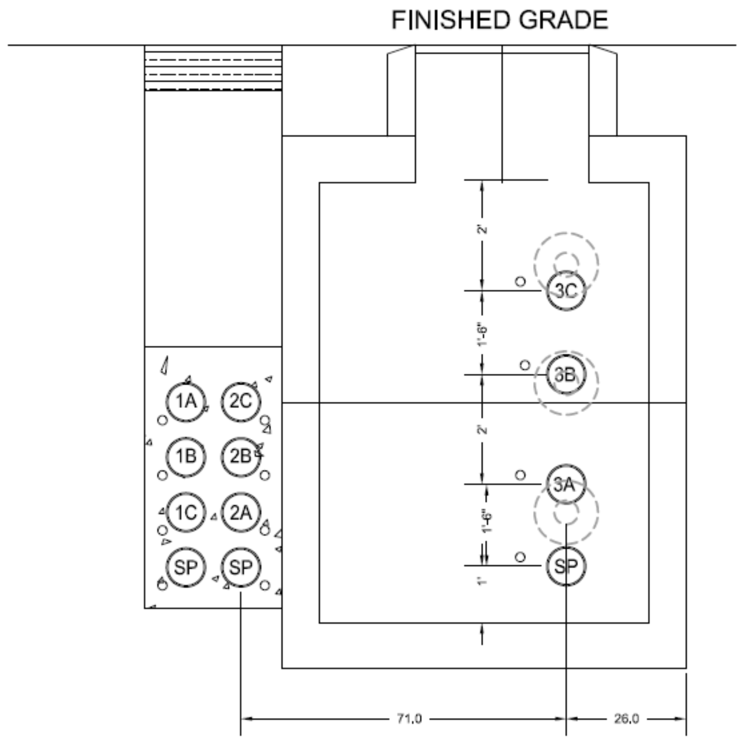


Figure 4.6 Representative Cross Section Drawings of the 275-kV Onshore Export Cable Splice Vaults. There are three cross sections, corresponding to the individual circuit splice vaults for each circuit. The circuits that are not being spliced are contained in either a 2W×4D bypass duct bank on one side of the splice vault (Cross Sections A and C) or individual 1W×4D bypass duct banks on either side of the splice vault (Cross Section B). The numbers 1, 2, or 3 indicate the circuit and the letters A, B, or C indicate the conductor phasing.

Mitigation of magnetic fields has been factored into the design of the underground onshore export and grid interconnection transmission systems. The underground placement of the onshore export and grid interconnection cables is a key design component for mitigating aboveground MF levels because underground phase conductors can be placed relatively close to each other in underground duct banks, contributing to greater self-cancellation of magnetic fields as compared to overhead circuits.[7] MF mitigation has been factored into the identification of minimum burial depths for the underground duct banks. MF mitigation has also been considered in the selection of conductor phasing, in particular the conductor phasing for the typical and deep installation 3W×4D duct bank arrays (*e.g.*, where the Circuit 1 phase conductors in the uppermost conduits are reverse phased with the Circuit 2 phase conductors below them in the middle conduits, and the Circuit 2 phase conductors are in phase with the Circuit 3 phase conductors below them, which results in significantly less aboveground MF levels than other conductor phasing arrangements). MF mitigation informed the design of both the transition joint bays and the splice vaults, including the burial depths, cable configurations, and conductor phasing arrangements. Modeling of the splice vault cross sections was conducted for multiple circuit configurations and phase conductor

[7] The closer spacing also results in more rapid fall-off of the MF levels with distance away from the cable centerlines (*i.e.*, more rapid decay with distance) than is the case with overhead circuits.

arrangements in order to identify constructible circuit configurations and phase conductor arrangements with reduced aboveground MF impacts. Finally, the installation of ground continuity conductors (GCCs) in the underground duct banks, which can carry currents induced by the MFs from the phase conductors and generate MFs that oppose (partially cancel) the phase conductor MFs, is also expected to contribute to some reduction in aboveground MFs.[8]

For each onshore cable installation cross section, aboveground MF strengths were modeled as a function of horizontal distance, perpendicular to the direction of current flow. Per standard industry practices (IEEE Power Engineering Society, 1995a,b), MF levels were modeled at a height of 3.28 ft (1 m) above the ground surface to represent the exposure of an upright person.

4.4 MF Modeling Results for the Underground Onshore Export and Grid Interconnection Cable Installation Scenarios

The results of the MF modeling for the representative underground onshore export and grid interconnection cable installation scenarios are summarized in Table 4.4. Figure 4.7 shows the MF modeling results for the 275-kV onshore export cable underground duct bank arrays, and Figures 4.8, 4.9, and 4.10 show the MF modeling results for the Route 6 crossing microtunnel, transition joint bay, and the splice vault installation scenarios, respectively. Figure 4.11 shows the modeling results for the 345-kV grid interconnection cable underground duct bank arrays. The modeled MFs, including those directly above the underground cables for all installation cases of both the 275-kV onshore export cables and the 345-kV grid interconnection cables, are all well below the ICNIRP health-based guideline of 2,000 mG for allowable public exposure to 60-Hz magnetic fields (ICNIRP, 2010). As shown in the table and each of the figures, the highest modeled MF levels for each of the underground onshore export and grid interconnection cable installation scenarios occur directly above the cables. Despite their greater burial depths, higher MF levels were obtained for the deep installation case than the typical installation case for both the 275-kV onshore export cables and the 345-kV grid interconnection cables due to the increased conductor spacing for the deep installation case that reduces MF self-cancellation and offsets the impact of the deeper burial depth. The plots show significant reductions in MF with increasing lateral distance from the cables including:

- For the 275-kV onshore export cable typical installation underground duct bank array, >80 percent reductions in MF levels at lateral distances of ±25 ft (±7.6 m) from the duct bank centerline;
- For the 275-kV onshore export cable underground transition joint bay cross section, >85 percent reductions in MF levels at lateral distances of ±25 ft (±7.6 m) from the duct bank centerline;
- For the 275-kV onshore export cable underground splice vault cross sections, >86 to >96 percent reductions in MF levels at lateral distances of ±25 ft (±7.6 m) from the duct bank centerline;
- For the 345-kV grid interconnection cable typical installation duct bank array, >80 percent reductions in MF levels at lateral distances of ±25 ft (±7.6 m) from the duct bank centerline.

Lastly, it bears mentioning that the MF modeling for both the underground onshore export and grid interconnection cable installation cases is expected to overpredict the magnitude of aboveground MF

[8] Because the FIELDS model cannot calculate the currents induced on GCCs by the phase conductors' main currents, the GCC induced currents were neglected in the MF modeling analysis. This is thus expected to be a contributing factor to the overestimation of MFs by the MF modeling analysis because any induced currents on ground conductors would be expected to produce an MF that would tend to oppose (partially cancel) the MF arising from the phase conductor currents (Istenic *et al*., 2001).

levels associated with the installed onshore export and grid interconnection cables. This is because minimum expected burial depths were used, and the currents used for the cables assume maximum wind turbine output (100 percent capacity). In addition, as discussed earlier, the MF modeling analyses did not account for the phase conductors' main currents inducing currents on ground continuity conductors in the duct banks. Any induced currents on ground conductors would be expected to produce an MF that would tend to oppose (partially cancel) the MF arising from the phase conductor currents (Istenic *et al*., 2001).

Table 4.4 Modeled Magnetic Fields at 3.28 ft (1 m) Above Ground Surface for Underground Onshore Export and Grid Interconnection Cable Installation Scenarios

Installation Scenario	Predicted Resultant Magnetic Field (mG)		
	Maximum Above Reference Point[a]	±10 ft (±3 m) from Reference Point[a]	±25 ft (±7.6 m) from Reference Point[a]
275-kV Onshore Export Cables			
3W×4D Duct Bank, Typical Installation	77.2	50.1 / 50.1	14.3 / 14.3
3W×4D Duct Bank, Deep Installation	83.4	59.8 / 59.8	21.8 / 21.8
Route 6 Crossing, 6-ft Microtunnel	38.8	30.2 / 18.8	13.9 / 5.2
Transition Joint Bay	96.9	50.2 / 49.1	14.1 / 13.8
Splice Vaults, Cross Section A	232.8	110.8 / 105.5	29.9 / 31.8
Splice Vaults, Cross Section B	121.3	68.7 / 28.2	11.6 / 4.2
Splice Vaults, Cross Section C	253.6	121.9 / 116.1	29.1 / 31.0
345-kV Grid Interconnection Cables			
3W×4D Duct Bank, Typical Installation	58.7	38.1 / 38.1	10.9 / 10.9
3W×4D Duct Bank, Deep Installation	75.7	53.8 / 53.8	19.6 / 19.6

Notes:

3W×4D = 3-Wide-By-4-Deep; ft = Foot; kV = Kilovolt; m = Meter; mG = Milligauss.

(a) The two values presented correspond to the model-predicted fields at the given lateral distances to the left and right of the reference point, respectively, where the reference point for the duct bank, transition joint bay, and splice vault installation scenarios is the duct bank, transition joint bay, or splice vault centerline. For the Route 6 crossing microtunnel installation scenario, the values presented at lateral distances of 10 and 25 ft are for 10 and 25 ft from the outer microtunnel.

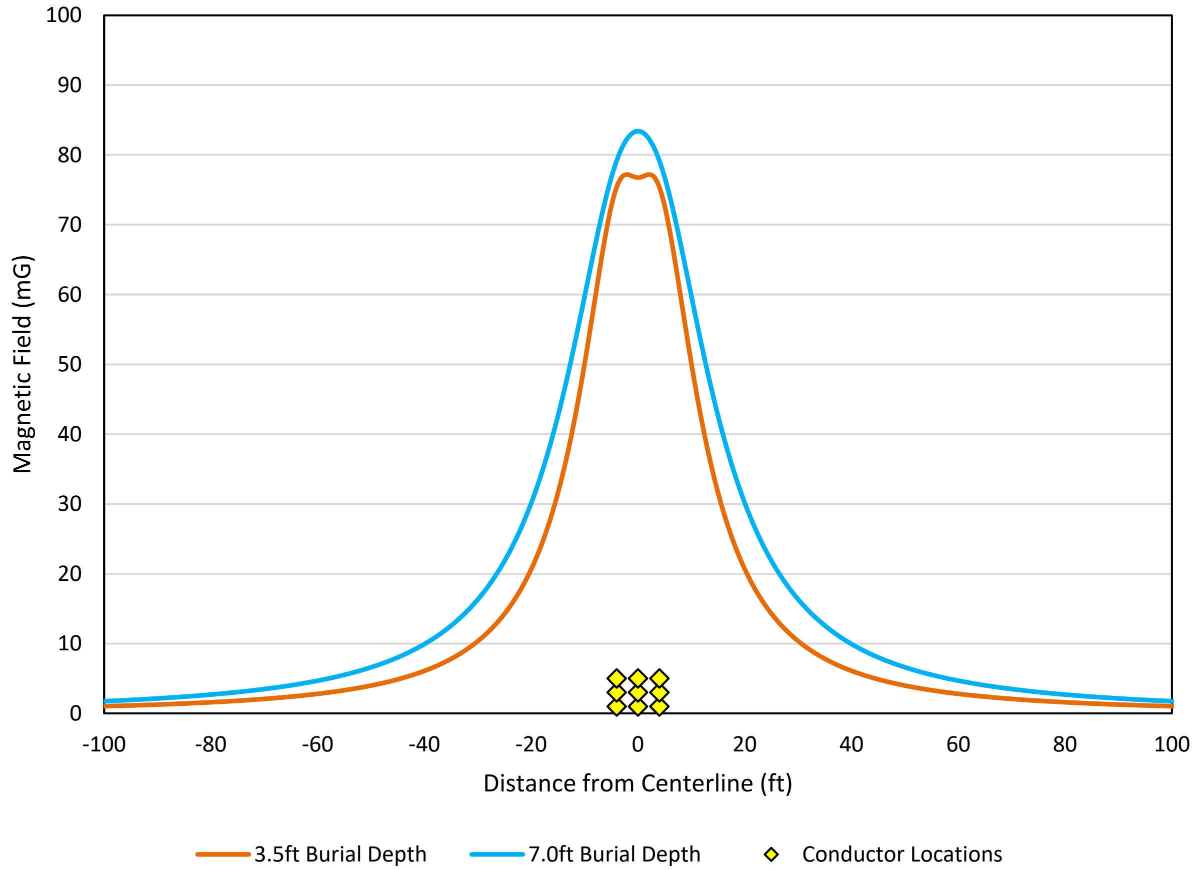


Figure 4.7 Magnetic Field Modeling Results at 1 Meter Aboveground for the 275-kV Onshore Export Cables in the Underground 3W×4D Duct Bank Arrays. ft= Feet; kV = Kilovolt; mG = Milligauss. The conductor locations (yellow diamonds) on the graphs are not to scale and are only provided to show relative locations.

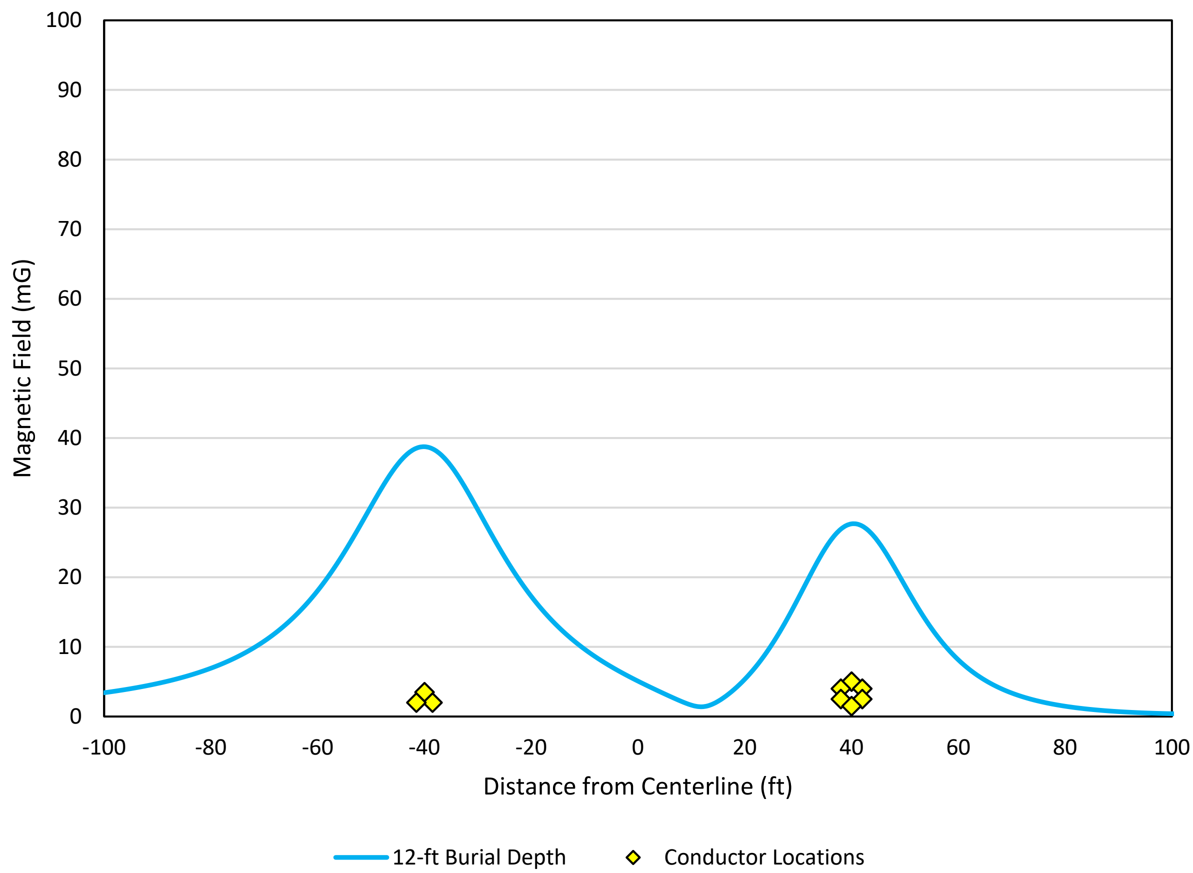


Figure 4.8 Magnetic Field Modeling Results at 1 Meter Aboveground for the Route 6 Crossing of the 275-kV Onshore Export Cables in Underground Microtunnels. ft= Feet; kV = Kilovolt; mG = Milligauss. Modeling was conducted for a burial depth of 12 feet (3.7 m) to the microtunnels, corresponding to the estimated depth where they cross beneath Route 6. The conductor locations (yellow diamonds) on the graphs are not to scale and are only provided to show relative locations.

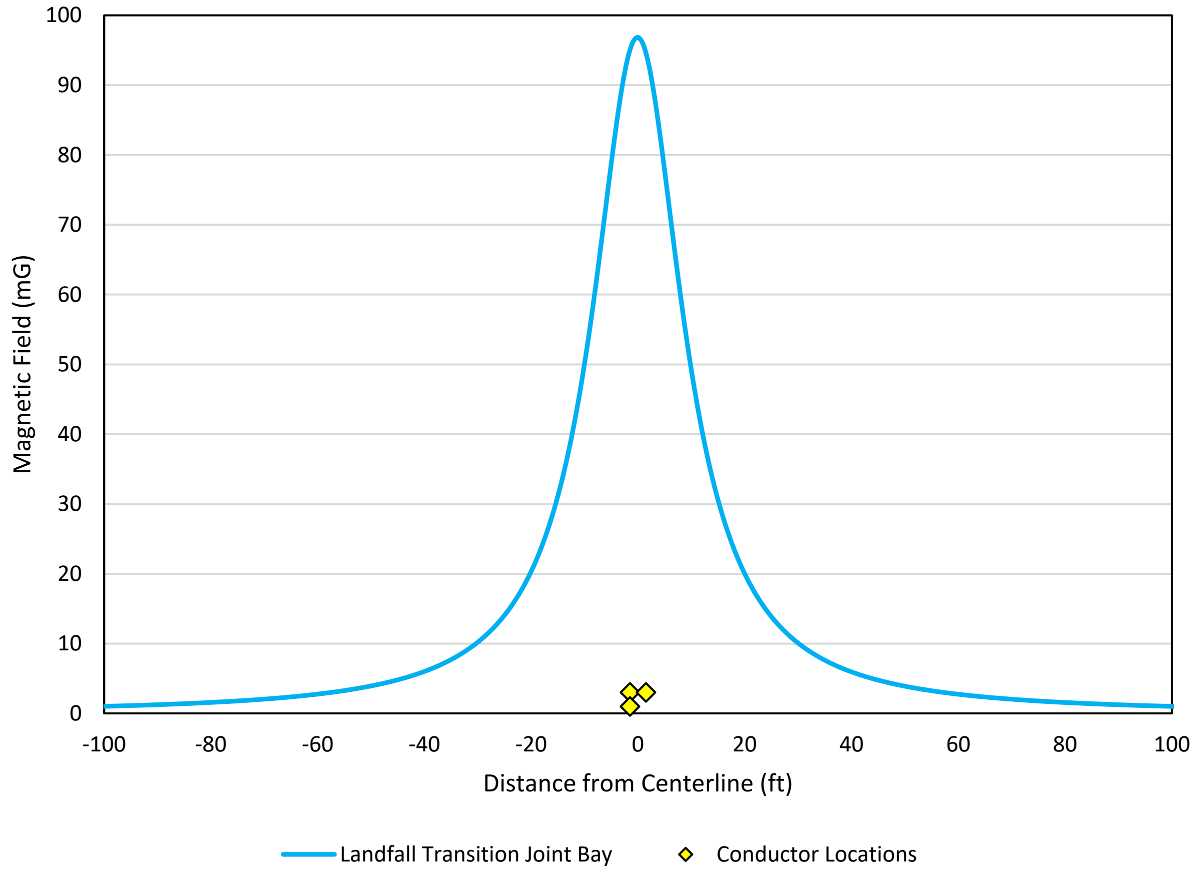
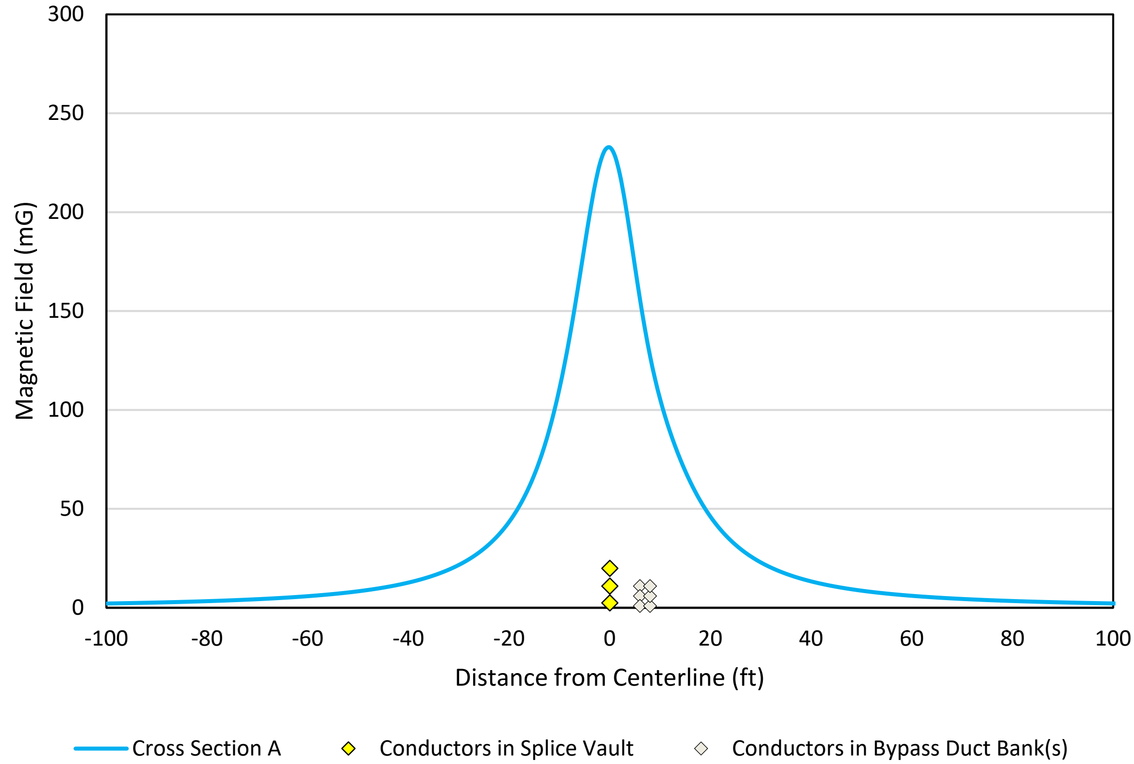
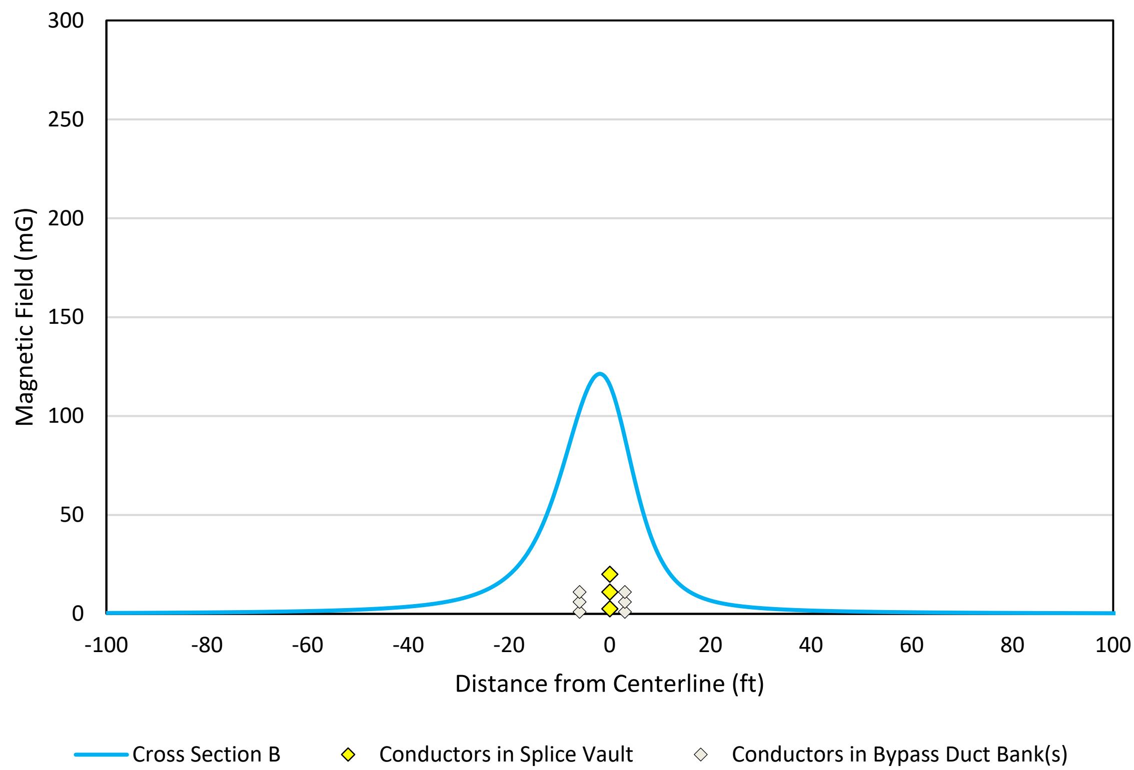


Figure 4.9 Magnetic Field Modeling Results at 1 Meter Aboveground for an Underground Transition Joint Bay at the Dowses Beach Landfall Site Containing an Individual 275-kV Onshore Transmission Circuit. ft= Feet; kV = Kilovolt; mG = Milligauss. The conductor locations (yellow diamonds) on the graphs are not to scale and are only provided to show relative locations.

a) Splice Vault Cross Section A



b) Splice Vault Cross Section B



c) Splice Vault Cross Section C

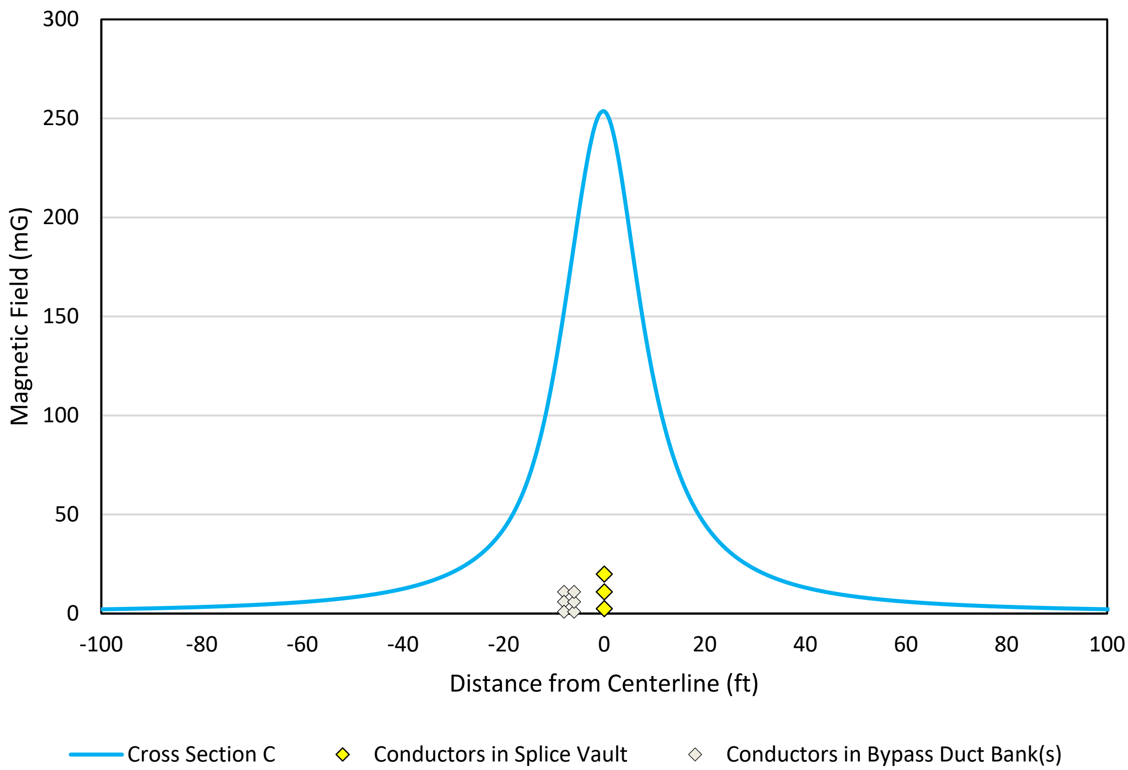


Figure 4.10 Magnetic Field Modeling Results at 1 Meter Aboveground for the 275-kV Onshore Export Cable Splice Vault Cross Sections. ft= Feet; kV = Kilovolt; mG = Milligauss. There are three cross sections corresponding to the individual splicing of the three circuits. The conductor locations (yellow diamonds) on the graphs are not to scale and are only provided to show relative locations.

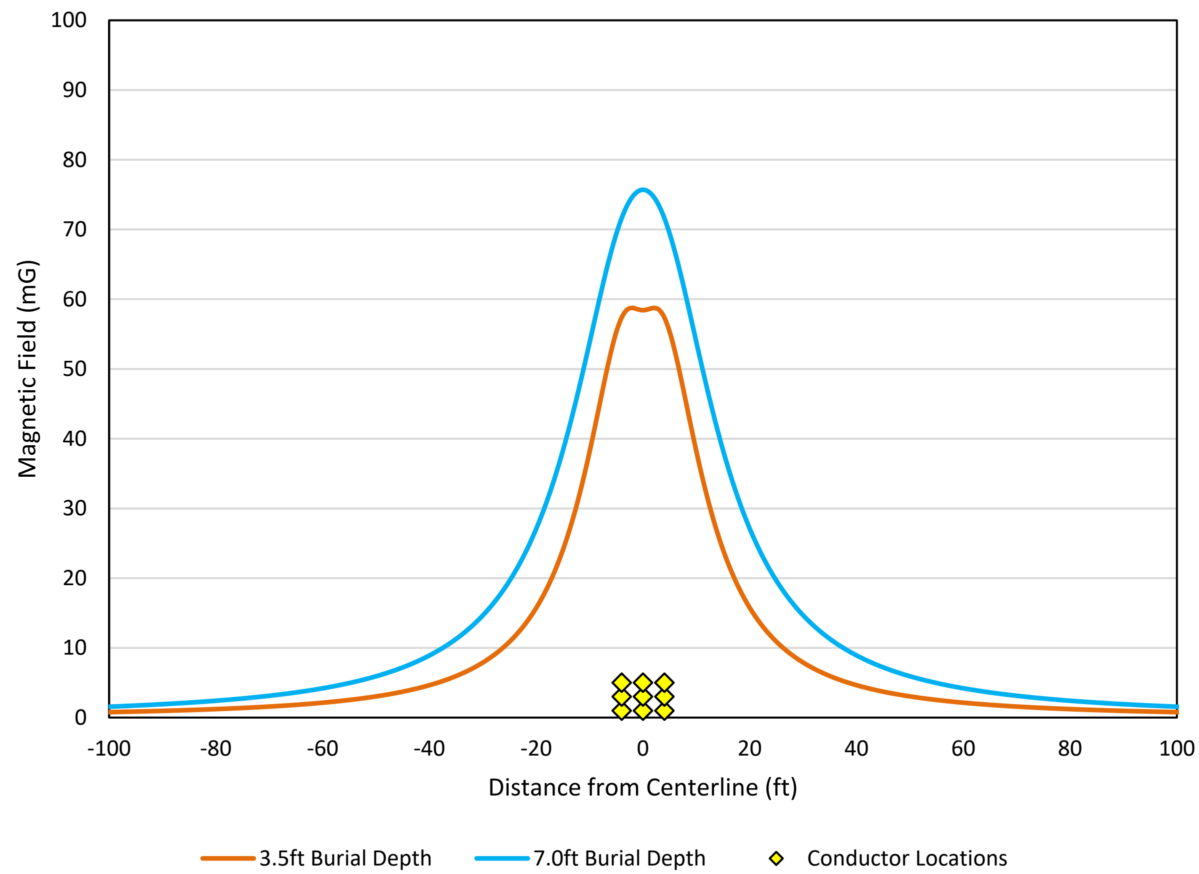


Figure 4.11 Magnetic Field Modeling Results at 1 Meter Aboveground for the 345-kV Grid Interconnection Cables in the Underground 3W×4D Duct Bank Arrays. ft= Feet; kV = Kilovolt; mG = Milligauss. The conductor locations (yellow diamonds) on the graphs are not to scale and are only provided to show relative locations.

4.5 MF Modeling Analysis for the Phinney's Bay Culvert Crossing with the Three 275-kV Onshore Export Cables in an Underground 12W×1D Duct Bank with Copper Plate Shielding

For the crossing of the existing Phinney's Bay box culvert located on Dowses Beach Causeway in Barnstable, it has been determined that it is not feasible to bury the typical underground 3W×4D duct bank to be used for the onshore export cables (Epsilon Associates, Inc., 2022; Stantec Consulting Services, Inc., 2022). Instead, the three 275-kV onshore export circuits will be arranged in a twelve conduit wide by one conduit deep configuration (*i.e.*, in an underground 12W×1D duct bank approximately 9.75 feet wide by 1.2 feet tall; see Figure 4.12) when crossing the box culvert (Epsilon Associates, Inc., 2022; Stantec Consulting Services, Inc., 2022). The three sets of 275-kV single-core onshore export cables will transition from the typical underground 3W×4H duct bank to a 12W×1D duct bank within the 24-inches of road surface cover above the Phinney's Bay box culvert, and will then transition back to the typical underground 3W×4H duct bank after the culvert crossing. As indicated in Figure 4.12, there will be approximately 10 inches of cover above the shallow concrete duct bank.

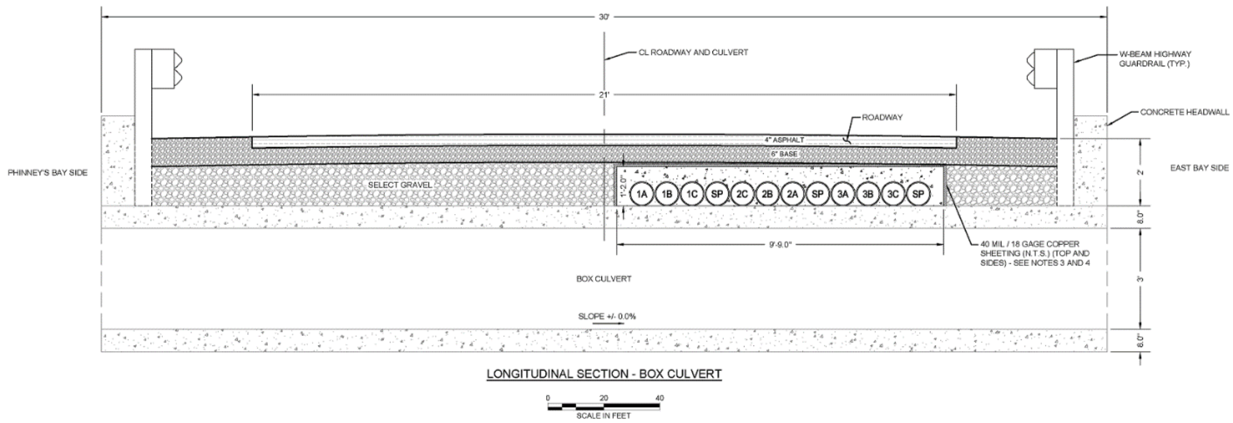


Figure 4.12 Cross Section for the Phinney's Bay Box Culvert Crossing with the Proposed Underground 12W×1D Duct Bank and Conductive Copper Plates. SP= Spare Duct. As indicated in the drawing, a 40MIL (0.040-inch) copper shield consisting of three copper plates installed over the top and sides of the concrete duct bank is proposed for minimizing the magnetic fields associated with this shallow duct bank. The proposed conductor phasing arrangements for the three circuits are also indicated in the drawing.

In order to minimize the magnetic fields associated with this shallow duct bank to be installed over the box culvert crossing, Stantec proposed the use of a 40MIL (0.040-inch) copper shield consisting of three conductive copper plates installed over the top and sides of the concrete duct bank. Stantec proposed that the copper sheeting be fabricated with bends along two edges to ensure continuous contact with the duct bank on three sides. Stantec conducted MF modeling using the CDEGS software system that demonstrated the proposed copper plates to have a shielding factor of approximately 3.6 for peak magnetic field levels above the duct bank. This modeling analysis assumed that the copper plate shielding will be installed along three sides of the duct bank over the entire length of the duct bank.

Figure 4.13 is a figure generated by Stantec from their MF modeling analysis that shows the magnetic fields predicted using CDEGS at a height of 1 meter above the ground surface with the MF mitigation from the copper plating. Gradient did not conduct MF modeling for this cross section because the FIELDS program does not have the capability to model the MF mitigation achieved by metallic plating. The Stantec modeling analysis predicted a maximum MF level of 63.0 mG above the duct bank with the proposed copper plating. Figure 4.13 shows the reduction in MF levels moving laterally along the bridge structure away from the location of the underground duct bank, with a MF level of approximately 32 mG at the bridge edge closest to the duct bank and a MF level of approximately 8 mG at the farther bridge edge, both at a height of 1 meter above the ground surface. These modeling results are consistent with literature reports of the significant shielding effect of conductive copper plates directly above underground cables (CIGRE, 2009, 2014).

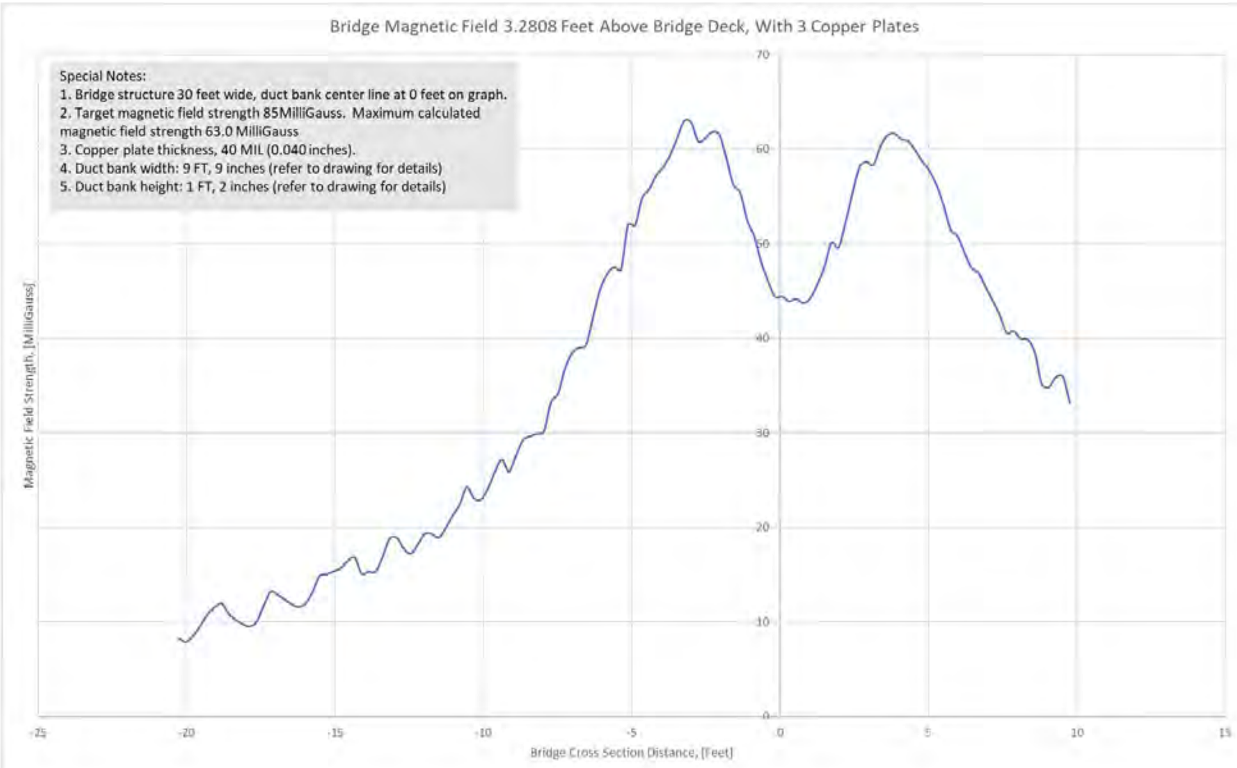


Figure 4.13 Model-predicted Magnetic Fields in Milligauss (mG) at the Phinney's Bay Box Culvert Crossing Located on Dowses Beach Causeway in Barnstable from the Stantec MF Modeling Analysis Using CDEGS. MF levels are shown at a height of 1 meter above the ground surface, and include MF mitigation from the proposed copper plating to be installed on three sides of the proposed underground 12W×1D duct bank with the onshore export cables. The width of the bridge structure is 30 feet, with the centerline of the duct bank assigned as x=0 in the graph.

5 Conclusions

Gradient performed an independent EMF assessment for the New England Wind 2 Connector Project, which will deliver up to 1,200 MW of offshore wind energy generation to the New England energy grid *via* up to three 275-kV three-core offshore export cables, three sets of 275-kV single-core onshore export cables, and three sets of 345-kV single-core grid interconnection cables. This modeling analysis focused on MFs because the electric fields produced by the voltage on the offshore export cables will be contained by the metallic sheathing and/or steel armoring of the cables – *i.e.*, the metallic sheathing and/or steel armoring will completely shield the electric fields arising from the voltage on the cables. In addition, there will be no aboveground electric fields from either the onshore export cables or the grid interconnection cables, since both of these cables will be installed underground and underground lines produce no aboveground electric fields.

For the 275-kV offshore export cables, 275-kV onshore export cables, and 345-kV grid interconnection cables, MF modeling was conservatively performed for representative installation cases assuming maximum wind turbine output (100% capacity). The wind turbine array is expected to operate at an annual-average capacity factor of approximately 50%; thus, much of the time, the actual output and MF attributable to the Project cables will be correspondingly lower than predicted herein for maximum output.

For the 275-kV offshore export cables, MF levels were modeled at the sea floor for a representative submarine installation cross section that assumed a burial depth of 4.9 ft (1.5 m) corresponding to the lower limit of the target burial depth of approximately 5 to 8 ft (1.5 to 2.5 m) for the offshore export cables, and the minimum spacing of 164 ft (50 m) between the cables. The modeling showed the highest modeled MF levels of approximately 109 mG directly above the offshore export cables, with rapid reductions in MF levels with lateral distance away from the cable centerlines – *e.g.*, there is a >95% reduction in MF levels at a lateral distance of ±25 ft (±7.6 m) from the cable centerlines. MF levels in the water column will be less than the modeled MF levels at the sea floor, with the rate of decrease in MF levels as a function of height above the cables being similar to the rate of fall-off as a function of distance laterally from the cables. Due to the rapid reductions in MF levels with lateral distance away from the cables, there is minimal interaction of MF from adjacent cables at the modeled minimum separation distance of 164 ft (50 m). Based on the localized nature of the MF impacts of the offshore export cables as well as the weight of the scientific evidence that 60-Hz AC EMFs are above the typical frequency range of EMFs to which magnetosensitive and electrosensitive marine species are known to detect and respond, there is no expectation that the modeled MFs from the HVAC offshore export cables will cause significant population-level harms to marine species in the OECCs.

Modeling of the offshore export cables was also performed for cross sections representative of two locations at the Dowses Beach landfall site in Barnstable along the HDD paths to be constructed for bringing the cables ashore, including: (1) a middle-of-the beach cross section representative of where the cables will pass under the publicly accessible beach with burial depths to the tops of the cables that range from 24.7 ft to 57.4 ft (7.5 m to 17.5 m) for the three HDD paths; and (2) a parking lot cross section representative of the HDDs beneath the paved parking lot at Dowses Beach, where the offshore export cables have moved closer to the ground surface prior to the transition vaults and have depths to the tops of the cables of 5.0 to 6.0 ft (1.5 to 1.8 m) for the three HDD paths. Maximum modeled MFs of 5.0 and 1.0 mG were obtained at the ground surface directly above the offshore export cables for the two HDD modeling scenarios for the middle-of-the-beach location. For the parking lot location where the HDD paths are closer to the ground surface, maximum modeled MFs were 41.4 and 32.7 mG at 1 m above the ground surface directly above the offshore export cables for the two HDD modeling scenarios. For the parking lot cross section, modeled MFs were found to drop off very rapidly with lateral distance from the cables, with reductions in MF levels of between 85 to 90% for a lateral distance of 25 feet on either side of the cable centerlines. All modeled MF levels for the landfall site cross sections were below both the ICNIRP health-based guideline of 2,000 mG for allowable public exposure to 60-Hz AC MFs. This is the case despite modeled MF levels for the 275-kV offshore export cables being overestimates of the expected MF levels for actual Project operations due to several conservative assumptions in the modeling analysis, including the lack of accounting for the expected twisting of the conductors within the cables that will contribute to substantially greater self-cancellation of MF than for straight conductors, and the use of cable currents based on maximum wind farm output (100 percent capacity).

For the 275-kV onshore export cables, MF levels were calculated 1 meter above the ground surface for several underground circuit cross sections representative of different portions of the Project onshore transmission route, including both the typical and deep installation cases for the underground 3W×4D duct banks to be used for the majority of the onshore transmission route, the microtunnels to be used for the Route 6 crossing, the transition joint bays to be located in the Dowses Beach parking lot, and the splice vaults to be located in groups every 1,500 to 3,000 feet (approximately 460 to 915 meters) or more along the onshore transmission route. In addition, MF levels were calculated 1 meter above the ground surface for both the typical and deep installation cases for the underground 3W×4D duct banks to be used for the 345-kV grid interconnection cables to be installed between the new onshore substation and the grid interconnection point at the existing Eversource 345-kV West Barnstable Substation.

As described in this report, all modeled MF levels for the representative cross sections of the 275-kV onshore export cables and 345-kV grid interconnection cables are below the ICNIRP health-based guideline of 2,000 mG for allowable public exposure to 60-Hz AC MFs. Moreover, the MF modeling results show significant reductions in MF levels with increasing lateral distance from the cables. Similar to the MF modeling for the offshore export cables, the MF modeling for both the underground onshore export and grid interconnection cable installation cases is expected to overpredict the magnitude of aboveground MF levels associated with the installed onshore export and grid interconnection cables. This is because minimum expected burial depths were assumed, and the currents used for the cables assume maximum wind turbine output (100% capacity). In addition, as discussed earlier, the MF modeling analyses did not account for the phase conductors' main currents inducing currents on ground continuity conductors in the duct banks. Any induced currents on ground conductors would be expected to produce an MF that would tend to oppose (partially cancel) the MF arising from the phase conductor currents.

MF modeling performed by Stantec for one additional installation case for the 275-kV onshore export cables, namely an underground 12W×1D duct bank with copper plate shielding proposed for use for the Phinney's Bay culvert crossing on Dowses Beach Causeway in Barnstable, showed that the proposed use of copper plate shielding minimized aboveground MF levels from this shallow duct bank, with a maximum modeled MF level of 63.0 mG directly above the duct bank.

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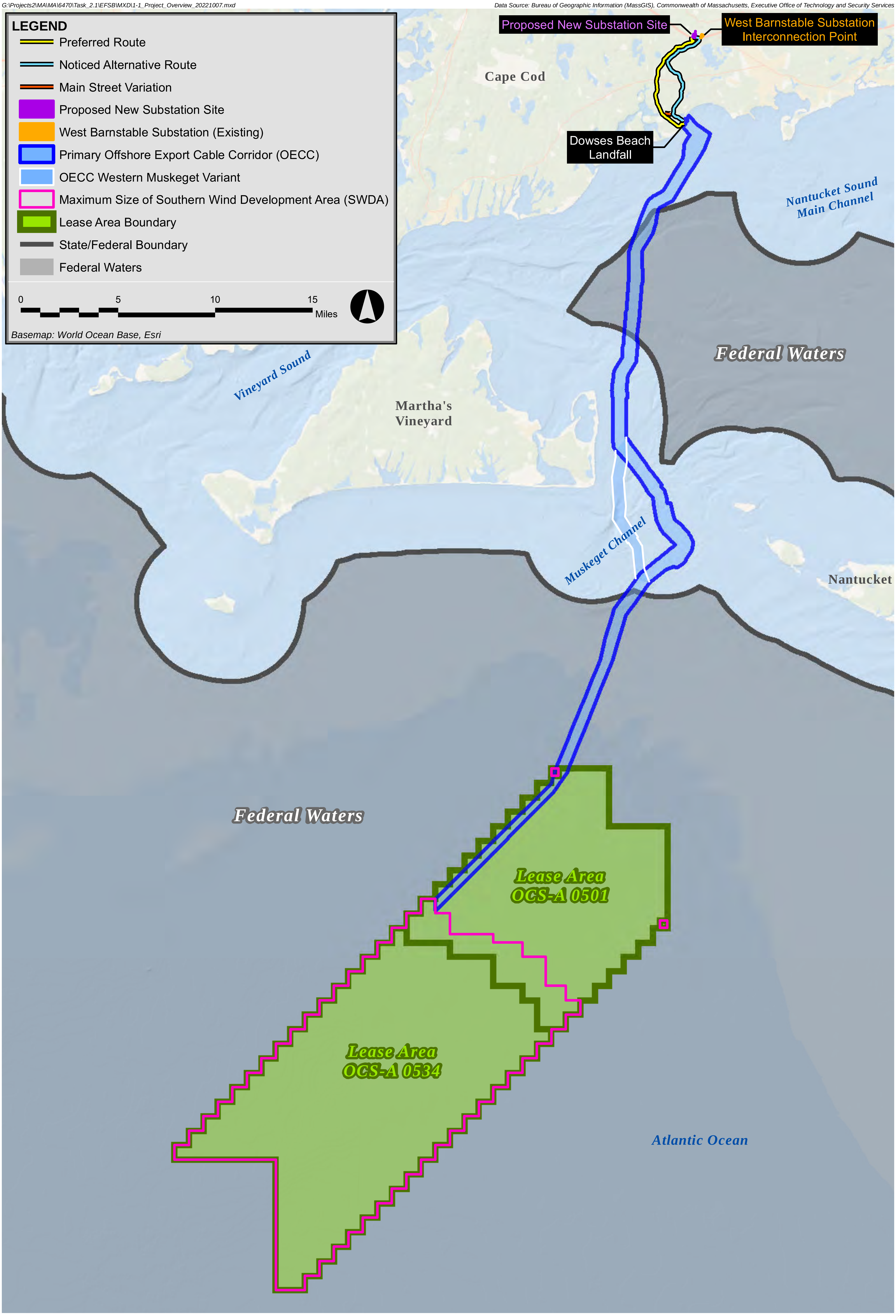
Appendix A

New England Wind 2 Connector Project Overview

G:\Projects2\MA\MA\6470\Task_2.1\EFSB\MXD\1-1_Project_Overview_20221007.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



New England Wind 2 Connector Project

Figure 1-1
Project Overview

Appendix B

New England Wind 2 Connector Project Onshore Transmission and Grid Interconnection Routes

G:\Projects2\MA\MA\6470\Task_2.1\EFSB\MXD\1-3_Onshore_Project_Components_20221007.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

New England Wind 2 Connector Project

AVANGRID | Offshore Wind

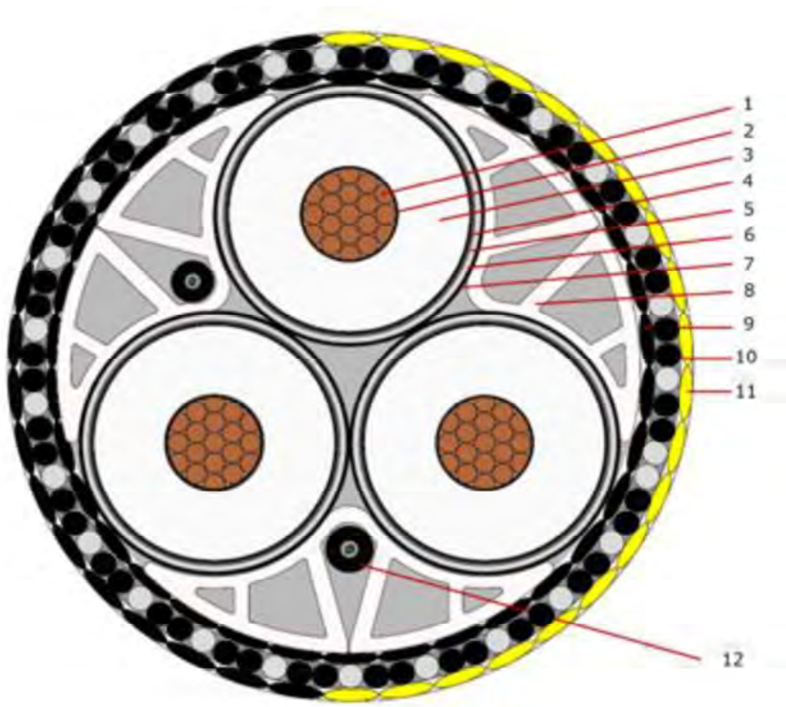
Figure 1-3
Onshore Project Components

Appendix C

Offshore Export Cable Specifications

8 Cable datasheet: 3x1600 mm² Copper with mixed armour (1/3 stainless steel, 2/3 PE) – Option 3

8.1 Cable cross sectional drawing



Not to scale – indicative only

No.	Description	Details
1	Conductor	Copper circular stranded, compacted, longitudinally water blocked, Semi conductive Water Swellable Tape on top of conductor
2	Conductor screen	Extruded bonded semi conductive compound
3	Insulation	XLPE (cross linked Polyethylene)
4	Insulation screen	Extruded bonded semi conductive compound
5	Water Blocking	Semi conductive Water Swellable Tape
6	Metal sheath	Lead alloy sheath
7	Inner sheath	Extruded Semi conductive Polyethylene on each phase
8	Fillers	Plastic fillers
9	Armour bedding	Polypropylene Yarns
10	Armouring	One layer mixed: 33% Stainless steel wires and 67% PE rod
11	Serving	Polypropylene Yarns
12	OF cable	2 x Optical Fibres Cable with 48 fibres

8.1.1 Technical data

Type of cable (Prysmian's designation)		RE4LEOJFJJ
Phase to phase design voltage Uo/U(Um)	kV	159/275(300)
Number of power cores	n°	3
Cross sectional area	mm^2	1600
Construction reference standard (as far as applicable)		IEC 62067; IEC60228

8.2 Constructional data

CONDUCTOR

Type		Longitudinally water blocked compact strand
Material		Copper wires with compound water blocking, Semi-conducting water-swelling tape on top
Diameter	mm	47.8

CONDUCTOR SCREEN

Material		Extruded semi-conducting compound(LE0500)
Indicative thickness	mm	1.25

INSULATION

Material		XLPE compound (LS4201EHV)
Nominal thickness	mm	22

INSULATION SCREEN

Material		Extruded semi-conducting compound
Indicative thickness	mm	1.25

LONGITUDINAL WATER BARRIER

Material		Semi-conducting water-swelling tape(LE0500)

LEAD SHEATH		Lead alloy E
Nominal thickness	mm	2.4

PLASTIC SHEATH

Material		Semi-conducting polyethylene
Nominal thickness	mm	2.9

OUTER DIAMETER

Single core outer diameter (approx.)	mm	110.5

Three cores as above are cabled together with two (2) interstitial fibre optic units placed in the extruded shaped fillers and bound by means of the PP yarn bedding.

BEDDING

Material		Polypropylene strings
Indicative thickness	mm	3.5

ARMOUR

Material		Stainless steel wires (Grade 316 L) and PE rod
Nominal diameter of each bare wire	mm	7
Number of armour wires	Nr.	34 (Stainless steel + 70 PE rods) (±3)

SERVING

Material		double layer Polypropylene strings
Indicative thickness	mm	6.5

OVERALL CABLE DIMENSIONS (approx.):

Diameter	mm	274
Weight in air	kg/m	120
Weight in water	kg/m	75

8.3 Mechanical data

BENDING

Minimum bending radius in static condition (drum)	m	2.7
Minimum bending radius in static condition (installed)	m	3
Minimum bending radius during installation	m	3

MECHANICAL FORCES

Maximum straight pulling tension with Factory Joints	kN	550
Maximum straight pulling tension without Factory Joints	kN	700
Tensile forces expected during installation at sea[16]	kN	75

SIDEWALL PRESSURE

Maximum sidewall pressure (one side)	kN/m	100
Maximum sidewall pressure (two side)	kN/m	70

8.4 Power core thermal data

Maximum continuous conductor temperatures (normal service)	°C	90
Maximum continuous conductor temperatures (short circuit)	°C	250
Conductor short circuit current for 1s (90°C – 250°C)	kA	229
Metallic screen short circuit current for 1s (80°C – 200°C)[17]		
- Each core	kA	20

[16] Calculated according to [9], considered maximum water depth = 45 m.
[17] Calculated according to [10].

8.5 Power core electrical data

Max. conductor D.C. resistance at 20 °C	Ω/km	0.0113
Conductor AC resistance at maximum operating temperature	Ω/km	0.022
Cable capacitance nominal	µF/km	0.219
Inductance	mH/km	0.355
Rated frequency	Hz	60
Thermal Resistance T1	K.m/W	0.42
Thermal Resistance T2	K.m/W	0.06
Thermal Resistance T3	K.m/W	0.05
Positive sequence Resistance R1 (when conductor @ 90ºC)	Ω/km	0.032
Positive sequence Resistance R1 (when conductor @ 20ºC)	Ω/km	0.031
Positive sequence Reactance X1 (when conductor @ 90ºC)	Ω/km	0.134
Positive sequence Reactance X1 (when conductor @ 20ºC)	Ω/km	0.134
Zero sequence Resistance R0 (when conductor @ 90ºC)	Ω/km	0.306
Zero sequence Resistance R0 (when conductor @ 20ºC)	Ω/km	0.257
Zero sequence Reactance X0 (when conductor @ 90ºC)	Ω/km	0.118
Zero sequence Reactance X0 (when conductor @ 20ºC)	Ω/km	0.118

Appendix D

Onshore Export Cable Specifications

XLPE insulated, concentric neutral high voltage power cable with segmental oxidized Copper conductor, metal moisture barrier tape, HDPE jacket

Type Designation: P/N 20380599 5000 kcmil Segmental Oxidized Copper 275kV

Reference Standards		ICEA S-108-720, AEIC CS9		
Temperature Rating		Maximum conductor operating temperature:	90° C	
		Maximum conductor emergency operation temperature:	105° C	
		Maximum permissible conductor temperature at short circuit:	250° C	
Construction:				
Conductor		Class B segmental compacted oxidized Copper conductor water-tight		
		Nominal cross-sectional area	5000 kcmil	2535 mm²
		Number of segments	6	
		Number of strands per segment (1 Aluminum center wire)	85	
		Approximate diameter	2.540 inches	64.5 mm
Conductor Shield	[2]	Water swellable semi-conducting tape applied helical intercalated	50% overlap	
	[2]	Semi-conducting tape applied helical	50% overlap	
	[1]	Extruded semi-conducting thermoset	Super Smooth	
		Minimum point thickness	30 mils	0.76 mm
Insulation		Extruded cross-linked polyethylene compound	Ultra Clean	
		Minimum point thickness	887 mils	22.5 mm
		Nominal thickness	985 mils	25.0 mm
		Maximum eccentricity (Tmax-Tmin)/Tmax	10%	
Insulation Shield	[1]	Extruded semi-conducting thermoset	Super Smooth	
		Minimum point thickness	40 mils	1.02 mm
		Maximum point thickness	100 mils	2.54 mm
Bedding	[2]	Water swellable semi-conducting tape applied helical intercalated	50% overlap	
Concentric Neutral	[59]	Wires, #14 AWG, solid bare soft drawn copper		1.63 mm
Bedding	[1]	Copper tape	gapped	
	[2]	Water swellable semi-conducting tape applied helical	50% overlap	
Metal Moisture Barrier	[1]	Laminated Aluminum tape applied longitudinally folded and bonded to the jacket	8 mils	0.20 mm
Jacket		Extruded black high density polyethylene compound, graphite coated		
		Minimum point thickness	125 mils	3.18 mm
		Maximum point thickness	185 mils	4.70 mm
Complete Cable		Approximate diameter	5.44 inches	138.3 mm
		Approximate weight	23.4 lbs/ft	34.8 kg/m

Marking:

Marks of Origin — Emboss or indent print on the outer sheath: manufacturer, type of insulation, insulation thickness, conductor size and material, rated voltage, year of manufacture at intervals of not more than three feet.

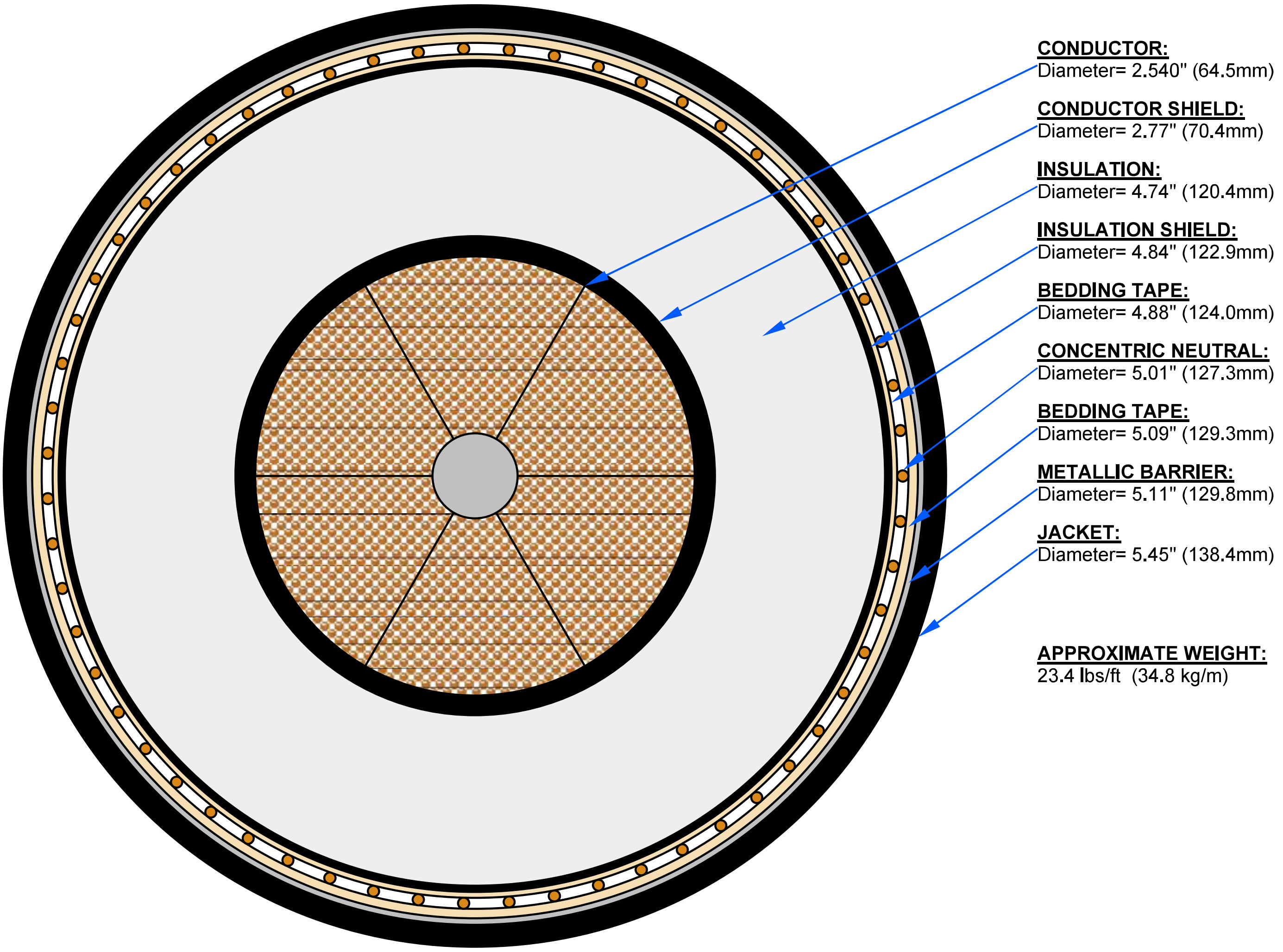
Length marking

Electrical Data:

Nominal voltage	275 kV	
Highest system voltage	289 kV	
Basic impulse insulation level (BIL)	1050 kV	
Maximum DC resistance of conductor at 25 °C	0.00224 Ω/kft	
Maximum voltage stress (conductor shield / insulation interface)	219 V/mil	8.6 kV/mm
Minimum voltage stress (insulation / insulation shield interface)	127 V/mil	5.0 kV/mm
Capacitance (nominal)	0.076 μF/kft	0.248 μF/km
Dielectric Constant	2.4	
Maximum permissible short-circuit current (thermal)	1 second	
Concentric neutral - ICEA P-45-482 (T_{init} at 75 °C and T_{final} 200 °C)	16 kA	

Mechanical Data:

Minimum bending radius	109 inches	2.77 m
Maximum pulling tension (with pulling eye)	40,000 lbs	18,143.7 kg
Maximum sidewall-pressure	1,500 lbs/ft	2,232.2 kg/m



Notes:

1. All dimensions are nominal and subject to manufacturing tolerances
2. Drawing is not to scale

Prepared by:	Approved by:
Dale Vinczi	Frank Kuchta

Appendix E

Grid Interconnection Cable Specifications

XLPE insulated, concentric neutral high voltage power cable with segmental Aluminum conductor, metal moisture barrier tape, HDPE jacket

Type Designation: P/N 20230793 4500 kcmil Segmental Aluminum 345kV

Reference Standards		ICEA S-108-720, AEIC CS9		
Temperature Rating		Maximum conductor operating temperature:	90° C	
		Maximum conductor emergency operation temperature:	105° C	
		Maximum permissible conductor temperature at short circuit:	250° C	
Construction:				
Conductor		Class B segmental compacted Aluminum conductor		
		Nominal cross-sectional area	4500 kcmil	2282 mm²
		Number of segments	5	
		Number of strands per segment (1 Aluminum center wire)	60	
		Approximate diameter	2.300 inches	58.4 mm
Conductor Shield	[2]	Semi-conducting tape applied helical intercalated	50% overlap	
	[2]	Semi-conducting tape applied helical intercalated	50% overlap	
	[1]	Extruded semi-conducting thermoset	Super Smooth	
		Minimum point thickness	30 mils	0.76 mm
Insulation		Extruded cross-linked polyethylene compound	Ultra Clean	
		Minimum point thickness	922 mils	23.4 mm
		Nominal thickness	1024 mils	26.0 mm
		Maximum eccentricity (Tmax-Tmin)/Tmax	10%	
Insulation Shield	[1]	Extruded semi-conducting thermoset	Super Smooth	
		Minimum point thickness	40 mils	1.02 mm
		Maximum point thickness	100 mils	2.54 mm
Bedding	[2]	Water swellable semi-conducting tape applied helical intercalated	50% overlap	
Concentric Neutral	[46]	Wires, #14 AWG, solid bare soft drawn copper		1.63 mm
Bedding	[1]	Copper tape	gapped	
	[2]	Water swellable semi-conducting tape applied helical	50% overlap	
Metal Moisture Barrier	[1]	Laminated Copper tape applied longitudinally folded and bonded to the jacket	6 mils	0.15 mm
Jacket		Extruded black high density polyethylene compound, graphite coated		
		Minimum point thickness	125 mils	3.18 mm
		Maximum point thickness	185 mils	4.70 mm
Complete Cable		Approximate diameter	5.21 inches	132.4 mm
		Approximate weight	11.6 lbs/ft	17.2 kg/m

Marking:

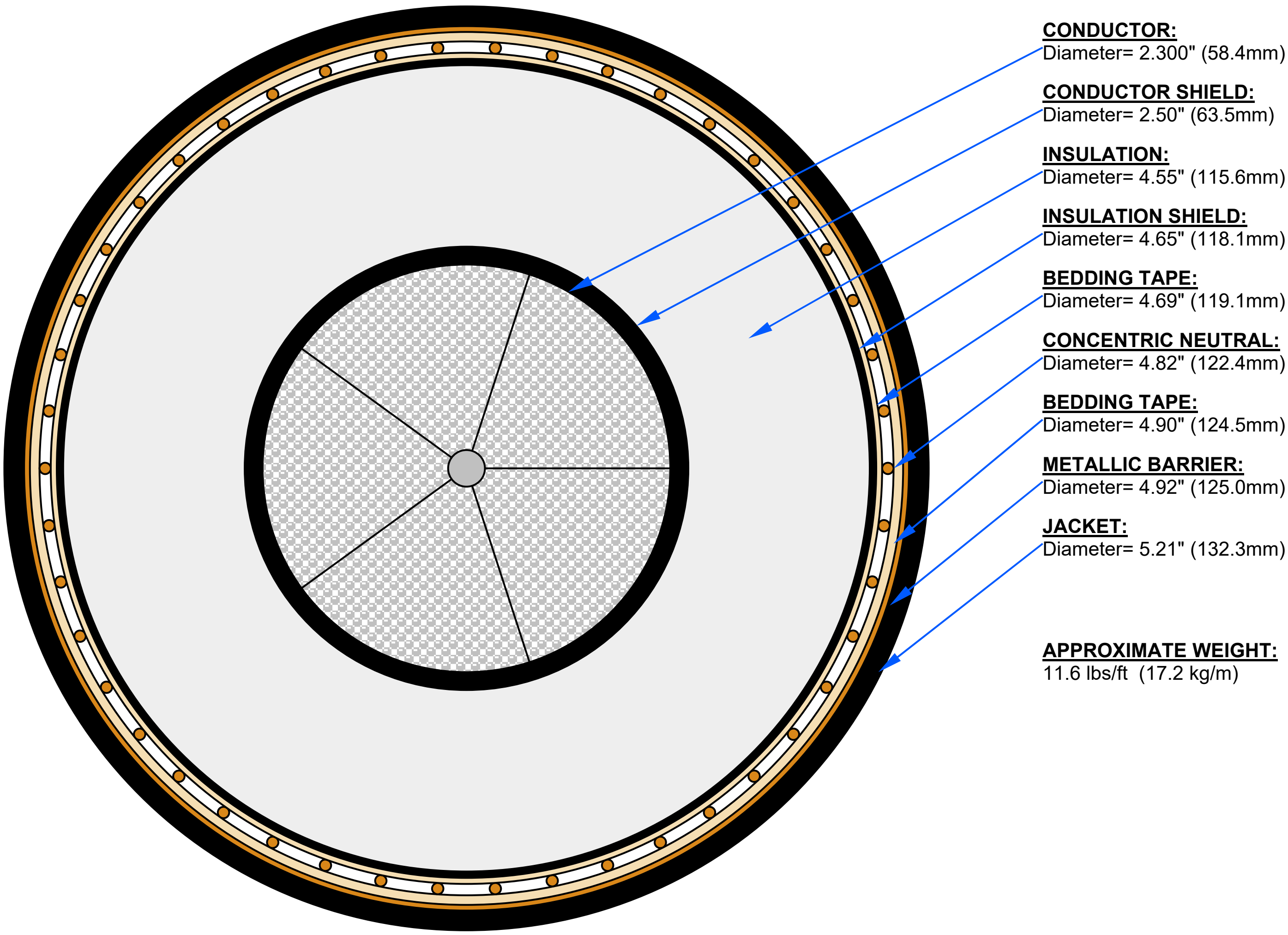
Marks of Origin	Emboss or indent print on the outer sheath: manufacturer, type of insulation, insulation thickness, conductor size and material, rated voltage, year of manufacture at intervals of not more than three feet.
	Length marking

Electrical Data:

Nominal voltage	345 kV	
Highest system voltage	362 kV	
Basic impulse insulation level (BIL)	1300 kV	
Maximum DC resistance of conductor at 25 °C	0.00415 Ω/kft	
Maximum voltage stress (conductor shield / insulation interface)	274 V/mil	10.8 kV/mm
Minimum voltage stress (insulation / insulation shield interface)	148 V/mil	5.8 kV/mm
Capacitance (nominal)	0.068 µF/kft	0.222 µF/km
Dielectric Constant	2.4	
Maximum permissible short-circuit current (thermal)	15 Cycles	
Composite Metallic Sheath (concentric neutral and laminated copper sheath) - ICEA P-45-482 (T_{init} at 75 °C and T_{final} 200 °C)	40 kA	

Mechanical Data:

Minimum bending radius	104 inches	2.64 m
Maximum pulling tension (with pulling eye)	27,000 lbs	12,247.0 kg
Maximum sidewall-pressure	1,500 lbs/ft	2,232.2 kg/m



Notes:

1. All dimensions are nominal and subject to manufacturing tolerances
2. Drawing is not to scale

Prepared by:	**Approved by:**
Dale Vinczi	Frank Kuchta

Attachment 5

Detailed Scoring Spreadsheets – Grid Interconnection Route Options

New England Wind 2 Connector
Grid Interconnection Routing Analysis

						DEVELOPED ENVIRONMENT CRITERIA						NATURAL ENVIRONMENT CRITERIA				
ROUTE	Route ID	Route Segment	From	To	Length (mi)	RESIDENTIAL UNITS # abutting each route (ROW limits)	COMMERCIAL / INDUSTRIAL UNITS # abutting each route (ROW limits)	SENSITIVE RECEPTORS # abutting each route (ROW limits)	HISTORIC RESOURCES # of historic resources abutting routes (ROW limits)	ARCHAEOLOGICAL RESOURCES # miles of "moderate" and "high" sensitivity areas crossed by each route (ROW limits)	POTENTIAL TO ENCOUNTER SUBSURFACE CONTAMINATION # BWSC sites within 300' of route (ROW limits)	WETLAND RESOURCE AREAS # miles of mapped resource areas (ROW limits) including 200' RFA and 100-yr floodplain (but excluding buffer zones) crossed	RARE SPECIES HABITAT # miles of mapped Priority or Estimated Habitats crossed (ROW limits)	PUBLIC WATER SUPPLIES # miles in Zone I or II crossed by each route (ROW limits)	ARTICLE 97-JURISDICTIONAL AREAS # of Article 97-jurisdictional areas crossed outside the roadway layout (ROW limits)	TREE CLEARING # of acres requiring clearing of forested habitat (substation plus grid interconnection route)
GRID INTERCONNECTION ROUTE OPTIONS																
G1 (Fire Tower Access Road to Oak Street)		Fire Tower Access Road	Substation Site	Oak Street		2	0	0	16	0.2	0	0	0	0	1	13.5
		Oak Street	Fire Tower Access Road	Eversource ROW #342												
		Eversource ROW #342	Oak Street	Point of Interconnection	0.4											
G1 Variant 1 (Oak Street Access through Town Land)		Fire Tower Access Road	Substation Site	New Access Road		3	0	0	16	0.2	0	0	0	0	1	13.7
		New Access Road	Fire Tower Access Road	Oak Street												
		Oak Street	New Access Road	Eversource ROW #342												
		Eversource ROW #342	Oak Street	Point of Interconnection	0.4											
G2 (Eversource ROW #342)		Panhandle of Parcel 195_006	Substation Site	Eversource ROW #342		4	0	0	18	0.4	0	0	0	0	3	13.8
		Eversource ROW #342	Panhandle of Parcel 195_006	Oak Street												
		Oak Street Crossing	Parcel 195_027 West of Oak Street	Evesource West Barnstable Substation Parcel												
		Eversource ROW #342	Eversource West Barnstable Substation	Point of Interconnection	0.6											
G3 (Route 6 State Highway Layout to Oak Street)		Substation Site	Substation Site	Route 6 State Highway Layout		3	0	0	16	0.5	0	0	0	0	0	15.2
		Route 6 State Highway Layout	Substation Site	Oak Street												
		Oak Street	Route 6 State Highway Layout	Eversource ROW #342												
		Eversource ROW #342	Eversource West Barnstable Substation	Point of Interconnection	0.6											

New England Wind 2 Connector - Grid Interconnection Scoring Analysis (Raw, Ratio, and Weighted Scores)							
				Grid Interconnection Route Options			
	Scoring Criteria	Weight	Score Type	G1 (Fire Tower Access Rd)	Variant 1 to G1 (Oak Street Spur)	G2 (Eversource ROW #342)	G3 (Route 6 SHLO)
	Length (miles)			0.4	0.4	0.6	0.6
Developed Environment	Residential Units	3	*Raw*	2	3	4	3
			Ratio	0.50	0.75	1.00	0.75
			Weighted	1.50	2.25	3.00	2.25
	Commercial / Industrial Units	3	*Raw*	0	0	0	0
			Ratio	0.00	0.00	0.00	0.00
			Weighted	0.00	0.00	0.00	0.00
	Sensitive Receptors	2	*Raw*	0	0	0	0
			Ratio	0.00	0.00	0.00	0.00
			Weighted	0.00	0.00	0.00	0.00
	Historic Resources	1	*Raw*	16	16	18	16
			Ratio	0.89	0.89	1.00	0.89
			Weighted	0.89	0.89	1.00	0.89
	Archaeological Resources	1	*Raw*	0.2	0.2	0.4	0.5
			Ratio	0.40	0.40	0.80	1.00
			Weighted	0.40	0.40	0.80	1.00
	Potential to Encounter Subsurface Contamination	1	*Raw*	0	0	0	0
			Ratio	0.00	0.00	0.00	0.00
			Weighted	0.00	0.00	0.00	0.00
	subtotal (raw unweighted score)			*18.20*	*19.20*	*22.40*	*19.50*
	subtotal (weighted score)			*2.79*	*3.54*	*4.80*	*4.14*
Natural Environment	Wetland Resource Areas	2	*Raw*	0	0	0	0
			Ratio	0.00	0.00	0.00	0.00
			Weighted	0.00	0.00	0.00	0.00
	Rare Species Habitat	2	*Raw*	0	0	0	0
			Ratio	0.00	0.00	0.00	0.00
			Weighted	0.00	0.00	0.00	0.00
	Public Water Supplies	1	*Raw*	0	0	0	0
			Ratio	0.00	0.00	0.00	0.00
			Weighted	0.00	0.00	0.00	0.00
	Article 97 Jurisdictional Areas	2	*Raw*	1	1	3	0
			Ratio	0.33	0.33	1.00	0.00
			Weighted	0.67	0.67	2.00	0.00
	Tree Clearing [a]	3	*Raw*	13.5	13.7	13.8	15.2
			Ratio	0.89	0.90	0.91	1.00
			Weighted	2.66	2.70	2.72	3.00
	subtotal (raw unweighted score)			*14.50*	*14.70*	*16.80*	*15.20*
	subtotal (weighted score)			*3.33*	*3.37*	*4.72*	*3.00*
total ratio score				***3.01***	***3.27***	***4.71***	***3.64***
total weighted score				***6.12***	***6.91***	***9.52***	***7.14***

a Area of tree clearing includes the substation development itself, including stormwater management, as well as the grid interconnection routes/access roads.

Attachment 6

Massachusetts Department of Environmental Protection
Noise Policy DAQC 90-001

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Quality Engineering
Division of Air Quality Control
One Winter Street, Boston 02108

February 1, 1990

DAQC Policy 90-001

DIVISION OF AIR QUALITY CONTROL POLICY

This policy is adopted by the Division of Air Quality Control. The Department's existing guideline for enforcing its noise regulation (310 CMR 7.10) is being reaffirmed.

P O L I C Y

A source of sound will be considered to be violating the Department's noise regulation (310 CMR 7.10) if the source:

1. Increases the broadband sound level by more than 10 dB(A) above ambient, or

2. Produces a "pure tone" condition - when any octave band center frequency sound pressure level exceeds the two adjacent center frequency sound pressure levels by 3 decibels or more.

These criteria are measured both at the property line and at the nearest inhabited residence. Ambient is defined as the background A-weighted sound level that is exceeded 90% of the time measured during equipment operating hours. The ambient may also be established by other means with the consent of the Department.

Approved: February 1, 1990 Effective: Immediately

Barbara A. Kwetz
Acting Director
Division of Air Quality Control

Attachment 7

Massachusetts Department of Environmental Protection
Noise Pollution Policy Interpretation

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

One Winter Street Boston, MA 02108 • 617-292-5500

Noise Pollution Policy Interpretation

Noise is a public health concern that falls within the scope of Massachusetts Department of Environmental Protection (MassDEP) authority as a form of regulated air pollution. See the related law, regulations, and policy: M.G.L. Chapter 111, Sections 142A-M, 310 CMR 7.00: Air Pollution Control, and MassDEP Noise Policy

Definitions (310 CMR 7.00)

- *Noise* is defined as "sound of sufficient intensity and/or duration as to cause a condition of air pollution."
- *Air pollution* means "the presence in the ambient air space of one or more air contaminants or combinations thereof in such concentrations and of such duration as to: (a) cause a nuisance; (b) be injurious, or be on the basis of current information, potentially injurious to human health or animal life, to vegetation, or to property; or (c) unreasonably interfere with the comfortable enjoyment of life and property or the conduct of business."

When Does MassDEP Evaluate Noise Impacts?

MassDEP evaluates how noise may affect people when 1) the agency reviews applications for approval under its air pollution regulations (310 CMR 7.02) for construction of facilities that will generate more than threshold amounts of pollutants such as nitrogen dioxide, sulfur dioxide, carbon monoxide, volatile organic compounds, particulate matter, and substances that are toxic in air; and 2) the agency responds to complaints from the public about noise generated by an existing source:

- When reviewing applications for pre-construction approval of new sources of air pollution, MassDEP examines the potential increase in sound levels over ambient conditions and the impacts of noise at both the source's property line and at the nearest residence or other sensitive receptor (e.g., schools, hospitals) located in the area surrounding the facility and occupied at the time of the permit review. Please note: *MassDEP requires that an air approval be obtained when a proposed facility is expected to emit more than threshold amounts of specific pollutants. If noise is the only air pollutant expected to be emitted by a facility, a pre-construction air approval is not required.*
- When MassDEP responds to a complaint about an existing source of noise, it focuses on protecting affected people at their residences and in other buildings that are occupied by sensitive receptors from nuisances and the public health effects of the noise. *Please note: An existing source of sound may or may not have needed a MassDEP air approval before it was built.*

Where Are MassDEP's Noise Criteria Applied?

The MassDEP noise pollution policy describes criteria that MassDEP uses to evaluate noise impacts at both the property line and the nearest occupied residence or other sensitive receptor. When noise is found to be a nuisance or a threat to health, MassDEP requires the source to mitigate its noise.

Noise levels that exceed the criteria at the source's property line by themselves do not necessarily result in a violation or a condition of air pollution under MassDEP regulations (see 310 CMR 7.10 U). The agency also considers the effect of noise on the nearest occupied residence and/or building housing sensitive receptors:

- In responding to complaints, MassDEP measures noise levels at the complainant's location and at other nearby locations that may be affected (e.g., residences and/or buildings with other sensitive receptors). If the noise level at a sensitive receptor's location is more than 10 dB(A) above ambient, MassDEP requires the noise source to mitigate its impact.

- A new noise source will be required to mitigate its sound emissions if they are projected to cause the broadband sound level at a residence or building housing sensitive receptors to exceed ambient background by more than 10 dB(A).

- A new noise source that would be located in an area that is not likely to be developed for residential use in the future (e.g., due to abutting wetlands or similarly undevelopable areas), or in a commercial or industrial area with no sensitive receptors may not be required to mitigate its noise impact on those areas, even if projected to cause noise levels at the facility's property line to exceed ambient background by more than 10 dB(A). However, a new noise source that would be located in an area in which housing or buildings containing other sensitive receptors could be developed in the future may be required to mitigate its noise impact in these areas.

This policy has been designed to protect affected residents and other sensitive occupants of nearby property, but not necessarily uninhabited areas in and around the source's property. Sources of noise may need to implement mitigation if residences or buildings occupied by sensitive receptors are developed where they may be affected by the source's noise.

Attachment 8

National Weather Service Meteorological Data for Hyannis, MA
(Barnstable Municipal Airport)

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Local Climatological Data
Hourly Precipitation
December 2022

Generated on 12/23/2022

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 37 ft. Lat: 41.6719° N Lon: -70.2697° W

Station: **HYANNIS BARNSTABLE MUNICIPAL AIRPORT, MA US WBAN: 72506794720 (KHYA)**

Date	For Hour (LST) Ending at																							Date
	1 AM	**2 AM**	**3 AM**	**4 AM**	**5 AM**	**6 AM**	**7 AM**	**8 AM**	**9 AM**	**10 AM**	**11 AM**	**NOON**	**1 PM**	**2 PM**	**3 PM**	**4 PM**	**5 PM**	**6 PM**	**7 PM**	**8 PM**	**9 PM**	**10 PM**	**11 PM**	**MID**	
01																									01
02																									02
03												T	T	0.01	0.05	0.05	0.14	0.09	T	T		T			03
04																									04
05									T																05
06																				T			T	T	06
07			T	0.01	0.05	0.12	0.04	0.07	0.21	0.09	0.08	0.01	0.03	0.12	0.27	0.05	0.10	0.07	0.16	T					07
08																									08
09																									09
10							T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	0.01	T	10
11	T	T	T	T	T				T	T	T					T	T	T	T	0.01	T	T			11
12				T	T	T	0.01	T	T	T	T														12
13																									13
14				T	T																T	0.01	T		14
15												T				T	T	T	T	0.01		T	T	T	15
16	T	T		0.03	0.07	0.06	0.07	0.04	0.02	0.10	0.05	0.08	0.11	0.07	T	T	0.02	0.02	0.03	T	T		0.02	0.02	16
17								T	T	T	T	T	0.01			T									17
18																									18
19																									19
20	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	20

Maximum Short Duration Precipitation

Time Period (Minutes)	**5**	**10**	**15**	**20**	**30**	**45**	**60**	**80**	**100**	**120**	**150**	**180**
Precipitation (inches)												
Ending Date Time (yyyy-mm-dd hh:mi)												

Hourly, daily, and monthly totals on the Daily Summary page and the Hourly Precipitation Table are shown as reported by the instrumentation at the site. However, NWS does not edit hourly values for its ASOS sites, but may edit the daily and monthly totals for selected sites which will be reflected on the Daily Summary page.

T = Trace
s = Suspect
* = Erroneous
blank = No precipitation observed
M = Missing

Attachment 9

New England Wind 2 Connector 275/345 kV GIS Substation Visibility Assessment

SARATOGA ASSOCIATES

NEW ENGLAND WIND 2 CONNECTOR 275/345KV GIS SUBSTATION

WEST BARNSTABLE, MA

VISIBILITY ASSESSMENT

Prepared for:
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3 Mill & Main Place, Suite 250
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and

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125 High Street, 6th Floor
Boston, MA 02110

March 2, 2023

Landscape Architects, Architects,
Engineers and Planners, P.C.

#2022-025

Introduction

Commonwealth Wind, LLC, a wholly owned subsidiary of Avangrid Renewables, LLC (the "Company") proposes to construct, operate, and maintain the Commonwealth Wind Project, an offshore wind project located within Lease Area OCS-A 0534 in federal waters under the jurisdiction of the Bureau of Ocean Energy Management (BOEM). The New England Wind 2 Connector or "the Project" will deliver more than 1,200 megawatts (MW) of carbon-free energy from the Commonwealth Wind Project to the ISO-New England (ISO-NE) electrical grid. At its nearest point, the portion of Lease Area OCS-A 0534 that will be utilized for the Commonwealth Wind Project is just over 20 miles (32 kilometers [km]) from the southwest corner of Martha's Vineyard, approximately 24 miles (38 km) from Nantucket, and approximately 37 miles (60 km) south of the Cape Cod mainland. New England Wind 2 Connector is the Massachusetts-jurisdictional elements of the Commonwealth Wind Project.

Major elements of the Commonwealth Wind Project will include wind turbine generators (WTGs) and foundations, offshore electrical service platforms (ESPs) and foundations, inter-array cables[1], offshore export cables, onshore export cables, and an onshore substation that will step up transmission voltage to 345 kilovolts (kV) for interconnection with the regional power grid at the existing Eversource 345-kV West Barnstable Substation.

Saratoga Associates, Landscape Architects, Architects, Engineers, and Planners, P.C. was retained by the Company to conduct a visibility assessment of the proposed new onshore substation for the Project. The visual assessment included a viewshed analysis, photographic simulations, and line-of-sight profiles which identify the degree and character of potential visibility of the proposed onshore substation from off-site vantage points.

The Project's proposed new onshore substation is located west of Oak Street near the Oak Street Bridge overpass of U.S. Route 6 (Mid-Cape Highway), approximately 0.25 miles west of the interconnection location at the existing Eversource West Barnstable Substation as measured in a straight line. The onshore substation site includes eight privately owned parcels totaling approximately 29.01 acres. Of the eight parcels, four of the parcels (Parcels 195-007, 195-006, 195-005, and 195-037) will be developed with the new onshore substation. Of the four parcels to be developed, three of the parcels are undeveloped wooded lots with the fourth parcel developed with a single-family residence (Parcel 195-007) that will be removed. The proposed onshore substation will be sited primarily in the southern and central portions of the four parcels that will be developed with the new onshore substation.

The proposed onshore substation is a gas-insulated substation (GIS) design with primary electrical equipment occupying the central part of the parcel. The design includes several equipment and GIS enclosures as well as a perimeter access road and a full-perimeter security

[1] Inter-array cables connect several WTGs to a single ESP.

fence. The equipment complement includes main transformers, shunt reactors, 275 kV switchgear, 345 kV switchgear, and STATCOMs. The necessary stormwater facilities are located on the northern portion of the site.

Substation electrical equipment and buildings are generally lower than 30 feet in height above finished grade. All electrical interconnects will be installed underground. The proposed onshore substation does not include tall take-off structures or transmission towers, however, the substation will require lightning masts approximately 80-feet in height. This analysis assumes the lightning mast will be approximately 3 feet in diameter at the base tapering to 2 feet in diameter at the top.

The four parcels that will be developed for the proposed onshore substation will be partially cleared as a result of Project development. Land and tree clearing will be minimized to the extent practicable. The proposed onshore substation (area inside the perimeter security fence) will occupy approximately 9.9 acres and development of the proposed onshore substation will disturb a total of 14.5 acres. An on-site existing forested buffer will be maintained around the substation with the exception of the northeast corner where the stormwater infiltration basin is proposed within an existing natural depression. The undisturbed woodland areas will provide near complete visual screening of the proposed onshore substation from adjacent properties and nearby vantage points.

The preliminary substation engineering plan is provided in Appendix A.

As described in further detail below, the results of this assessment indicate that due to dense intervening woodland vegetation to remain, the proposed onshore substation will be screened from view from all nearby residential properties and public roadways. The proposed onshore substation will have little to no visual impact on the visual character of the surrounding landscape.

Existing Visual Conditions

The Project's proposed onshore substation is located west of Oak Street near the Oak Street Bridge overpass of Route 6 in the Town of Barnstable, MA (2021 estimated population 49,583).[2] The onshore substation site includes eight privately owned parcels totaling approximately 29.01 acres. Surrounding land uses include the Department of Conservation and Recreation (DCR) Fire Tower parcel and Route 6 State Highway Layout (SHLO) managed by the Massachusetts Department of Transportation (MassDOT) to the south. To the west, the proposed onshore substation parcels are bordered by undeveloped Article 97 protected land owned by the Town of Barnstable and managed by the Conservation Commission. To the north, the site, including a

[2] United States Census Bureau - Quick Facts https://www.census.gov/quickfacts/fact/table/barnstabletowncitymassachusetts,barnstablecountymassachusetts/PST045222,PST045221

40-foot-wide “panhandle,” partially occupied by a clearcut electrical easement that extends from the north of Parcel 195-006, is bordered by Article 97 protected parcels that are part of the Spruce Pond Conservation Area owned by the Town of Barnstable and managed by the Conservation Commission and Falcon Road Conservation Area. The existing Eversource right-of-way (ROW) #342 and Spruce Pond Road are located in the Spruce Pond Conservation Area. To the east, the site is also bordered by undeveloped Article 97 protected land owned by the Town of Barnstable and managed by the Conservation Commission (Kuhn Property).

The local landscape is characterized by a gently rolling glacial moraine outwash topography typical of this portion of Cape Cod. Except for minor areas around the DCR fire tower and existing residential structures (to be removed), the Substation Site and all adjacent properties to the north, east and west are densely wooded with mature pitch pine and scrub oak vegetation. A 100-foot-wide densely wooded buffer also exists within the Route 6 SHLO along the southern boundary of the Substation Site.

The existing Eversource West Barnstable and Oak Street Substations are located along Oak Street approximately 0.25 miles east of the Substation Site adjacent to the existing Eversource ROW #342. These facilities are a visually complex grouping of electric utility infrastructure ranging in height from approximately 30 feet for most ground level equipment to 60-140 feet for transition structures. The existing Oak Street Substation is within 140 feet and directly visible from Oak Street. The existing Eversource West Barnstable Substation is within 425 feet and directly visible from Oak Street.

Approximately 50 existing transition/transmission and distribution structures ranging from approximately 60 to 140 feet in height are within 1,500 feet of Oak Street at the existing transmission line crossing. These multiple wooden distribution poles and steel transmission monopoles support multiple overhead conductors and shield wires. Several of these existing structures are immediately adjacent to and directly visible from Oak Street.

Route 6 is the primary transportation corridor connecting mainland Massachusetts with destinations throughout Cape Cod. This four-lane median separated highway has an average annual daily traffic volume (AADT) of approximately 52,000 vehicles per day with individual daily traffic volumes exceeding 70,000 vehicles per day during peak summer vacation periods.[3]

The wider project area is generally suburban in character comprised of low to moderate density (i.e., 1 to 5+ acre) single-family residential lots and undeveloped woodland open space. Approximately 22 single family residential structures are within 1,000 feet of the Substation Site. 17 of these residential structures are in residential neighborhoods to the south of Route 6. Two residential structures (56 Plum Street and 141 Plum Street) are north of the existing

[3] Mass DOT Transportation Data Management System
https://mhd.public.ms2soft.com/tcds/tsearch.asp?loc=Mhd&mod=

Eversource ROW #342. Three existing residential structures are located along Oak Steet between Route 6 and the existing Eversource ROW #342 (35 Plum Street, 550 Oak Street, and 575 Oak Street).

Zone of Visual Influence Mapping

Zone of Visual Influence (ZVI) analysis identifies the geographic area within which some portion of the proposed onshore substation could potentially be visible based on geographic information system (GIS) generated viewshed analysis. The ZVI extends to a 2-mile radius from the proposed onshore substation.

For this analysis, two ZVI conditions are identified:

- Zone of Theoretical Visibility (ZTV) – The ZTV defines the theoretical worst-case area of potential visual effect considering only the screening effect of existing topography and earth curvature (i.e., “bare earth” condition).
- Zone of Likely Visibility (ZLV) – The ZLV presents the more realistic case area of potential visual effect including the real-world screening elements of existing intervening vegetation and structures (i.e., “land cover” condition).

Topographic, vegetation, and built structure elevations are based on 2011–2013 Light Detection and Ranging (Lidar) surveys obtained from the United States Geological Survey (USGS) “The National Map” data download[4]. Using the Lidar data, a highly detailed digital terrain model (DTM) was created at a horizontal resolution of less than 2 meters representing bare earth conditions of all land surface areas within the 2-mile radius study area. The DTM was adjusted to account for proposed site grading (see Appendix A, Preliminary Substation Engineering Plan).

Additionally, a digital surface model (DSM) was created at the same resolution representing the more realistic land cover condition incorporating all existing surface features including land surface areas, as well as vertical elements such as existing buildings and vegetation which may result in visual screening. The DSM was also adjusted to account for proposed vegetative clearing.

The ZVI calculation is based on 23 control points representing electrical equipment and building high points within the proposed onshore substation. The 23 viewshed control points are conservatively established at 30 feet above finished grade. Eight control points were used to represent the approximate 80-foot-tall lightning masts.

Separate ZVI overlays were generated to identify the visible areas of the eight 80-foot-tall lightning mast control points and the lower height electrical equipment and buildings.

[4] https://apps.nationalmap.gov/downloader/

All viewshed calculations were generated using a horizontal resolution of 5 meters. Viewshed calculations are based on a 5.75-foot observer height above existing grade. Viewshed analyses were conducted using Global Mapper Pro v23.0 software.

Zone of Visual Influence maps (including ZTV and ZLV overlays) are provided in Appendix B.

ZVI analysis demonstrates that within ½ mile of the proposed onshore substation visibility of substation equipment will be limited to small isolated pockets. Due to existing intervening vegetation, predicted views from these small, isolated areas are expected to be limited to the upper portion of one or more lightning mast, visible above the intervening vegetation. These isolated views are primarily found within cleared areas of the existing Eversource ROW #342 and Route 6. Areas with isolated views along Route 6 are generally on the west bound side of Route 6 with one location along the east bound side of Route 6 and will likely go unnoticed by motorists travelling at highway speed (Route 6 has a speed limit of 55 mph).

Beyond ½ mile of the proposed onshore substation, the viewshed analysis indicates that a line-of-sight to lower height electrical structures (30 feet tall) and one or more lightning mast (80 feet tall) may occur approximately 1.25 miles to north of the Substation Site in areas of Barnstable Harbor. Potential views from this area will be distant and low to the intervening tree line and will likely go unnoticed.

Predicted visibility of one or more lightning mast is also found on the southern half of Wequaquet Lake, approximately one mile southeast of the Substation Site. Affected viewers may include boaters and shoreline residential properties with open water vistas to the northwest. Potential views from the southern half of Wequaquet Lake will be distant and low to the intervening tree line and will likely go unnoticed.

Photographic Simulations

Existing Condition Photography

On December 2, 2022, an experienced visual analyst visited the Project area to photograph locations where the proposed onshore substation may be visible. Ordinarily photographs are taken from places where potential project visibility is identified by viewshed analysis. However, as demonstrated by viewshed analysis (refer to Appendix B), identified areas of likely visibility within a one-mile radius of the proposed onshore substation are highly limited due to intervening woodland vegetation to remain. In this case photographs were taken from locations along local roadways near the Substation Site where potential views above or through intervening vegetation were deemed most likely in the informed opinion of the visual analyst.

Photographs were taken using a Canon 6D Mark II digital single lens reflex ("DSLR") 26-mega pixel camera. The precise coordinates of each photo location were recorded in the field using a handheld global positioning system (GPS) unit. Photographs were taken by a standing photographer with an eye level of approximately 5.75 feet above ground.

Photographs taken during field reconnaissance are provided in Appendix C.

Photo Simulation Methodology

Photo simulations were developed by superimposing a rendering of a 3D computer model of the proposed 345-kV Substation into the existing condition photograph taken from each vantage point. The 3D computer model was developed using *Autodesk Civil 3D®* and *3D Studio Max Design®* software (3D Studio Max) based on drawings provided by the project engineer.

Camera Alignment - To accurately superimpose the 3D computer model within the existing condition photograph, a virtual camera was created in *3D Studio Max Design®* to precisely match the geographic coordinates (latitude/longitude), height above ground (photographer's eye level), and lens focal length setting (i.e., 24mm) of the field camera used to take each existing conditions photograph. Precisely matching these conditions assures location and scale accuracy between the base photograph and the subsequent simulated view. The virtual camera's target position was also set to match the bearing of the corresponding existing condition photograph.

To assist with camera alignment, existing elements visible in existing condition photographs (i.e., utility poles, buildings, road signs, pavement edges, etc.) were manually digitized from high resolution digital ortho imagery. Each element was assigned an elevation ("Z" value) based on Lidar data and then imported to *3D Studio Max* for use as fixed benchmarks. In addition, a 3D digital terrain model (DTM) and digital surface model (DSM) were generated (using Lidar point cloud data) in *Global Mapper Pro v23.0®* software to create a 3D model of the existing ground surface and vegetative and building masses. DTM and DSM elements were then exported as an elevation grid and imported into the 3D model. The digitized elements and Lidar based DTM and DSM provide clearly identifiable benchmarks which are also used to accurately align the virtual image of the 3D model with the actual photographed image.

With the existing condition photograph displayed as a "viewport background", and the viewport properties set to match the photograph's pixel dimensions, minor camera adjustments were made (horizontal and vertical positioning, and camera roll) to align benchmark elements in the background photograph with corresponding features of the 3D model.

Once the camera alignment was verified, a to-scale 3D model of the proposed onshore substation was merged into the model space. To the extent practicable, and to the extent necessary to convey visual character and reveal impacts, design details of the proposed onshore substation were built into the 3D model and incorporated into the photo simulation. As a result, the scale, alignment, elevations, and location of the visible elements of the proposed substation are true to the conceptual design.

Six (6) representative key observation points were selected for photo simulation. These are:

- Photo 17 – Parker Road at Eversource ROW #342
- Photo 19 – Service Road at Biltmore Place
- Photo 21 – U.S. Route 6 (Mid-Cape Highway)
- Photo 23 – Oak Street at U.S. Route 6 Overpass
- Photo 26 – Oak Street Near 550 Oak Street
- Photo 29 – Within Eversource ROW #342 near 50 Plum Street

Based on accurate camera alignment, the 3D model of the proposed onshore substation falls behind foreground vegetation as viewed from all 6 representative key observation points. To illustrate where the proposed substation falls within each photo frame an outline of major substation structures is provided in each simulated view. This graphic outline is not meant to imply visibility but is provided for reference to show the scale and position of the proposed onshore substation behind intervening foreground woodland vegetation.

Photo simulations are provided in Appendix D.

In all photo simulations lower height electrical structures and buildings (30 feet tall) fall below the intervening tree line and are screened or obscured from view. The upper limits of one lightning mast (80 feet tall) may be visible low within the tree line to eastbound motorists on Route 6 (*refer* to Figure D6 in Appendix D). However, such visibility would be perpendicular to the direction of travel and limited to a momentary glimpse and will likely go unnoticed by motorists travelling at highway speed.

The upper limits of one or more lighting masts may be visible low to the tree line from Plum Street within the existing Eversource ROW #342 (*refer* to Figure D12 in Appendix D). Such visibility is consistent with existing visual elements on the landscape (e.g., the approximately 50 existing transition/transmission and distribution structures ranging from approximately 60 to 140 feet in height which dominate the landscape in this area) and will not alter the viewshed.

Photo Simulation Viewing Instructions

Due to the proximity of photographed locations to the proposed onshore substation, existing condition photographs were taken using a 24mm wide-angle lens to capture as much local context within the field of view as practicable. A wide-angle image has a degree of optical distortion that makes the image appear to curve slightly outward toward the edge of the image frame. Optical distortion in these photo simulations has been minimized using the lens correction function of *Adobe Lightroom®* image processing software.

The single frame photo simulations included in Appendix D have been formatted to be printed on an 11 x 17-inch page format. At this image size, the page should be held at a distance of approximately 11 inches from the readers eye to appear at the correct scale. Viewing the image closer would make the scene appear too large and viewing the image from a greater distance would make the scene appear too small compared to what an observer would actually see in the field.

Line-of-Sight Profiles

Line-of-sight (LOS) profiles are provided to illustrate the potential screening effects of topography, vegetation, and structures from the six (6) representative observation points.

LOS profiles were generated using *Global Mapper Pro v23.0* ® software based on DTM and DSM surfaces generated from 2011–2013 Light Detection and Ranging (Lidar) surveys.

LOS profiles are placed to intersect with residential structures and the nearest substation components. The software sampled DTM and DSM elevations along the profile line to depict a bare earth profile line and a separate line demonstrating additional screening provided by trees and structures.

Each generated LOS profile was exported as vector linework from Global Mapper into AutoDesk AutoCAD® software to insert to-scale graphic representations of the substation structures, interconnect towers and adjacent transmission structures.

The LOS cross sections are included in Appendix E.

Line of sight-profiles further reinforce the effectiveness of intervening woodland vegetation to remain in providing visual screening from nearby residential properties and public roadways.

Results

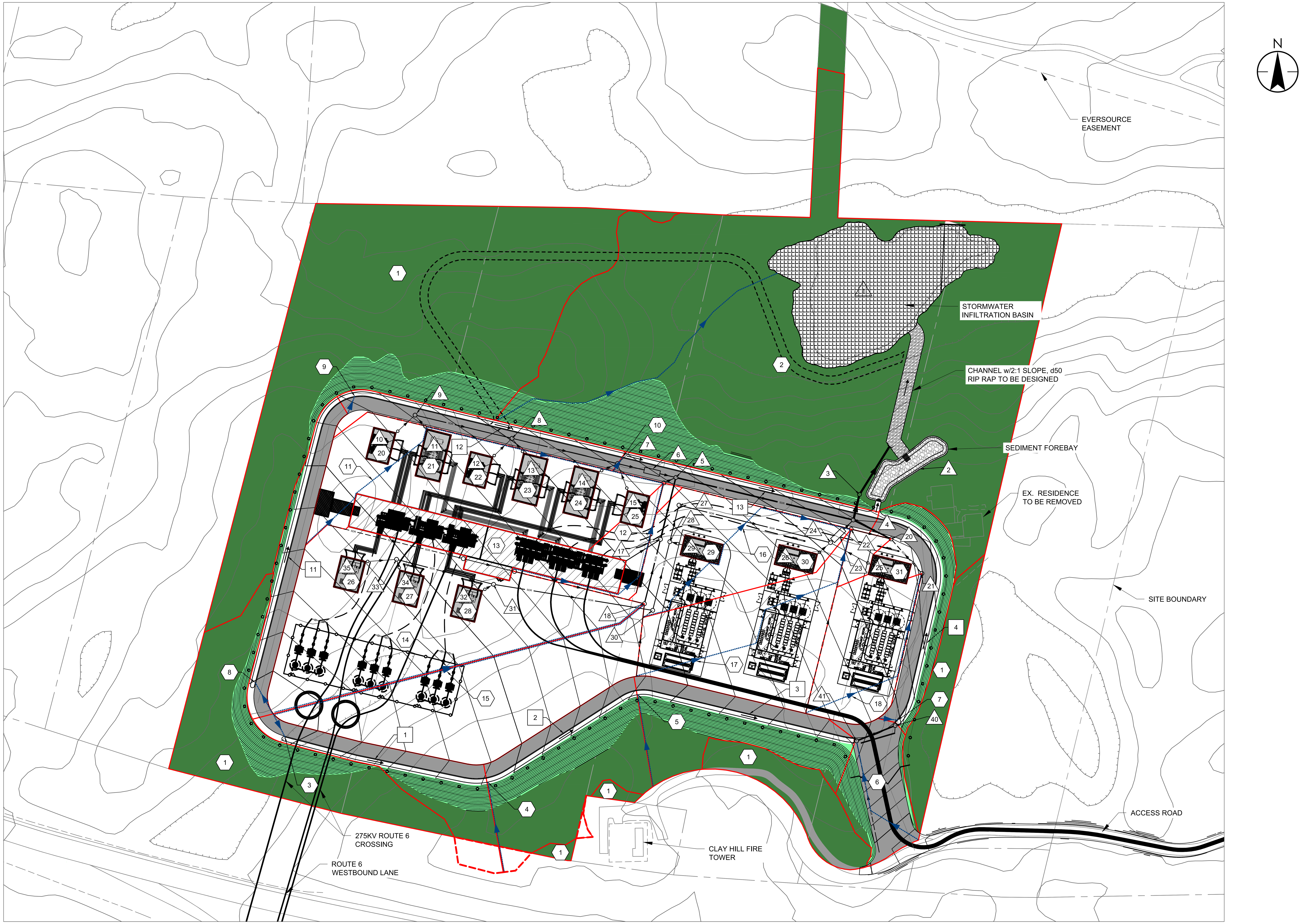
ZVI analysis demonstrates that within ½ mile of the proposed onshore substation, views of the substation equipment will be limited and occur in small isolated geographic pockets. Beyond ½ mile of the proposed onshore substation a line-of-sight to lower height electrical structures (30 feet tall) and one or more lightning masts (80 feet tall) may occur in distant areas approximately 1.25 miles to north of the Substation Site. Distant visibility of one or more lightning masts is also found on the southern half of Wequaquet Lake approximately one mile southeast of the Substation Site. In all cases, visibility of proposed onshore substation components will be low within the existing tree line, distant, and away from residential properties and areas commonly visited by the public.

Photo simulations demonstrate that lower height electrical equipment and buildings (30 feet tall) fall well below the intervening tree line from all studied vantage points. The upper portion of one or more lightning mast (80 feet tall) may be visible low within the existing tree line from isolated locations along Route 6 and from near Plum Street within the existing Eversource ROW #342. In both cases, the predicted visibility is minor in nature and is anticipated to go unnoticed by observers.

The proposed onshore substation is located within a densely wooded area. Considerable existing woodland vegetation will remain on the Substation Site and will provide substantial visual screen. Lower height electrical equipment and buildings associated with the proposed onshore substation will not be directly visible from any off-site vantage point. In areas where lightning masts are predicted to be visible; the lightning masts will be low within the intervening tree line and represent a de minimis alteration to the existing visual character of the local landscape.

Appendix A

PRELIMINARY SUBSTATION ENGINEERING PLAN



Legend			
BUILDING	CONTAINMENT AREA	STORMWATER FLOW DIRECTION	NODES USED WITHIN HYDROCAD MODEL
GRAVEL ROADS	WOODS	TRIBUTARY BOUNDARY	SUBCATCHMENT
CRUSHED ROCK AREA	DETENTION BASIN	TIME OF CONCENTRATION LINE	POND / STRUCTURE
GRADED EXTERNAL AREA - GRASS SEEDED			REACH

ALL UNITS SHOWN ARE 'ENGLISH UNITS' (FEET AND INCHES)

THIS PLAN SET IS PRELIMINARY AND HAS BEEN ISSUED FOR PERMITTING PURPOSES ONLY; AND, IS NOT INTENDED FOR CONSTRUCTION PURPOSES.

REV.	DATE	REVISION DESCRIPTION	STATUS	DRAWN	CHKD	APPRVD
D	2022-12-15	REVISED SITING - PARCELS 2-5	IFI	MDC	JDT	KEF
C	2022-10-26	ISSUED FOR STATE PERMITTING	IFI	MDC	JDT	KEF
B	2022-09-28	ISSUED FOR STATE PERMITTING	IFI	DRM	JDT	KEF
A	2022-09-14	ISSUED FOR CLIENT REVIEW	IFCR	DRM	JDT	KEF

CONTRACTOR:
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Quincy, MA U.S.A. 02169-0982

CLIENT:
AVANGRID | Offshore Wind
125 High Street
Boston, MA 02110

PROJECT
NEW ENGLAND WIND 2 CONNECTOR

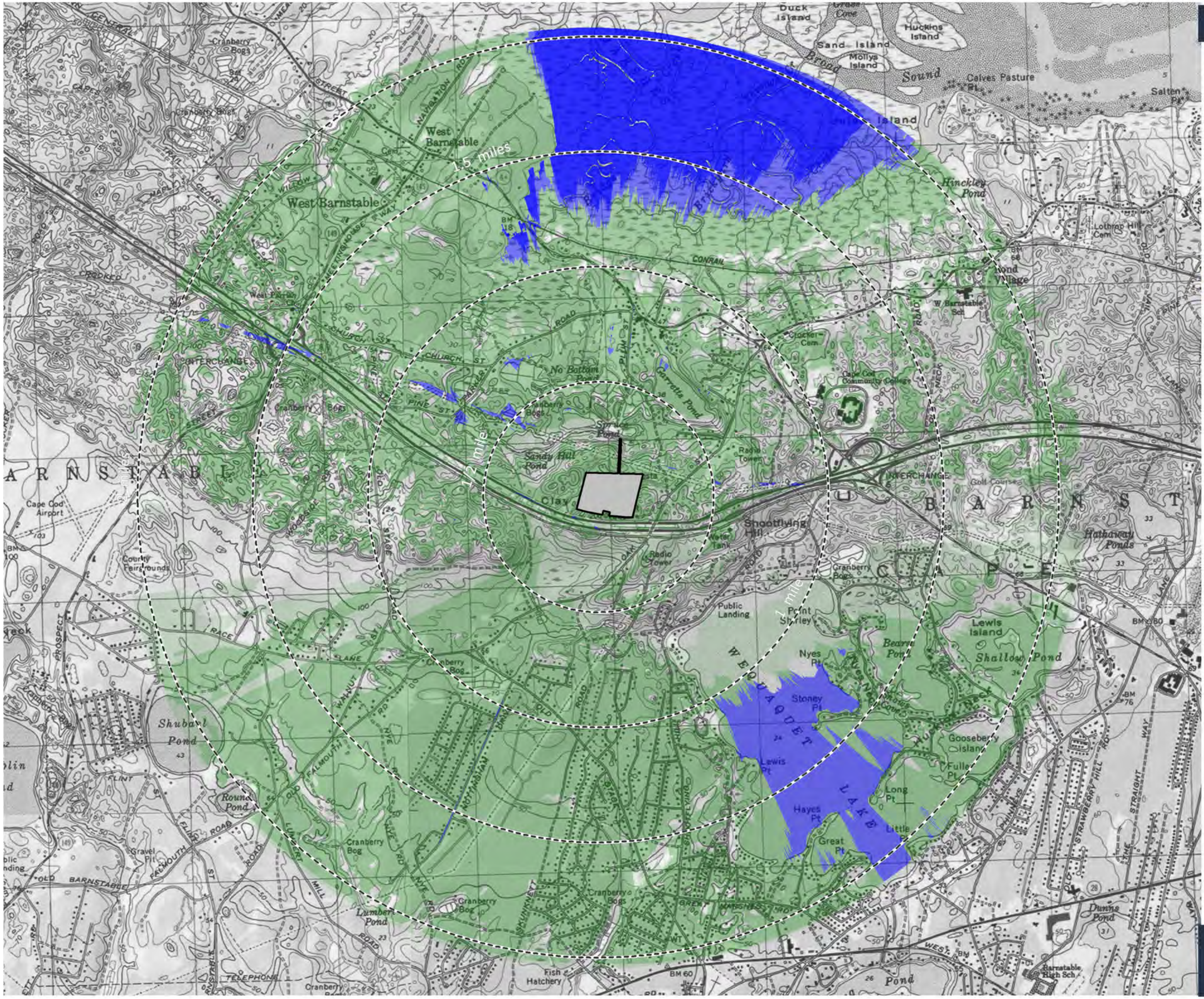
TITLE:
275/345 KV GIS SUBSTATION
PROPOSED SUBCATCHMENT AREAS

DOC ID:
CWW-OSP-STC-DW-0003

SHEET 8 OF 9 | DWG. NO. SHEET - 8 | SCALE AS SHOWN | FORMAT/SIZE ANSI D | REV: D

Appendix B

ZONE OF VISUAL INFLUENCE MAPS



Visibility Assessment

Figure B1

Zone of Visual Influence (ZVI) Map

1:24,000 Scale

Zone of Theoretical Visibility

(Excludes screening by existing vegetation and structures)

- Theoretical Viewshed Area Lighting Masts (80 ft tall)
- Theoretical Viewshed Area Substation Structures (30 ft tall)

Zone of Likely Visibility

(Includes screening by existing vegetation and structures)

- Likely Viewshed Area Lighting Masts (80 ft tall)
- Likely Viewshed Area Substation Structures (30 ft tall)

Proposed Substation

- Project Site

0 mi 0.25 mi 0.5 mi 0.75 mi 1 mi

NEW ENGLAND WIND 2 Connector

Visibility Assessment

Figure B2

Zone of Visual Influence (ZVI) Map

1:6,000 Scale

Zone of Likely Visibility

(Includes screening by existing vegetation and structures)

- Likely Viewshed Area Lighting Masts (80 ft tall)
- Likely Viewshed Area Substation Structures (30 ft tall)

Photographs

- Line-of-Sight Profile Lines (See Appendix E)
- Photo Locations (See Appendix C)
- Photo Simulations (See Appendix D)

Proposed Substation

- Drainage Basin
- Substation Equipment Pad
- Tree Clearing Area
- Underground Cables

0 ft 250 ft 500 ft 750 ft 1000 ft 1250 ft

NEW ENGLAND WIND 2 Connector

Appendix C

PHOTO LOG

Existing View

Photo	Location	Municipality	Distance to Site	Facility Visible
17	Parker Road at Eversource ROW #342	Town of Barnstable	3,260 ft	Not Visible

Existing View

Photo	Location	Municipality	Distance to Site	Facility Visible
18	Service Road at Saddle Lane	Town of Barnstable	3,240 ft	Not Visible

Existing View

Photo	Location	Municipality	Distance to Site	Facility Visibile
19	Service Road at Biltmore Place	Town of Barnstable	880 ft	Not Visible

Existing View

Photo	Location	Municipality	Distance to Site	Facility Visible
20	Oak Street at Service Road	Town of Barnstable	960 ft	Not Visible

Existing View

Photo	Location	Municipality	Distance to Site	Facility Visible
21	US Route 6 (Mid-Cape Highway)	Town of Barnstable	410 ft	Not Visible

Existing View

Photo	Location	Municipality	Distance to Site	Facility Visible
23	Oak Street at US Route 6 Overpass	Town of Barnstable	820 ft	Not Visible

Existing View

Photo	Location	Municipality	Distance to Site	Facility Visibile
26	Oak Street Near 550 Oak Street	Town of Barnstable	860 ft	Not Visible

Existing View

Photo	Location	Municipality	Distance to Site	Facility Visible
29	Within Eversource ROW #342 Near 50 Plum Street	Town of Barnstable	1,140 ft	Not Visible

Existing View

Photo	Location	Municipality	Distance to Site	Facility Visibile
35	Within Eversource ROW #342 Near 675 Oak Street	Town of Barnstable	2,080 ft	Not Visible